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Edition 1 ..... December 1998

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Safety Symbols



Instruction manual symbol affixed to product. Indicates that the user must refer to the manual for specific WARNING or CAUTION information to avoid personal injury or damage to the product.



Indicates the field wiring terminal that must be connected to earth ground before operating the equipment — protects against electrical shock in case of fault.



or

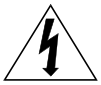


Frame or chassis ground terminal—typically connects to the equipment's metal frame



Alternating current (AC). Direct Current (DC).





Indicates hazardous voltages.

WARNING Calls attention to a procedure, practice, or condition that could cause bodily injury or death.

CAUTION Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

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The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.

For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holders.

Keep away from live circuits: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

DO NOT service or adjust alone: Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

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Getting Started With VXI Guide

Edition 1

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Please list the system controller, operating system, programming language, and plug-in modules you are using.

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• Instructions are easy to understand.	O	O	O	O	O
• The documentation is clearly written.	O	O	O	O	O
• Examples are clear and useful.	O	O	O	O	O
• Illustrations are clear and helpful.	O	O	O	O	O
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Chapter 1
Getting Started

What's in This Guide?

This *Getting Started with VXI Guide* is designed to guide you through a set of steps to identify, install, configure, and program your PC-based VXI system. This guide does not provide detailed information in each step. Rather, the guide suggests documentation and/or tools you can use to do the step.

The information in this guide is grouped according to the type of PC (External or Embedded) for major VXI system types. *Chapter 2: Installing External PC VXI Systems* shows steps to install external PC VXI systems. *Chapter 3: Installing Embedded PC VXI Systems* shows steps to install embedded PC VXI systems.

Note This guide does not show how to install Fibre Channel, GPIO, RS-232 or HP-UX VXI systems, nor does it attempt to include all combinations of PC-based VXI systems. See the documentation shipped with the equipment for specific steps to install these systems.

Note If you purchased an integrated (pre-configured) VXI system, some of the steps in this guide (such as installing VXI instruments, etc.) may already have been completed. In this case, skip the applicable step and go to the next step in the guide.

Steps to Get Started

☐ **Get Acquainted with VXI**

If you are not familiar with VXI systems, terms and concepts you may want to read the *Feeling Comfortable with VXI* booklet. If you are familiar with VXI terms, you can skip to the next step.

☐ **Determine Your VXI System Type**

In this guide, installation steps are divided according to the PC for your system: External PC or Embedded PC. To determine your system type, see Figure 1 (External PC) or Figure 2 (Embedded PC).

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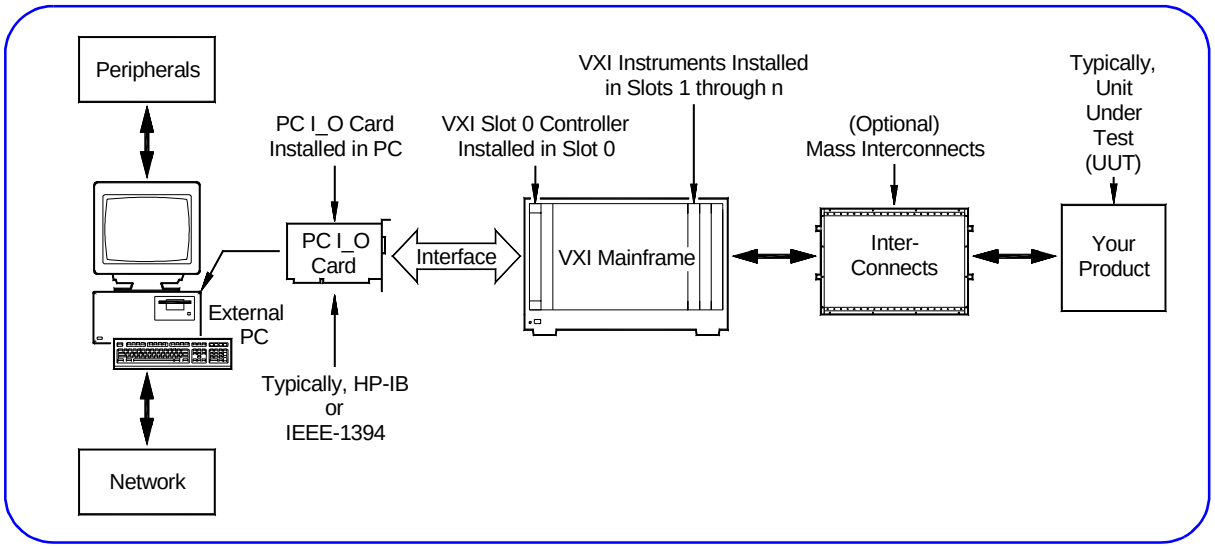


Figure 1. Typical External PC VXI System

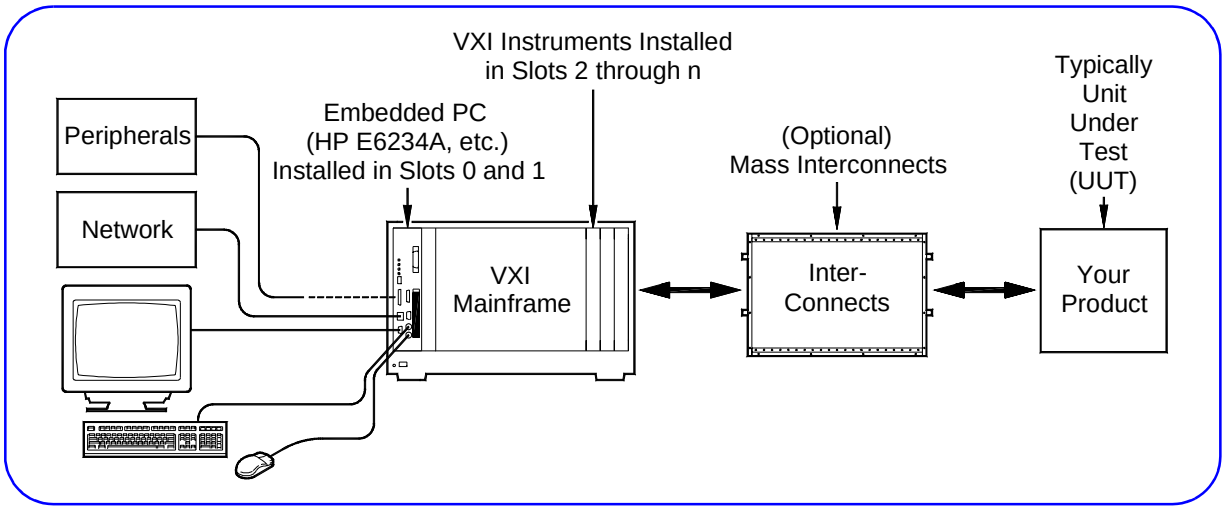


Figure 2. Typical Embedded PC VXI System

☐ Begin the Installation Process

For an External PC system, go to *Chapter 2*: *Installing External PC VXI Systems*. For an Embedded PC system, go to *Chapter 3*: *Installing Embedded PC VXI Systems*. For either system, see the *Getting Started with VXI* poster for a general sequence of steps to use. Follow the steps listed in the applicable chapter of this guide to install your system.

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If You Need Help

If You Have Questions

If you have any questions or require technical support from Hewlett-Packard, you can contact us by telephone or via the World-Wide Web at the numbers/addresses shown. When you call or write us, please provide the following information:

1. Your VXI system hardware configuration
2. Your PC operating system (NT, etc.) and PC version
3. The programming environment you are using
4. A complete description of the problem
5. A list of steps necessary to recreate the problem

Telephone Numbers

Americas HP Call Center: 1-800-452-4844
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Chapter 2
Installing External PC VXI Systems

Using This Chapter

What's in This Chapter?

This chapter shows a suggested six-step process to install, configure, and program an external PC VXI system. The chapter contents are:

- Step 1: Identify Your System . . . . . page 13
- Step 2: Configure Your PC . . . . . page 15
- Step 3: Install VXI Hardware . . . . . page 19
- Step 4: Install Libraries/Drivers . . . . . page 28
- Step 5: Verify Instrument Communication . . . . . page 34
- Step 6: Program Your System. . . . . page 43

What are External PC VXI Systems?

In this guide, external PC VXI systems are defined to consist of an external Windows-based PC and an interface between the PC and a VXI mainframe, with connections between your product (typically a Unit Under Test (UUT)) and VXI instruments. See Figure 1 for a typical external PC VXI system.

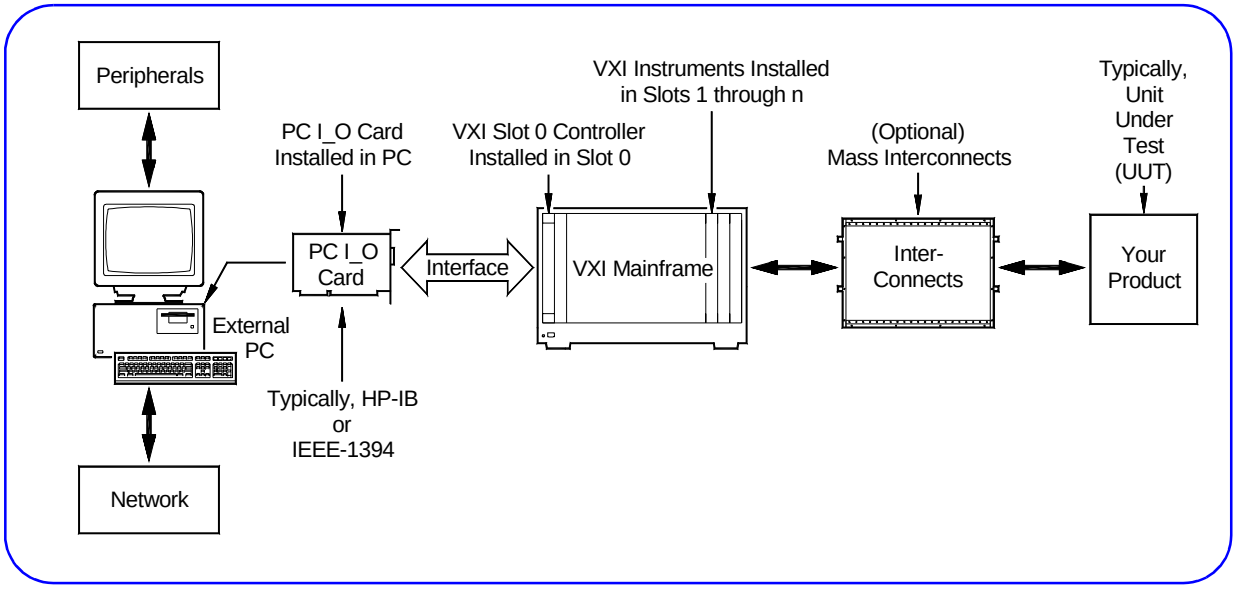


Figure 1. Typical External PC VXI System

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Steps to Install External PC VXI Systems

Figure 2 shows suggested steps to install, configure, and program an external PC VXI system.

Note Since your VXI system may vary from that shown in Figure 1 you may need to modify the steps in this guide. If you received a pre-configured system, skip any steps that have already been accomplished such as VXI instruments already installed in the mainframe, etc.

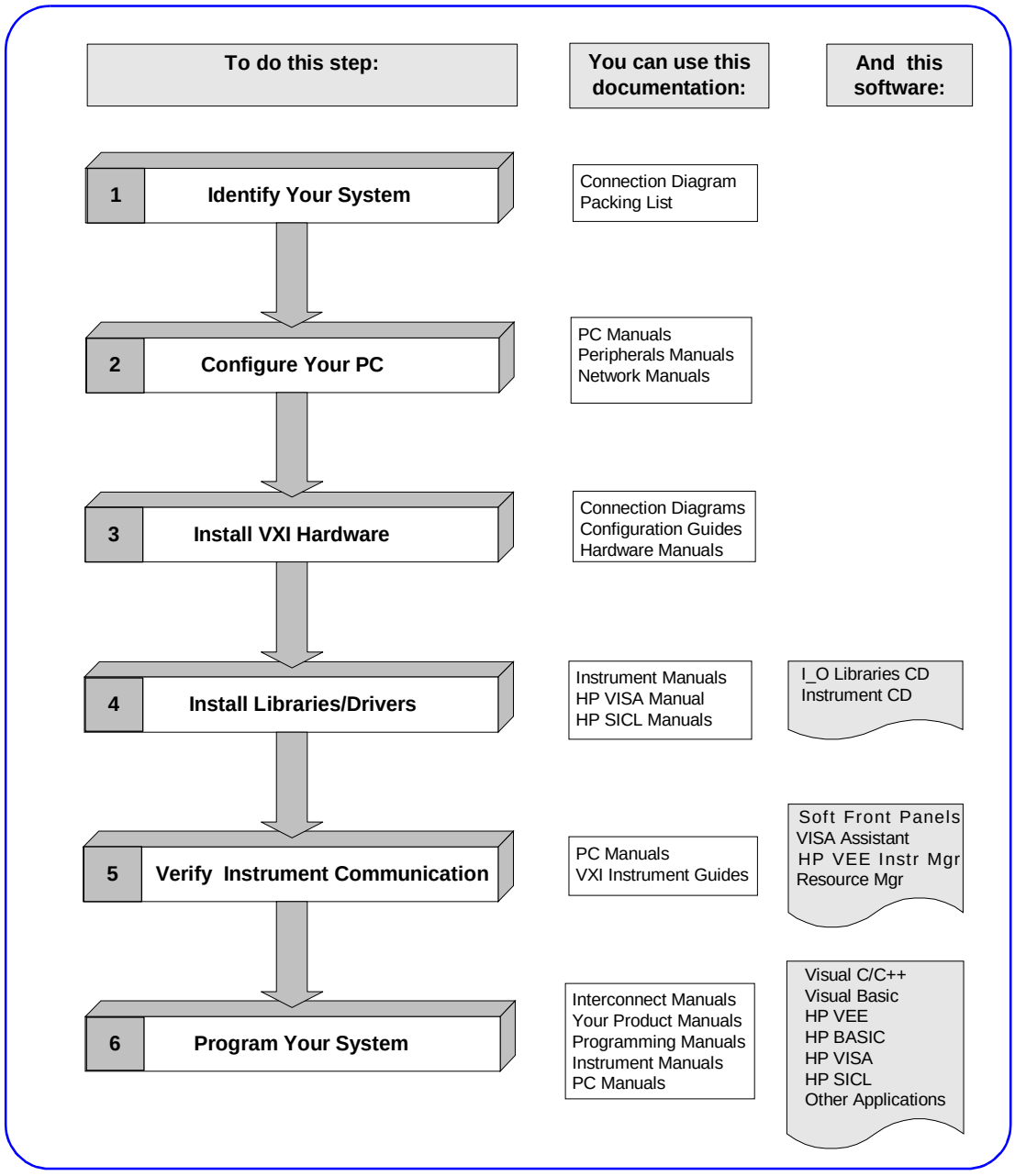


Figure 2. Steps to Install External PC VXI Systems

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1 Identify Your System

Step 1 Overview

What's in This Step?

The first step in installing your VXI system is to unpack and inventory the system, and to identify your specific VXI system type. This step includes the procedures in Figure 3.

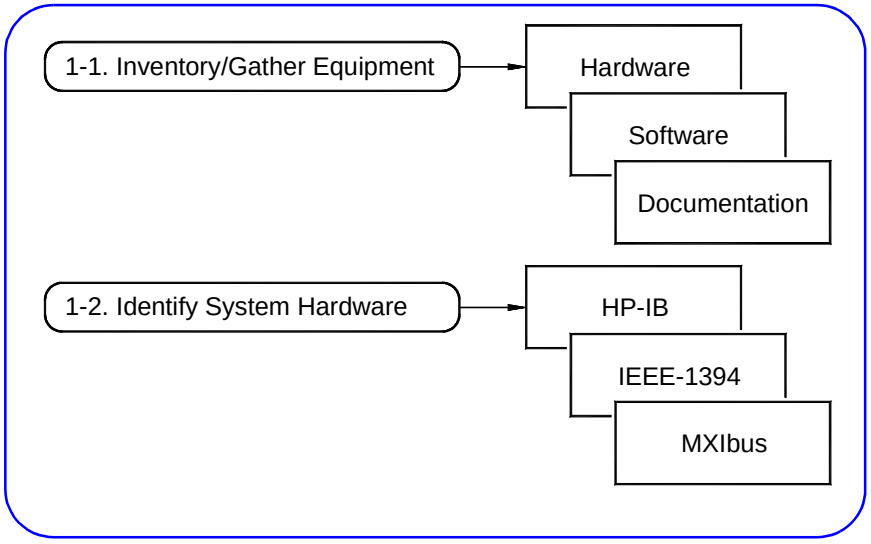


Figure 3. Steps to Identify Your VXI System

WARNING **During all phases of installation, operation, service or repair of any equipment for any step in this guide, you must follow all safety instructions in the applicable manual or guide, as well as the safety instructions in this guide.**

1-1: Inventory/ Gather Equipment

Inventory VXI Equipment/Gather Other Equipment

1 Unpack and inventory hardware, software, and documentation for your VXI system (see Figure 4). For pre-configured systems, you can use the *Packing List* that accompanied this guide to check the equipment contents.

2 Gather other items not received with your system, such as your PC and PC I_O cards, computer documentation, tools, etc., that you may need to assemble your system (see Figure 4).

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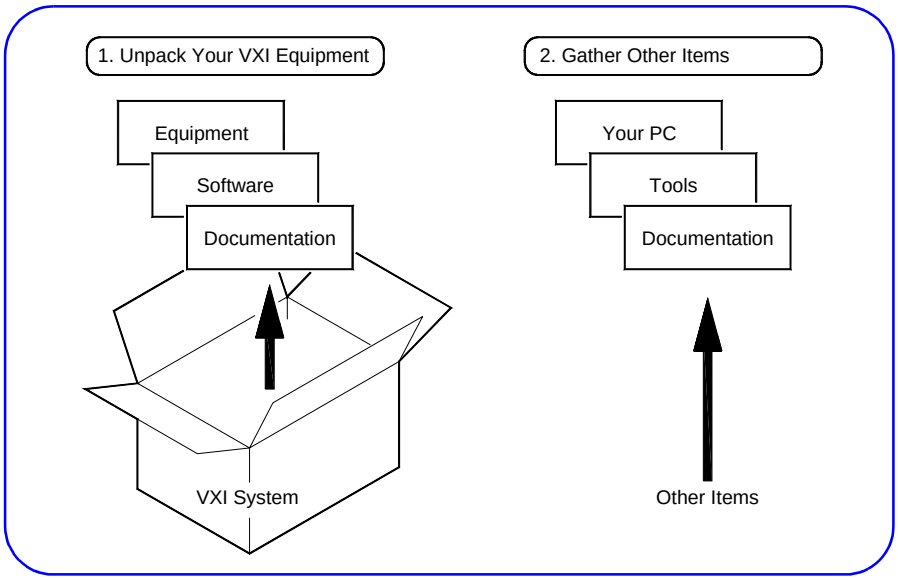


Figure 4. Inventory/Gather Equipment

1-2: Identify System Hardware

☐ Identify Your System Type

In this guide, external PC VXI systems are categorized as HP-IB (Figure 5), IEEE-1394 (Figure 6), or MXIbus (Figure 7). Select the system type that is closest to your system.

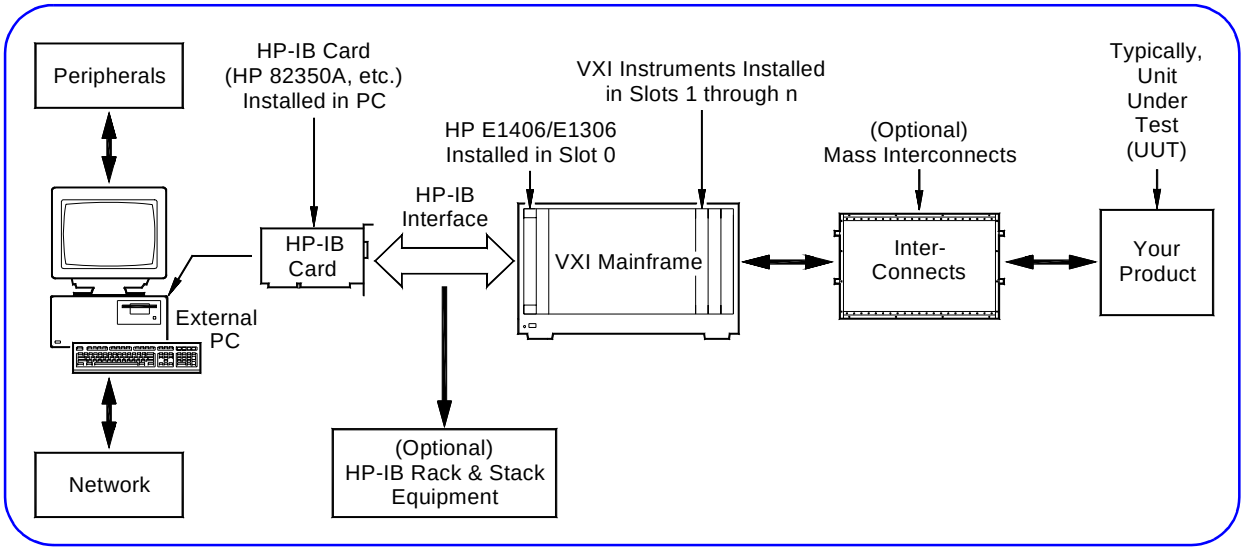


Figure 5. Typical HP-IB VXI System

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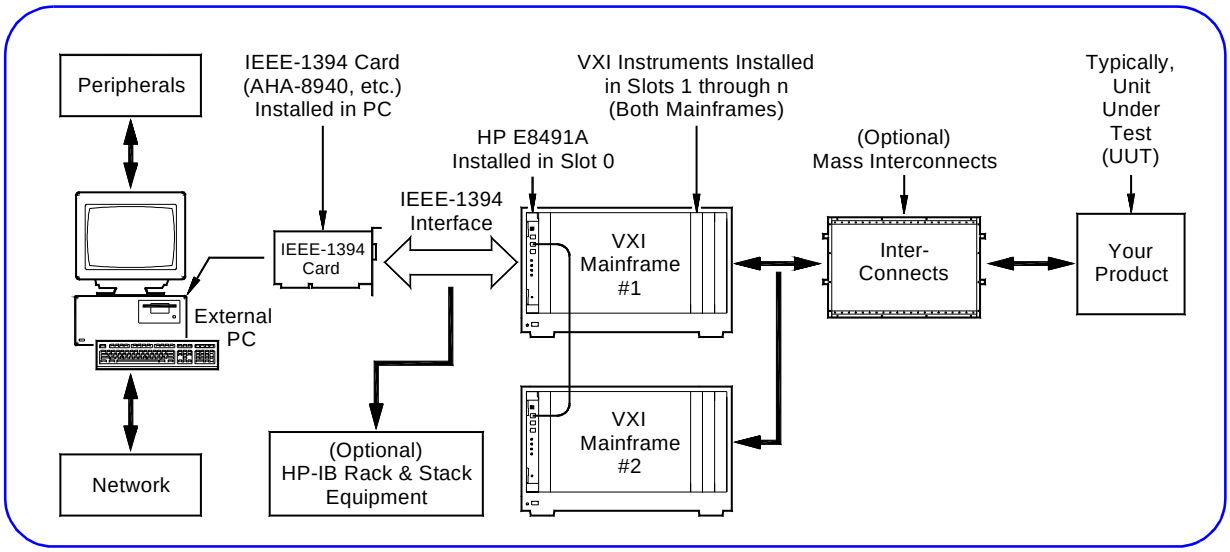


Figure 6. Typical IEEE-1394 VXI System

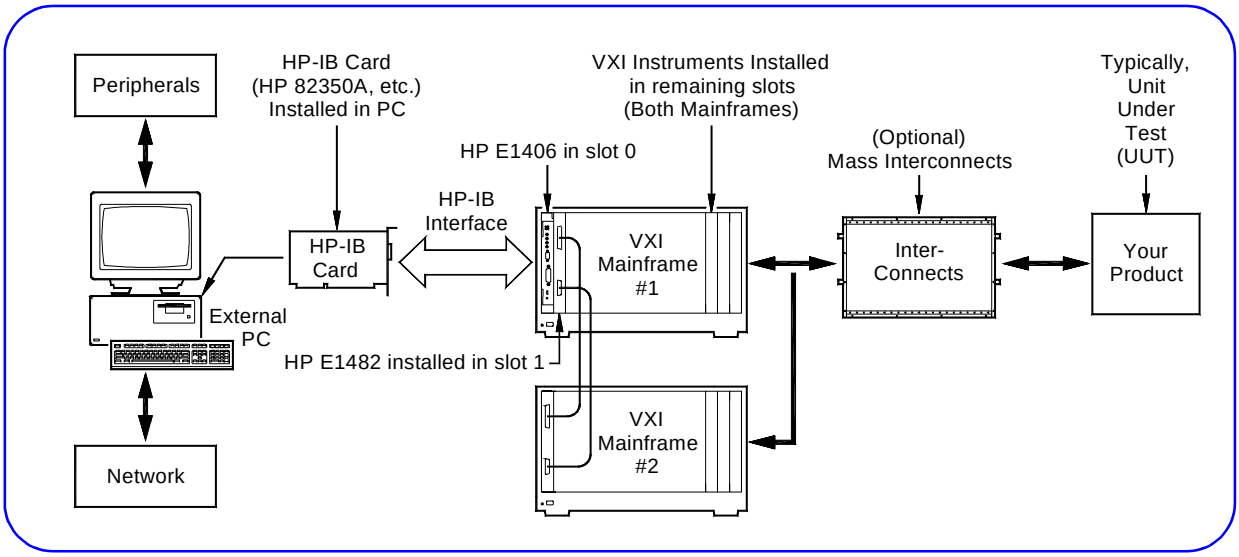


Figure 7. Typical MXIbus VXI System

☐ Identify Hardware

Use Figure 8 to identify the hardware for your VXI system, including PC I_O cards, mainframe(s), slot 0 card, and VXI instruments. You may want to copy this figure and highlight the specific hardware in your system for use in future steps.

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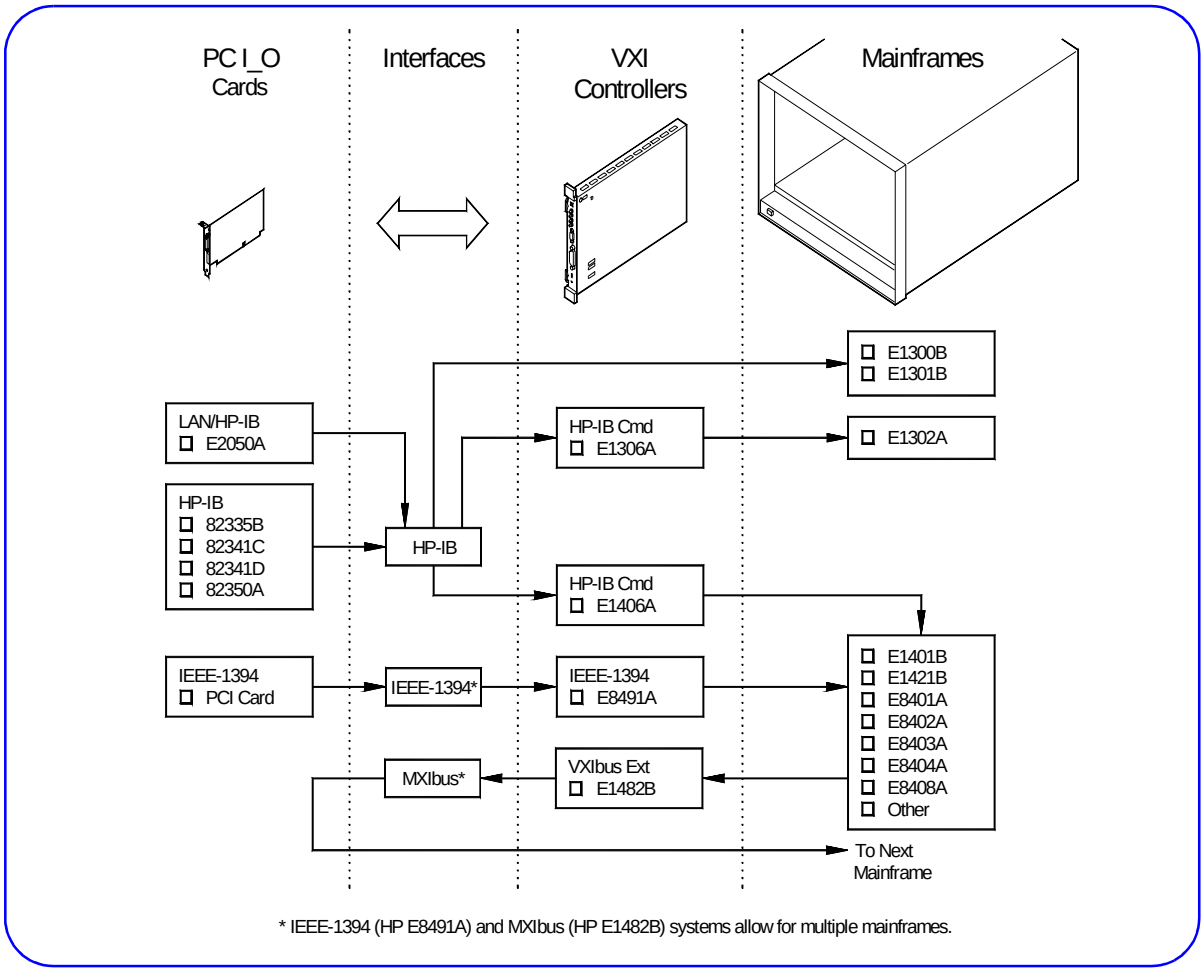


Figure 8. Typical External PC VXI Hardware

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2 Configure Your PC

Step 2 Overview

What's in This Step?

This step gives guidelines to configure an external PC for use with a VXI system. Figure 9 shows the parts of the VXI system that are installed when this step is completed.

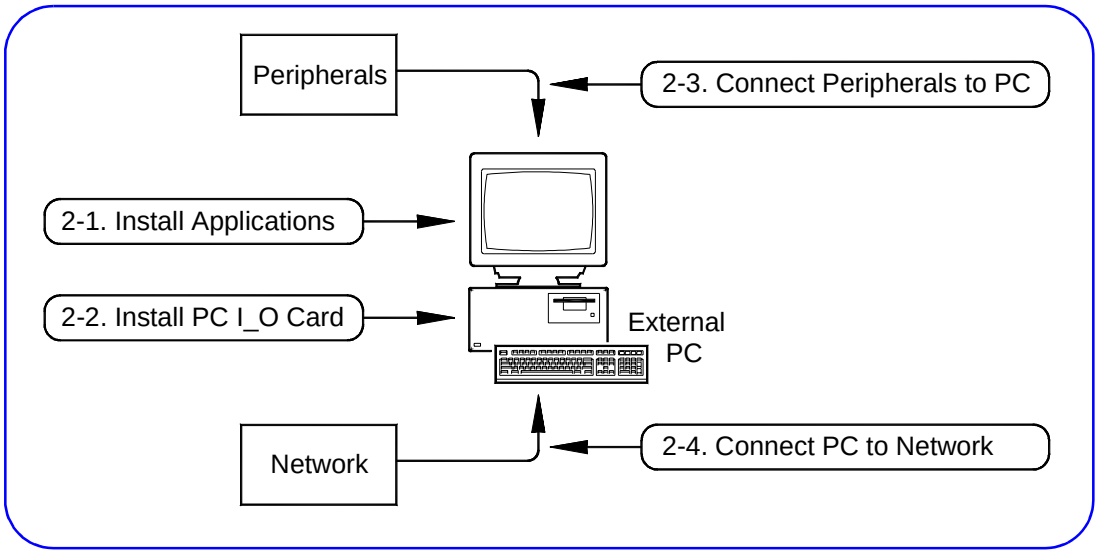


Figure 9. Steps to Configure Your PC

What You Will Need for This Step:

- Your PC
- PC I_O Cards
- Peripherals to be connected to PC (printers, plotters, etc.)
- ESD Wrist Strap (supplied with some pre-configured systems)
- Standard Torx (or equivalent) Screwdriver
- PC I_O Card Installation Guide
- PC User's Manual
- Peripherals Installation Manuals

2-1: Install Application Programs

Install Application Programs in Your PC

If you have not already done so, turn the PC ON and install the application programs to program the VXI system, such as Visual C/C++®, HP VEE, Visual Basic®, etc. Then, turn the PC OFF.

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2-2: Install PC I_O Cards

☐ **Install PC I_O Cards in Your PC**

1 Install required PC I_O card(s) into your PC. See the applicable PC I_O Card Installation Guide for instructions.

Caution To avoid potential damage to your PC, we suggest you wear an ESD wriststrap and observe all ESD precautions when installing (or removing) PC I_O cards.

2 Turn the PC ON and verify proper operation of the PC.

Note Before you can use the PC I_O card with a VXI system, you must configure the interface. We will do this in *Step 4-1: Install HP I_O Libraries*.

☐ ***Example: Installing an HP 82350A PC Card***

For example, you can use the instructions in the *HP 82350 PCI HP-IB Interface Installation Guide* to install an HP 82350A card into a PCI slot in the PC (see Figure 10).

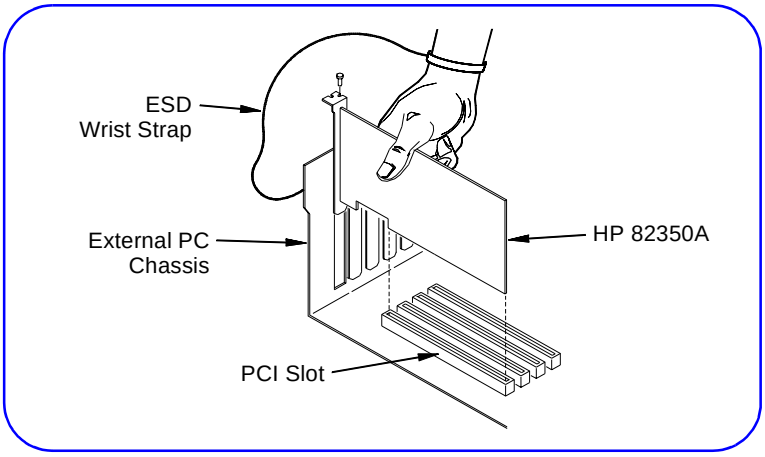


Figure 10. Example: Installing HP 82350A Card

2-3: Connect Peripherals to PC

☐ **Connect Peripherals to PC (OPTIONAL)**

If not already done, connect peripherals (printer, plotter, etc.) to the PC as required. See the applicable peripherals documentation for installation instructions.

2-4: Connect PC to Network

☐ **Connect PC to Your Network (OPTIONAL)**

As required, connect the PC to your network. See your System Administrator for connection requirements.

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3 Install VXI Hardware

Step 3 Overview ☐ What's in This Step?

This step gives guidelines to install the VXI hardware. Figure 11 shows the parts of this step, and shows the hardware installed after this step is completed. For pre-configured systems, you can skip the steps that do not apply to your system.

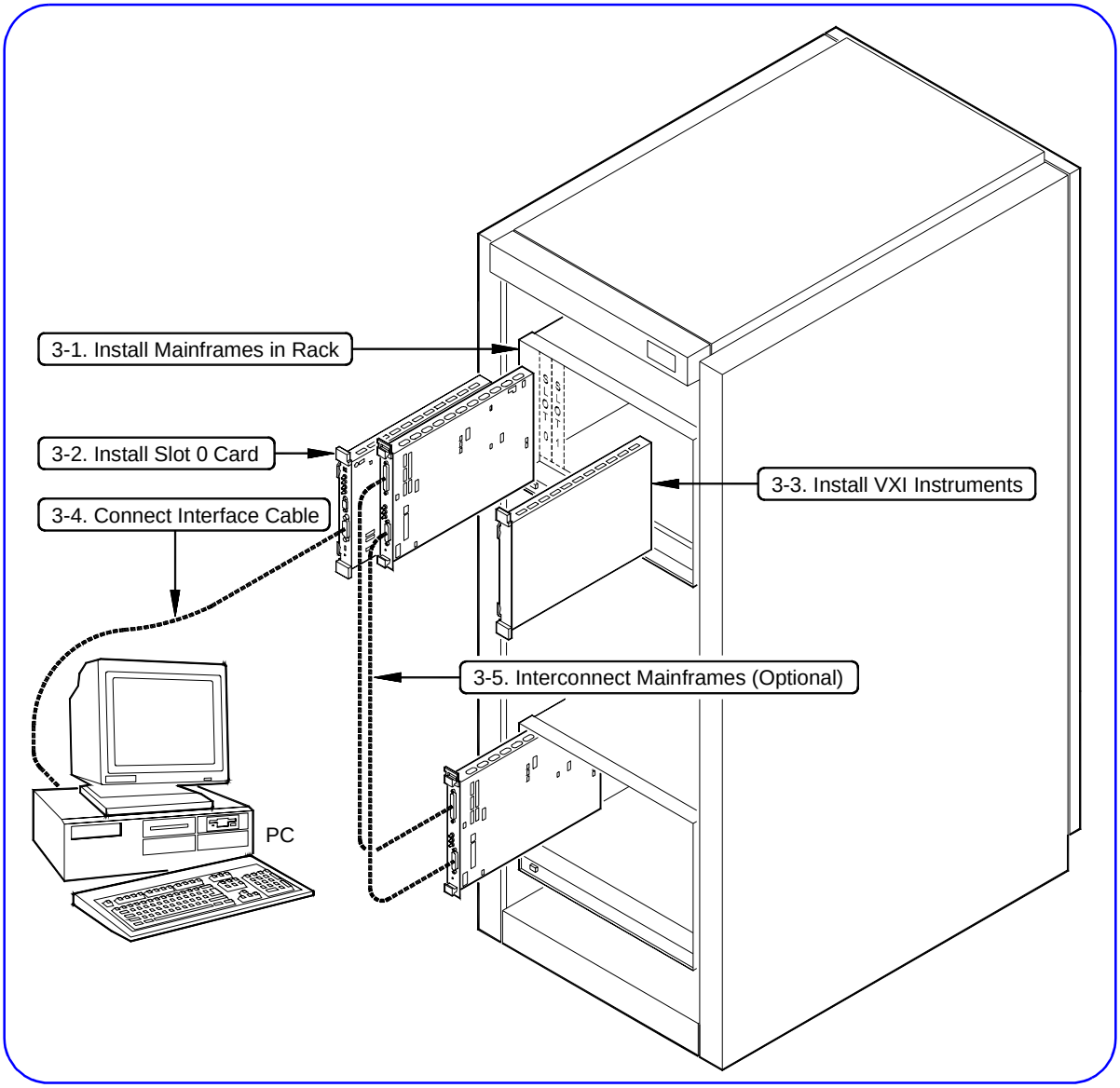


Figure 11. Steps to Install VXI Hardware

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What You Will Need for This Step:

- VXI Mainframe(s)
- Rack Mount Installation Kit (as required)
- VXI Slot 0 Card(s)
- VXI Instruments to be installed
- Mainframe User's/Service Manual
- Rack Mount Installation Instructions (as required)
- Slot 0 Controller User's Manual
- User's Manuals for each VXI instrument to be installed

3-1: Install Mainframe(s)

Rack Mount VXI Mainframe(s) (OPTIONAL)

As required, rack mount the mainframe(s) for your VXI system using the procedures in the applicable Rack Mount Installation Guide. If rack mounting is not required, go to the next step *Configure the VXI Mainframe(s)*.

Configure the VXI Mainframe(s)

1 If rack mounting is not required, place the mainframe on a bench or table as desired.

2 Install the ground connector (for 66 Hz and above operation ONLY), connect the power cord, and configure each mainframe as required as shown in the applicable Mainframe User/Service Manual. Figure 12 shows the hardware installed after this step.

3 Turn mainframe(s) power ON and observe the power-on sequence (if any) for the mainframe(s). See the applicable Mainframe User/Service Manual for details.

4 Turn mainframe(s) power OFF.

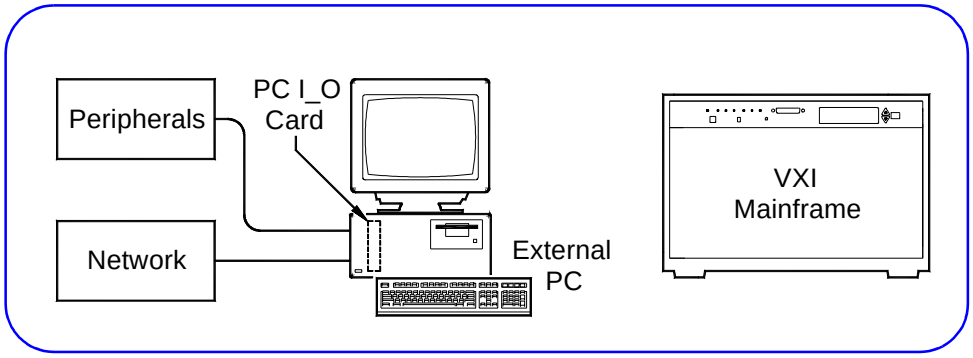


Figure 12. Installing/Configuring Mainframes

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Example: HP E8404A Power-On Sequence

To observe the HP E8404A C-Size mainframe power-on sequence, plug the power cord into an AC outlet. The amber Standby Indicator (see Figure 13) should turn ON. Then, press the Power switch. The Green Light should turn ON, and the Amber Light should turn OFF.

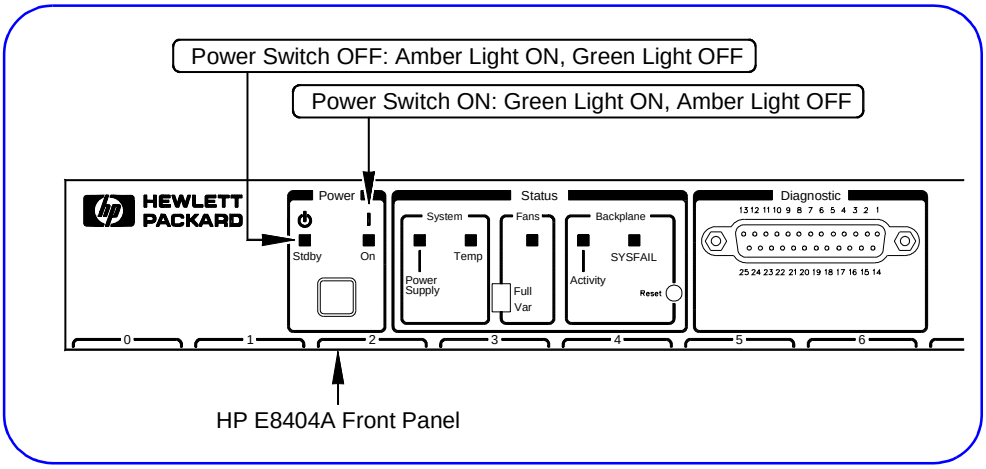


Figure 13. Example: HP E8404A Power-On Sequence

3-2: Install Slot 0 Card

Install Slot 0 Controller Card in Mainframe 1

1 Set the VXI Slot 0 Controller Card switch settings as required for your system. See the applicable Slot 0 Controller User's Manual for details. In general, you will not need to change the Slot 0 card switches from the default settings.

2 Install the VXI Slot 0 card in VXI Mainframe 1. See the applicable Slot 0 Controller User's Manual for installation steps. Figure 14 shows the hardware installed after this step.

3 Turn mainframe power ON and observe the Slot 0 card front panel power-on display sequence. Then, turn mainframe power OFF. If required, correct hardware errors and retest.

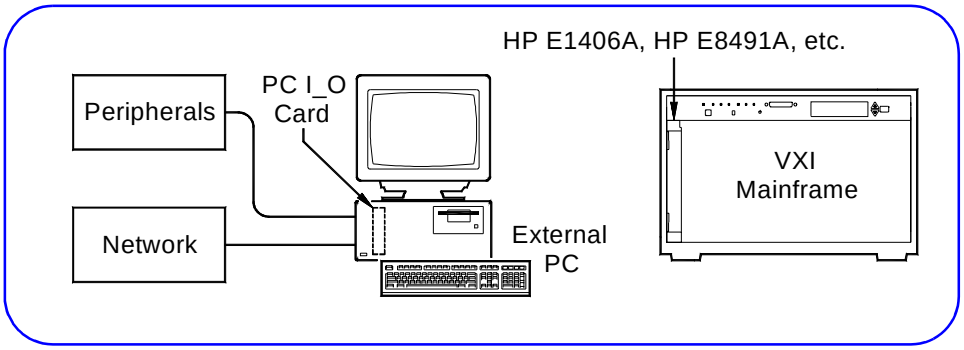


Figure 14. Installing Slot 0 Card in Mainframe

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3-3: Install VXI Instruments

☐ Ways to Install VXI Instruments

This step shows two ways to install VXI instruments in mainframes. The first way is to use the *HP VXI Installation Consultant (HP VIC).* The second way is to install using the procedures in this step.

- If you want to use HP VIC, go to "Installation Using HP VIC". HP VIC is a utility that provides a structured way to configure and install VXI instruments, and to check the installation.
- If you do **not** want to use *HP VIC*, go to "Installation Without Using HP VIC".

☐ Installation Using HP VIC

To use HP VIC:

1 Turn mainframe and PC power OFF. Connect the interface cable (HP-IB or IEEE-1394) from the Slot 0 card (in the mainframe) to the PC I_O card (in the PC). Turn PC power ON (leave mainframe power OFF).

2 Insert the *Hewlett-Packard Universal Instrument Drivers* CD into the CD-ROM drive and wait a few seconds for the setup instructions to appear.

3 If the setup screen does not appear in a few seconds, click *Start|Run* and then type <*drive*>:setup.exe in the Run box, where *drive* is your CD-ROM drive.

4 When the main menu appears, click *Launch Installer or View Manuals*. Click *Next* on the next screen and *Yes* on the third screen to go to the **Choose Type of Installation** screen (see Figure 15).

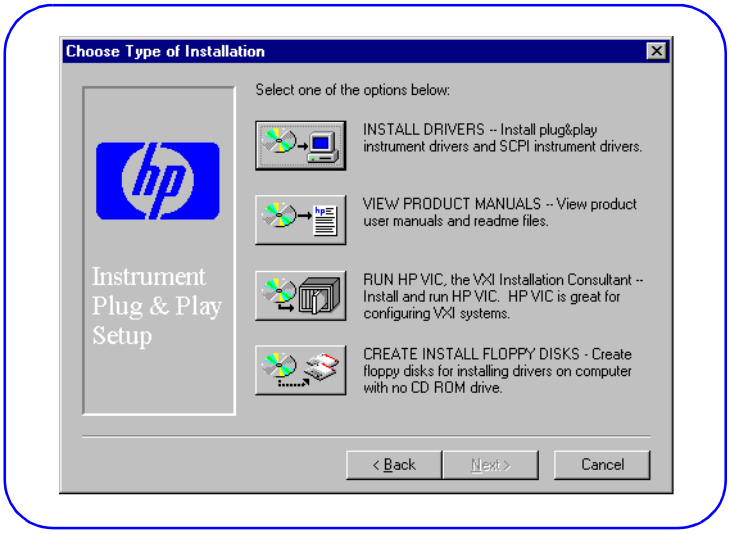


Figure 15. Choose Type of Installation Screen

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5 From the **Choose Type of Installation** screen, click the RUN HP VIC... icon to display the **Welcome to HP VIC** screen.

6 From this screen, click *New-->* and follow the on-screen instructions to install and check your VXI instruments and to (optionally) print the results.

7 If you have HP-IB Rack & Stack instruments or a terminal to install, go to *Step 3-4: Connect Interface Cable*. Otherwise, go to *Step 3-5: Interconnect Mainframes*.

☐ Installation Without Using HP VIC

1 The first step to install VXI instruments is to select the mainframe slot to use for each VXI instrument. See the applicable Mainframe User's/Service Manual or Instrument User's Guide for guidelines.

2 When you have selected a slot for an instrument, enter the instrument model number, name, and serial number for the instrument in Table 1. (The instrument serial number is located on the side of the instrument.) Do this for all instruments to be installed.

Note For pre-configured systems, the *Installed VXI Instruments* List in the *Owner's Pack* lists instrument model number, name, logical address, and serial number for each installed VXI instrument.

Table 1. VXI Instruments Installed in Mainframe

Slot	Model Number	Instrument Name	Logical Address	Serial Number
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

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Set VXI Instrument Logical Addresses

1 When you have selected the slot for each VXI instrument, the next step is to set the instrument logical addresses (LADDR) as required. In general, you can use the factory-set (default) logical addresses.

2 If you need to set other logical addresses, use the following guidelines. See the applicable Mainframe User's/Service Manual or Instrument User's Guide for details.

- The logical address for each VXI instrument is set by the Logical Address (LADDR) switch on the instrument. The logical address value is the sum of the values of the logical address switches set to the closed position (see Figure 16).
- For HP-IB (HP E1406A Command Module) systems, each VXI instrument must have a separate logical address and the logical address **must** be a multiple of 8 (8, 16, 24, etc.).
- For IEEE-1394 (HP E8941A Interconnect) systems, each VXI instrument must have a separate logical address but the logical address does **not** have to be a multiple of 8.
- A multimeter and one or more multiplexers can be used to form a **scanning multimeter**. In this case, the instruments must be in adjacent mainframe slots and must have sequential logical addresses (see Figure 17). In addition, for HP E1406A systems the multimeter must have a logical address that is a multiple of 8.

3 When you have selected the logical address for an instrument, set the address using the LADDR switch on the instrument. Then, record the logical address in Table 1. Repeat for each instrument.

Example: Setting Multimeter Logical Address

Figure 16 shows an HP E1411B multimeter with the Logical Address switch set to 24. Since switch 3 (logical value = 8) and switch 4 (logical value = 16) are both closed, the sum of the logical values (24) is the logical address for the HP E1411B. See the *HP E1326B/E1411B User's Guide* for details.

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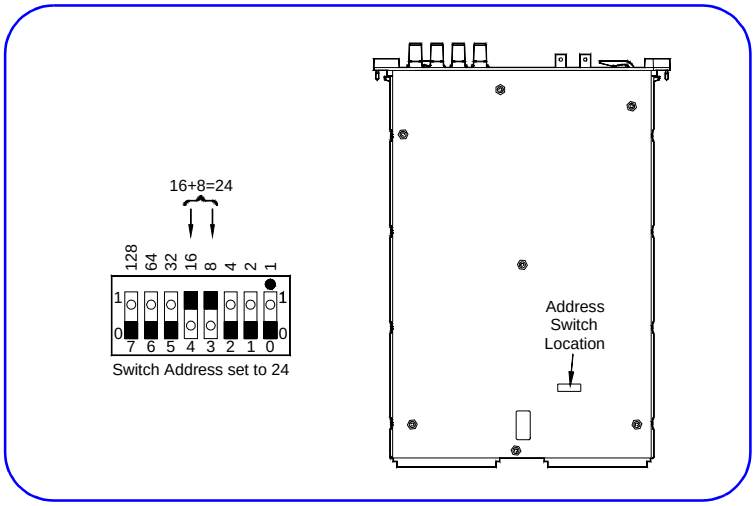


Figure 16. Example: HP E1411B Logical Address Switch

Example: Scanning Multimeter Logical Addresses

Figure 17 shows an HP E1406A installed in Slot 0 and VXI instruments installed in slots 1 through 4 of an HP E8404A VXI mainframe. The HP E1411B multimeter and the two HP E1460A multiplexers form a scanning multimeter since they are in adjacent mainframe slots, and they have sequential (24, 25, 26) logical addresses.

Since this is an HP-IB (HP E1406A) system, the HP E1411B multimeter must have a logical address that is a multiple of 8 (24 in this case). For an IEEE-1394 (HP E8491A) system, the three instruments must still be in adjacent mainframe slots, but could have any three sequential logical addresses (such as 17, 18, 19).

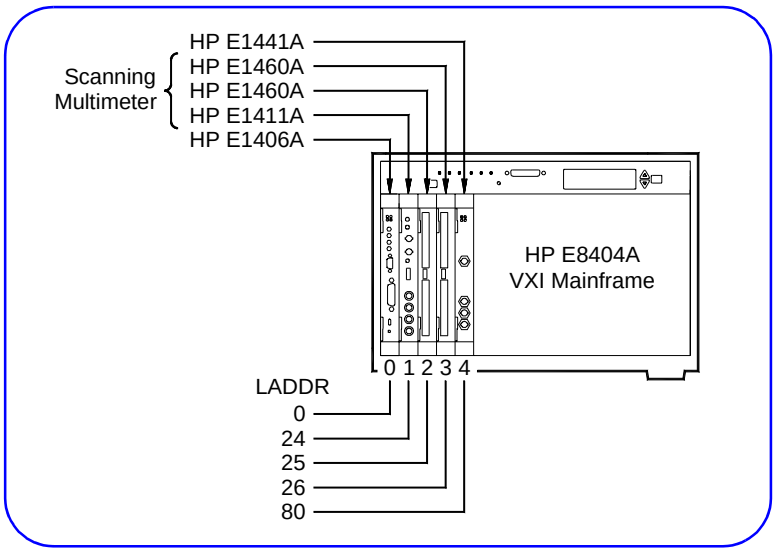


Figure 17. Example: Scanning Multimeter Logical Addresses

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☐ Install VXI Instruments in Mainframe

1 As required, perform Logical Address switch (and other switch) setting changes for each VXI instrument. See the previous step and the applicable Instrument User's Guide for details.

2 Turn mainframe power OFF. Then, install each VXI instrument in the slot(s) you previously identified. Figure 18 shows the hardware connected at the end of this step.

3 Turn mainframe power ON and observe each instrument's power-on display sequence (if any). See the applicable Instrument User's Guide for details. Then, turn mainframe power OFF.

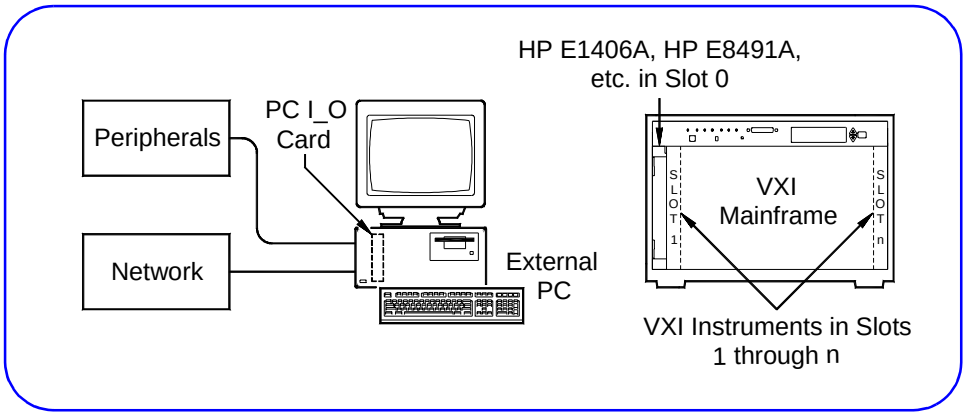


Figure 18. Installing VXI Instruments in the Mainframe

3-4: Connect Interface Cable

☐ Connect Interface Cable

1 Connect one end of the interface cable to the PC I_O card you installed (in Step 2). Connect the other end of the cable to the Slot 0 Controller card. Figure 19 shows the hardware connected at the end of this step (not including terminals or Rack & Stack equipment).

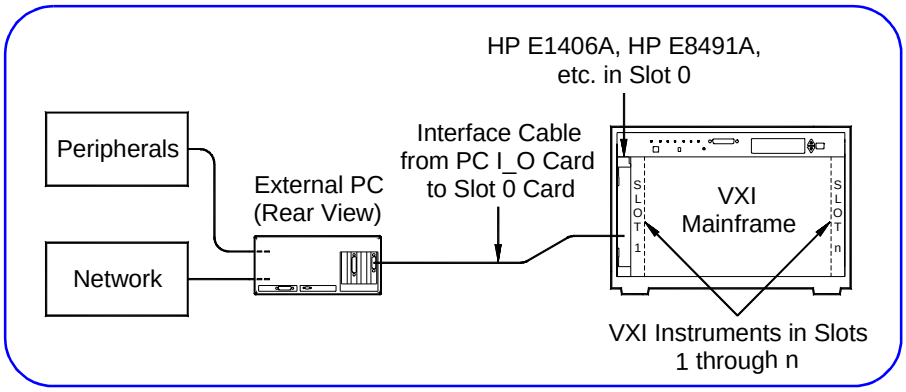


Figure 19. Connecting the Interface Cable

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2 (OPTIONAL - HP-IB ONLY) If you have HP-IB Rack & Stack equipment in your system, you can also connect the HP-IB cable to the Rack & Stack instruments (see Figure 20).

3 (OPTIONAL - HP-IB ONLY) For a system with an HP E1406 or HP E1306, you can also connect a terminal to the RS-232 port (see Figure 20). See the *HP E1406A User's Guide* or the *HP E1306A User's Guide* for details.

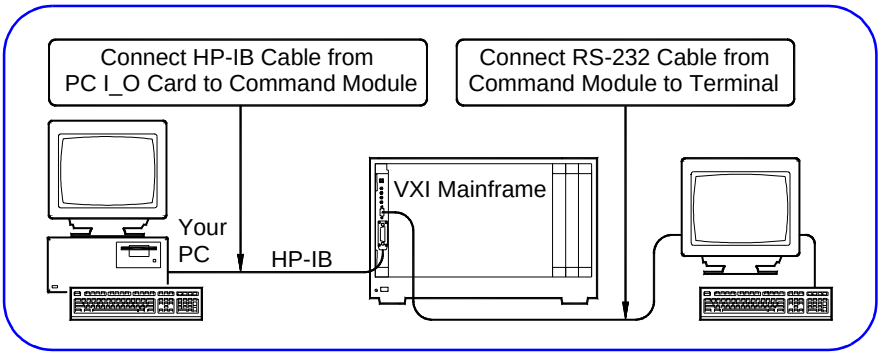


Figure 20. Connecting the Interface Cable

3-5: Interconnect Mainframes (Optional)

☐ **Interconnect VXI Mainframes (IEEE-1394/MXIbus ONLY)**

If your system includes an IEEE-1394 and/or MXIbus interface and multiple mainframes, interconnect the mainframes by connecting interface cables between each mainframe.

- See the *HP E8491A Configuration and User's Guide* to interconnect mainframes for IEEE-1394 systems.
- See the *HP E1482B VXI-MXIBus User's Manual* to interconnect mainframes for MXIbus systems.

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4 Install Libraries/Drivers

Step 4 Overview

☐ **What's in This Step?**

This step gives guidelines to install HP I_O Libraries and HP VXI*plug&play* drivers for a VXI system. Figure 21 shows the software installed at the end of this step.

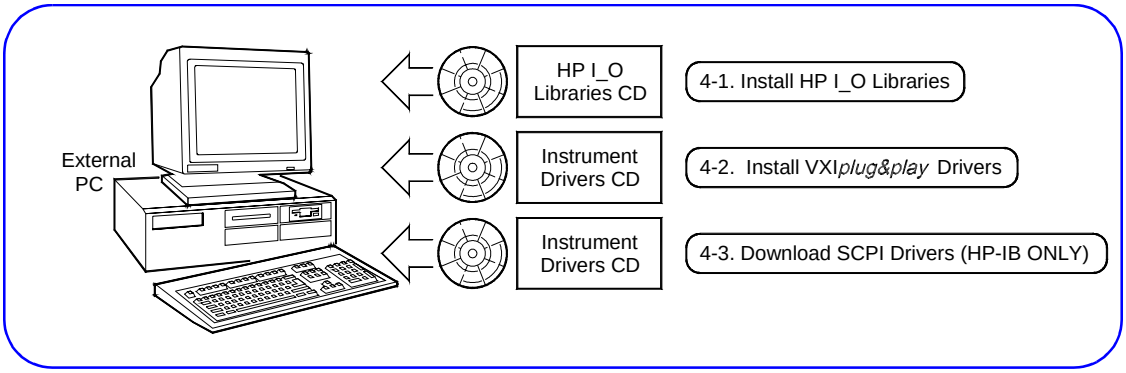


Figure 21. Steps to Install Libraries/Drivers

☐ **What You Will Need for This Step:**

- *HP Universal Instrument Drivers* CD
- *HP I_O Libraries for Instrument Control* CD
- *HP I_O Libraries Installation and Configuration Guide for Windows*

4-1: Install HP I_O Libraries

☐ **Install the HP I_O Libraries on the PC**

Note If you have already installed the HP I_O Libraries as part of the HP VEE installation process, skip this step and go to *Step 4-2: Install VXIplug&play Drivers.*

1 Turn the PC ON and close all open applications.

2 Insert the *HP I_O Libraries for Instrument Control* CD into the CD-ROM drive, and wait a few seconds for the application to run.

3 The installer should automatically start when the CD is inserted. If not, select *Start*|*Run* and type <drive>:setup.exe.

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4 Click *Next* on the first screen and *Yes* on the second screen.

5 When the **Install HP E8491 VXI Components** screen appears (see Figure 22), check the "Install HP E8491 VXI Components" box if your system has an HP E8491A (IEEE-1394 to VXI interface) and you want to install drivers for it. Then, click *Next*.

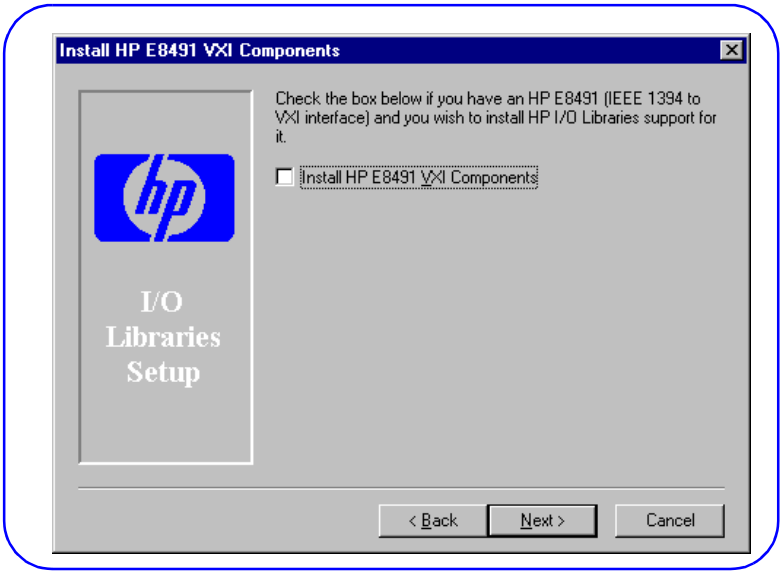


Figure 22. Install HP E8491 VXI Components Screen

6 Follow the instructions to go through the next two screens to select a destination directory and to copy files to the selected directory.

7 When the **View Readme and Configure Interface** screen appears, be sure the *Configure interfaces* box is checked. (You can uncheck the *View Readme* box if desired.) Then, click *Next* to display the **I_O Config** screen (see Figure 23).

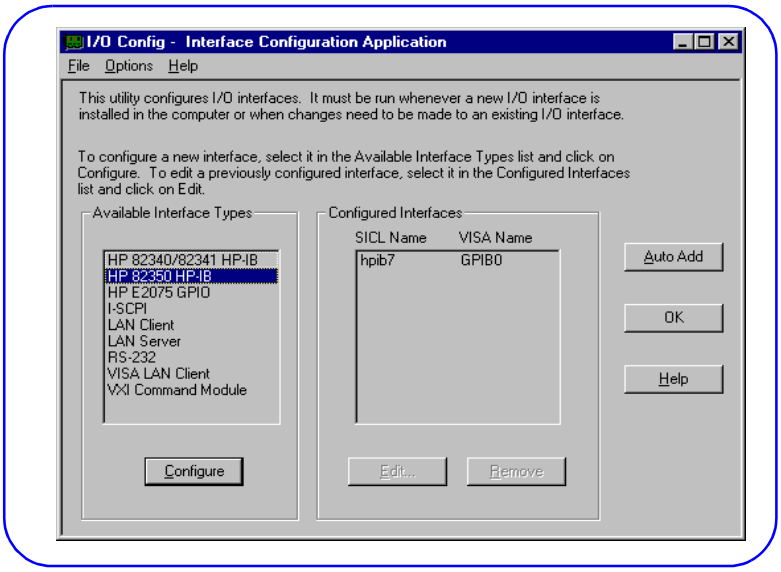


Figure 23. Typical I_O Config Utility Screen

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8 Select the interface you want to configure, and the I_O Config utility will help you configure each interface. Click the Help button for information on using I_O Config, or see the *HP I_O Libraries Installation and Configuration Guide for Windows.*

9 When you have completed I_O configuration, follow the instructions to display the **Restart Windows** screen. Select *Yes, I want to restart my computer now,* and then click *OK*.

10 After the computer has re-started, remove the HP *I_O Libraries* CD.

What Program Groups Are Created?

During installation, an HP I_O Libraries program group is created. Also, a Vxipnp (VXI*plug&play*) program group is created where VXI*plug&play* drivers can be installed.

Note When you install the I_O libraries, both VISA and SICL directories are automatically installed on your system. Do NOT delete the SICL directory as some parts of VISA are dependent on SICL.

4-2: Install VXI*plug&play* Drivers

Where are the VXI*plug&play* Drivers?

VXI*plug&play* drivers can be installed in the Vxipnp directory (created when you loaded the *Hewlett-Packard I_O Libraries for Instrument Control* CD) from the *Hewlett-Packard Universal Instrument Drivers* CD.

Note The *Hewlett-Packard Universal Instrument Drivers* CD you received should contain the latest version of the instrument drivers. See the World Wide Web at *http://www.hp.com/go/inst_drivers* for driver information.

Install VXI*plug&play* Drivers on Your PC

1 Insert the *Hewlett-Packard Universal Instrument Drivers* CD into the CD-ROM drive and wait a few seconds for the setup instructions to appear.

2 If the setup screen does not appear in a few seconds, click *Start*| *Run* and type <*drive*>:setup.exe in the Run box, where *drive* is your CD-ROM drive.

3 When the main menu appears, click *Launch Installer or View Manuals*. Click *Next* on the next screen and *Yes* on the third screen to go to the **Choose Type of Installation** screen (see Figure 24).

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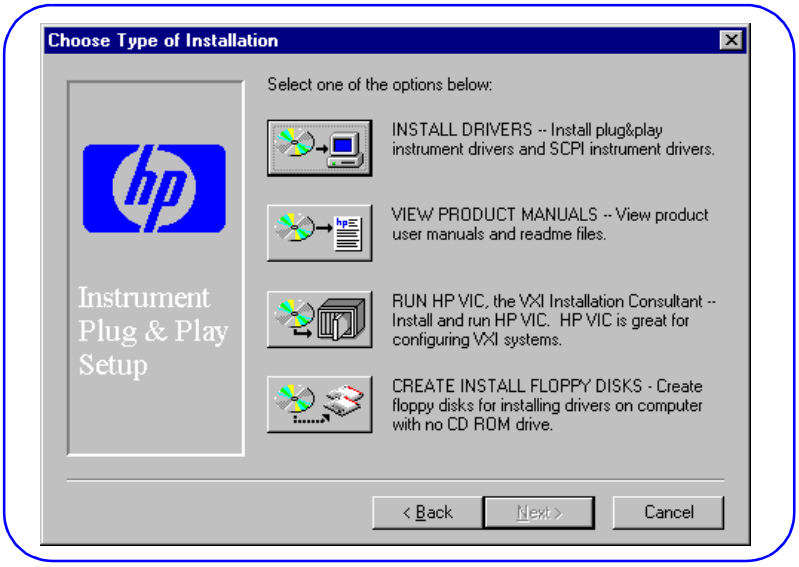


Figure 24. Choose Type of Installation Screen

4 Select *INSTALL DRIVERS* and choose whether or not to view the README.TXT file. Click *No* to display the **Choose Item to Install** screen (see Figure 25).

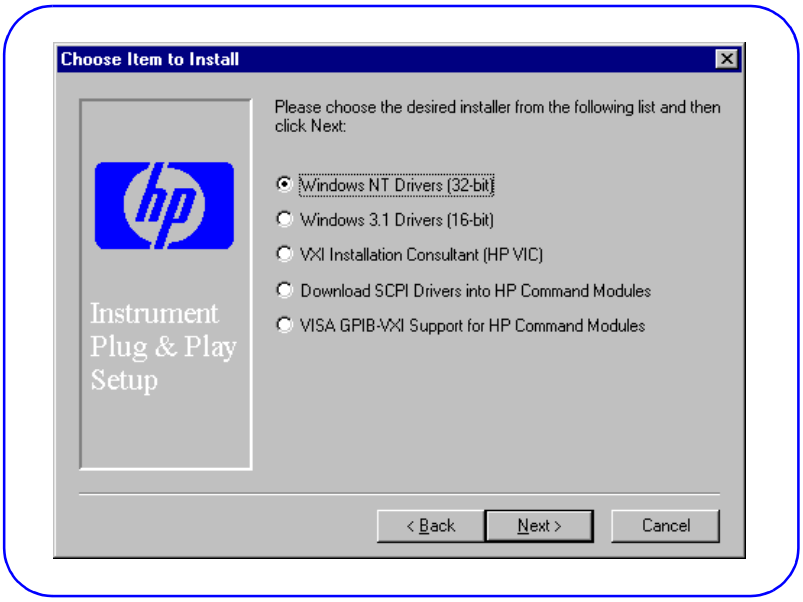


Figure 25. Choose Item to Install Screen

5 For Windows ® 95/Windows NT®, click *Windows NT Drivers (32-bit)*. For Windows ® 3.1, click *Windows 3.1 Drivers (16-bit)*. Click *Next* to display a list of available VXI*plug&play* drivers.

6 Highlight the driver(s) to be installed and press *Next* to begin installation. Follow the on-screen instructions to install the VXI*plug&play* driver(s) for your VXI system.

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Note The list of drivers displayed is for VXI instruments (such as an HP E1411 multimeter, HP E1460A multiplexer, etc.) and does not include Mainframes or Command Modules (HP E1406A, etc.). VXI*plug&play* drivers are not required for Mainframes and Command Modules.

7 When the **Choose Program Folder Items** screen appears (see Figure 26), check *the Soft Front Panel*, *Read Me* and *Help* entries. Then, click *Next*. Follow the instructions to load the driver(s).

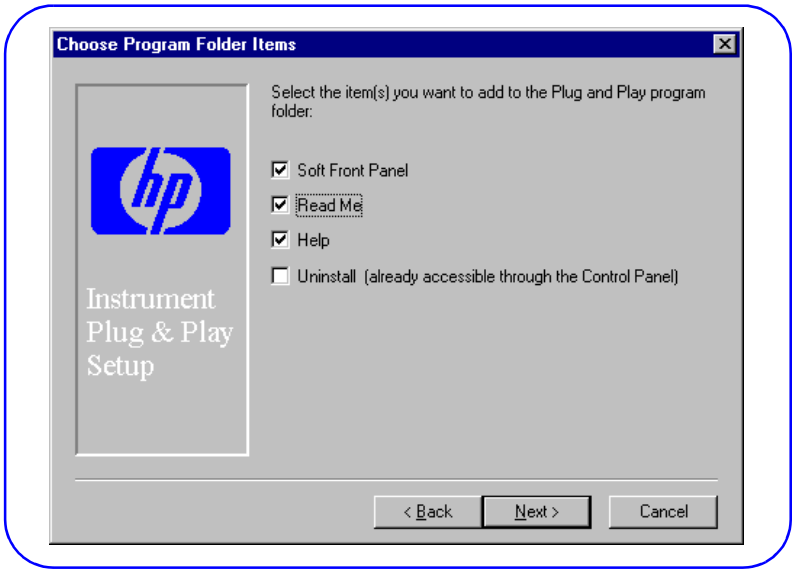


Figure 26. Choose Program Folder Items Screen

8 When installation is complete, click *No* when asked if you want to select another option.

9 Close the taskbar icons (*C:\WINNT\profiles...*, etc.) and then remove the CD.

4-3: Download SCPI Drivers (HP-IB Only)

This step gives guidelines to use the HP VXI Installation Consultant (HP VIC) to download SCPI drivers to the HP E1406A/E1306A Command Module or to an HP E1300/E1301A mainframe.

Note You will need to use this step **ONLY** if your VXI system includes an HP E1406A Command Module, an HP E1306A Command Module, or an HP E1300/E1301 Mainframe. If these items are not part of your system, skip this step and go to *Step 5: Verifying Instrument Communication.*

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Using HP VIC to Download SCPI Drivers

SCPI drivers can be downloaded into the HP Command Module using the HP VXI Installation Consultant (HP VIC). HP VIC will determine whether SCPI drivers are required and, if required, will download the drivers. To use HP VIC to download SCPI drivers:

1. If not already done, connect an HP_IB cable as shown in Figure 27. To do this, turn PC and mainframe power OFF and make the connections. Then, turn PC and mainframe power ON.

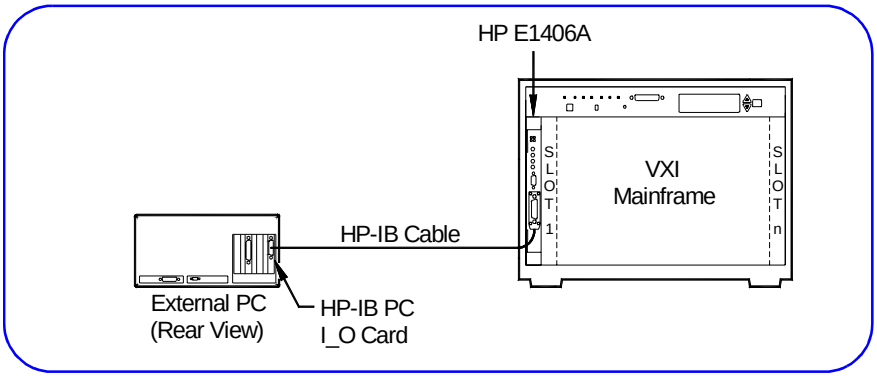


Figure 27. HP VIC Connections

2. Load the *Hewlett-Packard Universal Instrument Drivers* CD into the CD-ROM drive and wait a few seconds for the application to start.

3. The installer should automatically start when the CD is inserted. If not, select *Start*|*Run* and type <*drive*>:setup.exe.

4. When the main menu appears, click *Launch Installer or View Manuals*. Then, click *Next* on the next screen and *Yes* on the third screen to move to the **Choose Type of Installation** screen.

5. From the **Choose Type of Installation** screen, click the RUN HP VIC... icon to display the **Welcome to HP VIC** screen.

6. From the **Welcome to HP VIC** screen, click *Download* --> and follow the instructions. Click the Help menu for information on HP VIC.

7. When you have completed the download, exit HP VIC and remove the *Hewlett-Packard Universal Instrument Drivers* CD.

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5 Verify Instrument Communication

Step 5 Overview

☐ What's in This Step?

This step gives guidelines to use the tools shown in Figure 28 to verify communication with VXI instruments. Although several tools are described in this step to verify communication with instruments, no specific order is implied. You can use any one (or all) of the methods as desired.

Note For troubleshooting purposes, we suggest you first use the Resource Manager (see *Step 5-4: Use Resource Manager*). The Resource Manager displays what the system "thinks" is installed. This information is useful for identifying problems such as duplicate logical addresses or instruments not correctly installed.

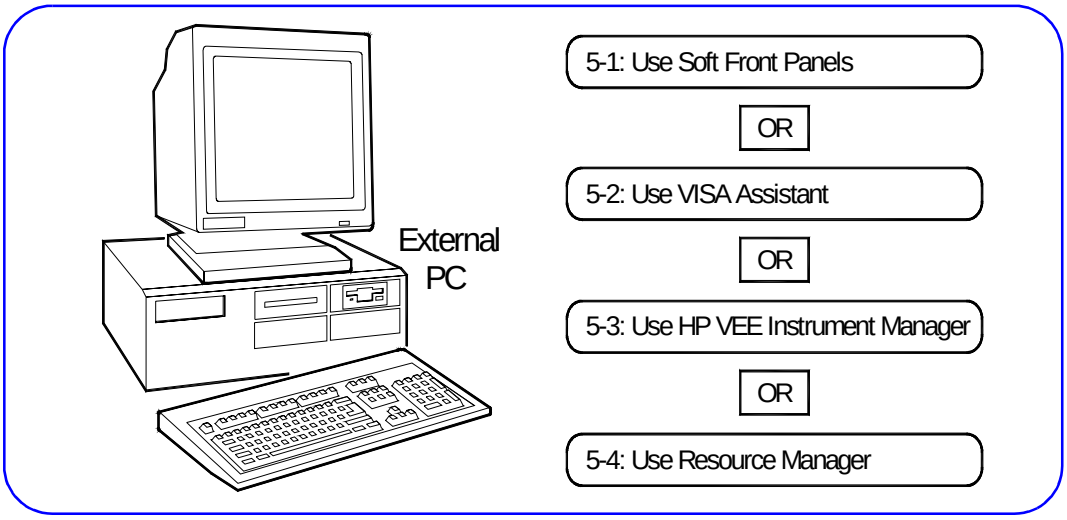


Figure 28. Some Tools to Verify Instrument Communication

☐ What You Will Need for This Step:

- Your VXI hardware system with configured PC connected
- Mainframe User's Manuals
- Slot 0 Controller User's Manuals
- User's Manual for each installed instrument
- *Controlling Instruments with HP VEE* manual

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5-1: Use Soft Front Panels

☐ Verify Communication Using Soft Front Panels

Instrument Soft Front Panels (SFP) are included as part of the instrument VXI*plug&play* drivers, and provide a virtual "front panel" for selected instruments. A soft front panel is activated from the Vxipnp program group when you click the applicable SFP icon (*Start*|*Programs*| *Vxipnp*|<*instrument*> *(SFP)*).

Note

To use an Instrument Soft Front Panel, the instrument must have a Soft Front Panel file loaded in the Vxipnp program group. See *Step 4-2: Install VXIplug&play Drivers* for information on loading Soft Front Panels.

Some features of Soft Front Panels (SFP) are:

- A SFP is a virtual "front panel" for the instrument. Thus, you can use the SFP to communicate with the instrument and to return results.
- SFPs return the slot number (for some instruments) and the instrument description, including the logical address.
- You can use SFPs to set instrument functions, ranges, and other features *without writing a single line of code*.

☐ *Example: Communicate Using HP E1411B Soft Front Panel*

For this example, we will use an HP E1411B multimeter and the HP E1411 Soft Front Panel to measure the voltage of a 9V battery connected to the HP E1411B terminals. To run this example:

1 Turn mainframe power OFF and connect the battery to the HI and LO terminals of the HP E1411B as shown in Figure 29. Then, turn mainframe power ON.

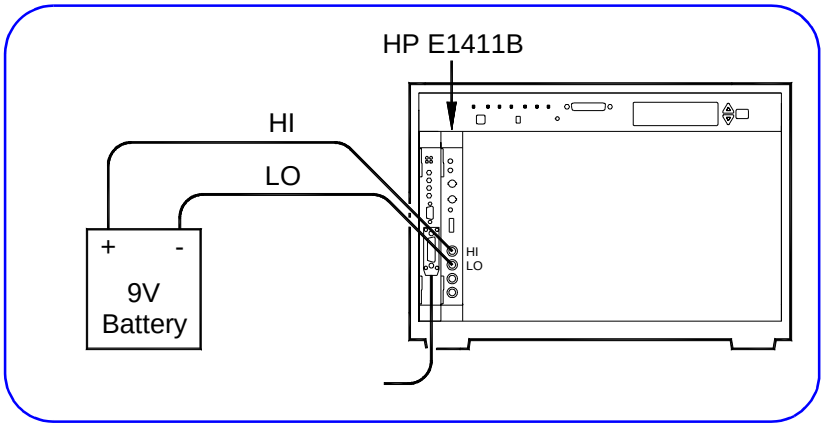


Figure 29. Example: HP E1411B Connections

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2 To display the HP E1411B Soft Front Panel, turn the PC ON and click *Start|Programs|Vxipnp|HP E1411 DVM (32-bit SFP)*. Then, to measure the 9V battery value, click the *System|Auto Update* menu item. See Figure 30 for a typical display.

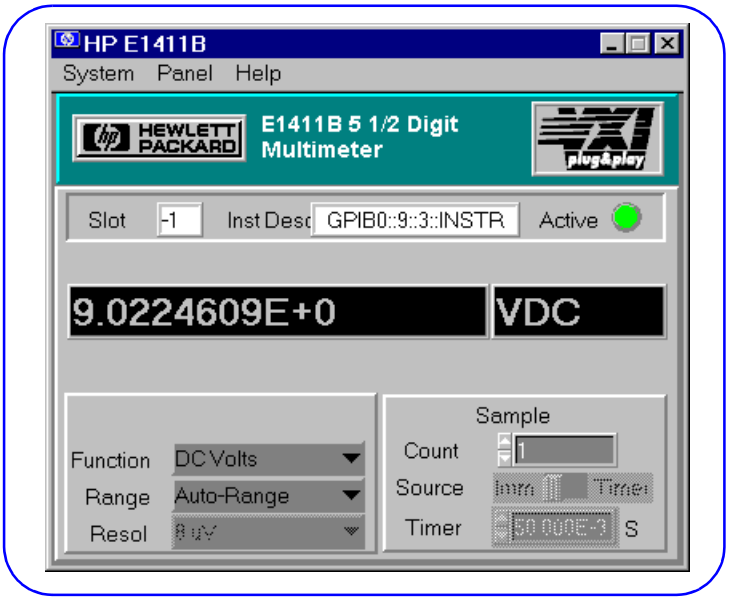


Figure 30. Example: HP E1411B Soft Front Panel Display

3 Some features of the Soft Front Panel display in Figure 30 are:

- Since this is a GPIB environment, the -1 in the **Slot** box indicates no slot information is returned. (Slot information is returned for a GPIB-VXI environment).
- The green **Active** light shows that communication is established with the HP E1411B.
- The **Instr Desc** box (GPIB0::9::3::INSTR) shows this is a GPIB environment, 9 is the HP-IB interface, 3 is the secondary address (logical address/8) of the instrument, and INSTR shows this is an instrument.
- The measured value (9.0224690E+0 VDC) is displayed in the **Display Panels**.
- You can set the **Function, Range, Resolution,** and **Sample** parameters of the instrument using the boxes at the bottom of the display.
- The **System** menu items allow you to control instrument operation. The **Panel** menu items allow you to select six different display panels. See the **Help** menu for help on using the Soft Front Panel. Click the **Close** [x] box to exit.

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5-2: Use VISA Assistant

Verify Communication Using VISA Assistant

VISA Assistant is an application program that uses the VISA I_O Library to communicate with and control VXI (GPIB-VXI), HP-IB (GPIB), and Serial (ASRL) Instruments. Some features of VISA Assistant are:

- VISA Assistant can automatically detect and assign VXI*plug&play* instrument drivers to instruments.
- VISA Assistant can also be used to send and receive I/O strings to instruments that support formatted I/O. You can execute any SCPI command from VISA Assistant.
- For other instruments, VISA Assistant allows you to read from and write to memory areas. VISA Assistant also describes attributes associated with instruments.

To use VISA Assistant, turn the PC ON and click the VISA Assistant icon in the Vxipnp program group (*Start|Programs|HP I_O Libraries|VISA Assistant*).

Example: Communicate Using VISA Assistant

For this example, we will use an HP E1411B multimeter and VISA Assistant to measure the voltage of a 9V battery connected to the HP E1411B terminals. To run this example:

1 Turn mainframe power OFF and connect the battery to the HI and LO terminals of the HP E1411B as shown in Figure 31. Then, turn mainframe power ON.

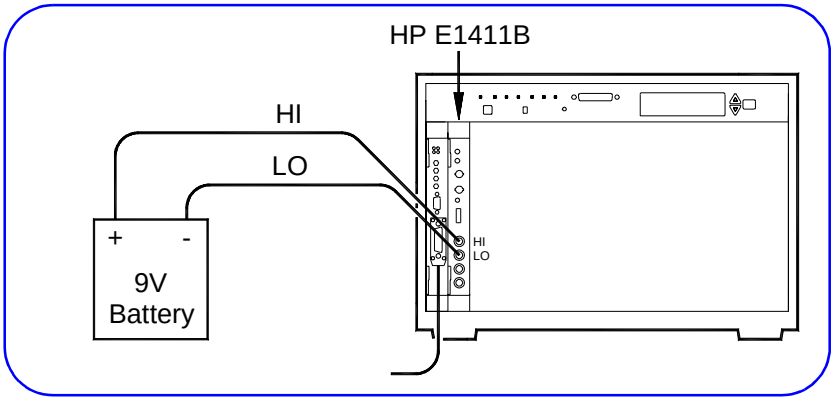


Figure 31. Example: HP E1411B Connections

2 To display the VISA Assistant Main Menu, click *Start|Programs|HP I_O Libraries|VISA Assistant*) for a display similar to that in Figure 32. (For this example, we will assume only the HP E1406A Command Module and HP E1411B DVM are installed in the mainframe.)

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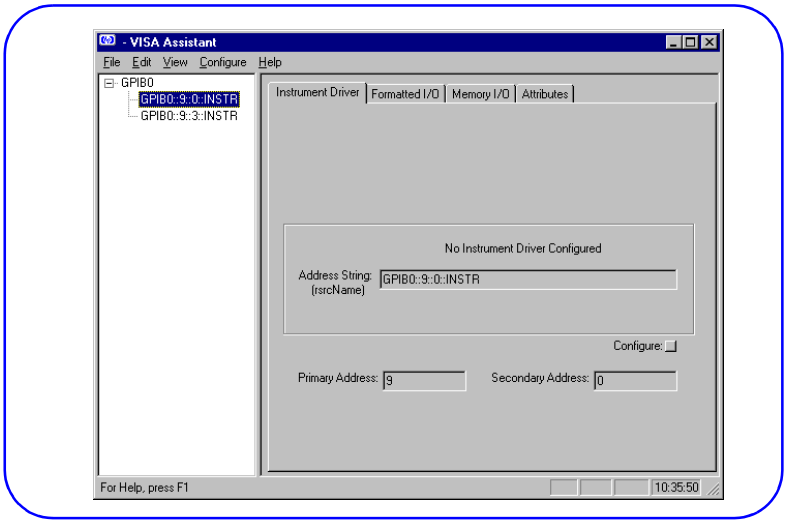


Figure 32. VISA Assistant Main Menu

3 To measure the 9V battery voltage, we will send the SCPI command MEAS:VOLT? from the Formatted I/O tab, and display the results and equivalent C-language code for MEAS:VOLT?. To do this:

- Highlight the **GPIB0::9::3::INSTR** entry
- Select the **Formatted I/O** tab
- Select **SCPI** in the *Instr. Lang*. box
- Click the ***RST** box to reset the HP E1411B

- Type MEAS:VOLT? in the **Enter String to Print or Query:** box
- Click the **viQueryf** box to display the SCPI command and result
- Check the **Show C Code** box
- Click the **viQueryf** box again to display the equivalent C code
- The result should be similar to that in Figure 33.

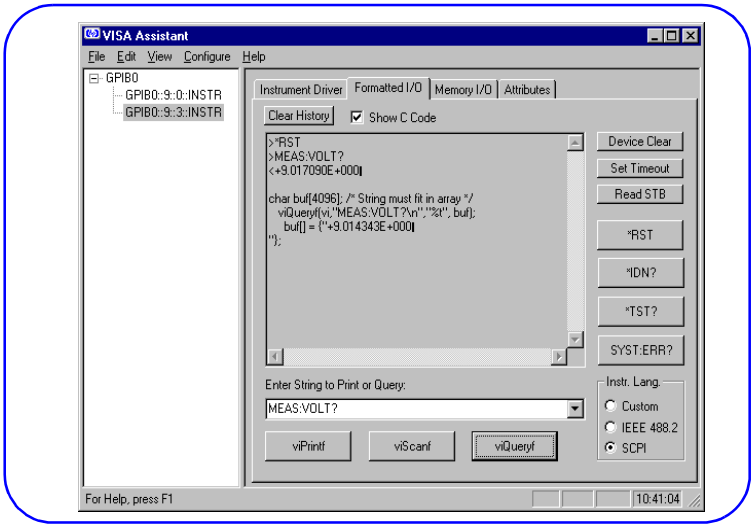


Figure 33. Example: Typical VISA Assistant Display

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5-3: Use HP VEE Instrument Manager

Verify Communication Using HP VEE Instrument Manager

You can use the HP VEE Instrument Manager to communicate with VXI instruments. See the *Controlling Instruments with HP VEE* manual for information on using Instrument Manager.

Example: Communicate Using Instrument Manager

For this HP-IB example, we will use the HP VEE Instrument Manager to communicate with an HP E1411B 5.5-Digit Multimeter at logical address 70903. The instrument name we will use is *dmm_scan*.

1 To run this example, turn PC and mainframe power ON and open HP VEE. Then, select the *I/O|Instrument Manager...* menu item to display the default Instrument Manager screen (see Figure 34).

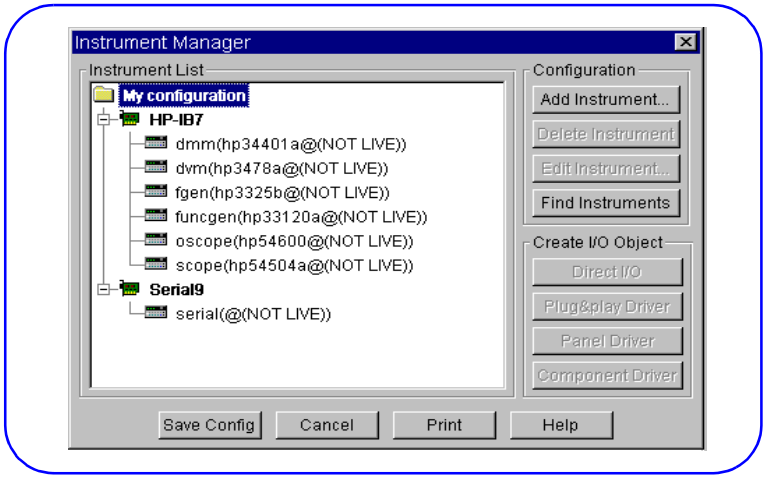


Figure 34. HP VEE Instrument Manager - Default Screen

2 Be sure *My configuration* is highlighted. Then, click the *Find Instruments* button to find all instruments (see Figure 35).

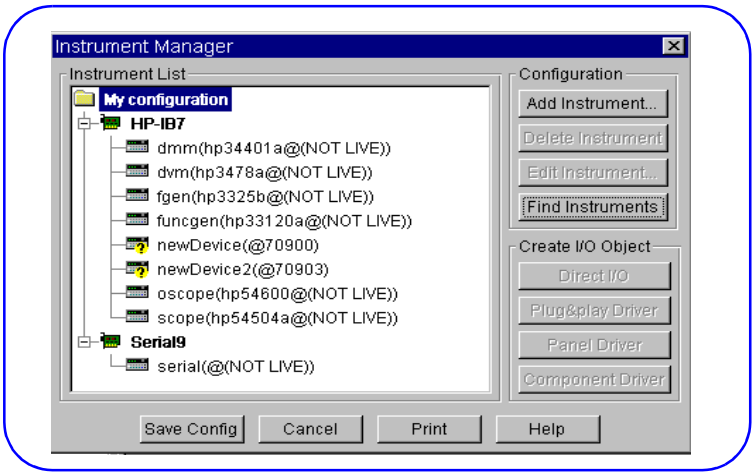


Figure 35. Instrument List Screen

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3 For an instrument at Logical Address 70903, highlight *newDevice2(@70903)*. Then, click *Edit Instrument* and set the instrument name to *dmm_scan* (see Figure 36).

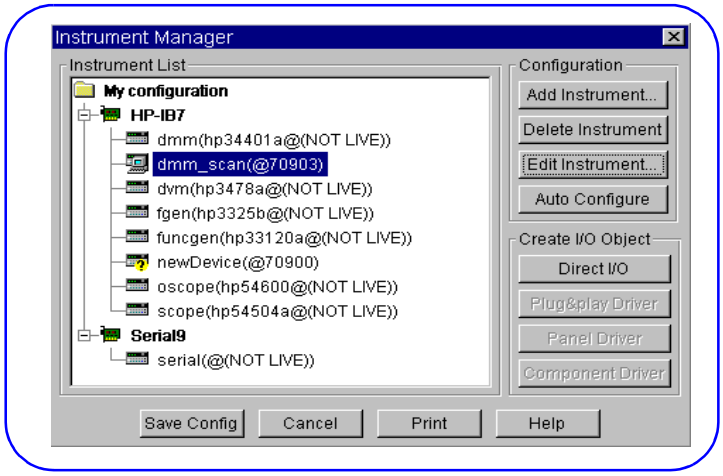


Figure 36. HP VEE Instrument Manager - Configuration

4 To verify communication with the HP E1411B, highlight the *dmm_scan (@70903)* line and then click *Auto Configure* to display an *IDN? message box similar to Figure 37.

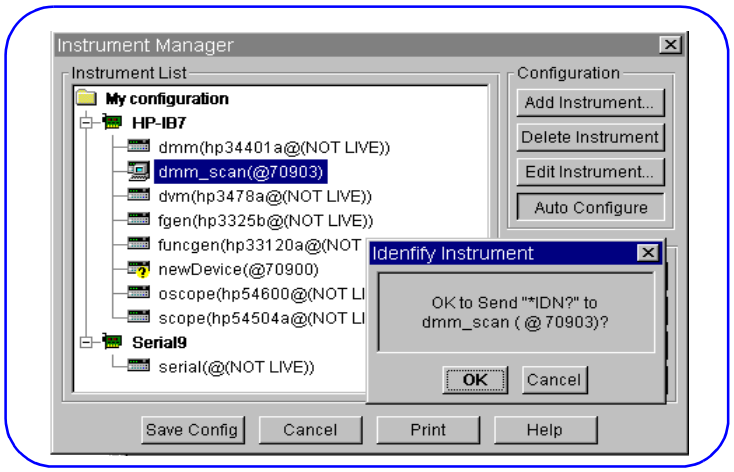


Figure 37. HP VEE Instrument Manager - Auto Configure

5 Click OK to send *IDN? to the HP E1411B. If the query is successful, instrument communication is verified and the instrument model number (hpe1411b) appears (see Figure 38).

6 Click *Save Config* to return to the HP VEE main menu.

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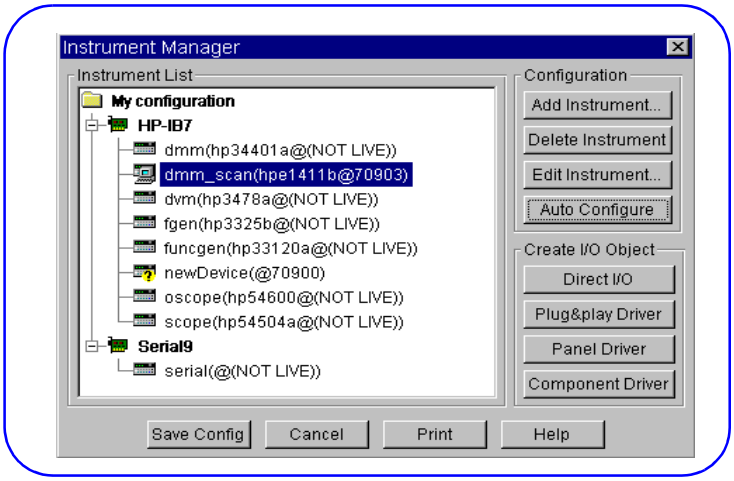


Figure 38. Typical HP VEE Instrument Manager Display

5-4: Use Resource Manager

☐ Verify Communication with Resource Manager (HP-IB)

For an HP-IB (HP E1406/E1306A) system and a PC with Windows NT/95, you can use the HyperTerminal ® utility to display the Resource Manager results. To use HyperTerminal:

1 Turn mainframe and PC power OFF and connect an RS-232 (9-pin) cable from the HP E1406A/E1306A RS232 port to a COM port on the PC.

2 Turn PC power ON (leave mainframe power OFF) and click *Start|Programs|Accessories|Hyperterminal|HyperTerminal* to display the HyperTerminal **Connection Description** screen.

3 From the **Connection Description** screen, enter a connection (session) name and click OK to display the **Connect to** screen.

4 From the **Connect to** screen, enter a phone number and the name of the COM port used (COM1 or COM2). Click OK to display the **COM{1|2} Properties** screen.

5 From the **COM{1|2} Properties** screen, select 9600 Bits per second and the COM port (COM1 or COM2) connected in Step 1 and leave the default values for the other properties. Then, click OK to display the ***session name*** **- HyperTerminal** screen.

6 When the ***session name*** **- HyperTerminal** screen is displayed, turn mainframe power ON and observe the (Resource Manager) display. See the *HP E1406A Command Module User's Guide* for details on the display. See Figure 39 for a portion of a typical Resource Manager display.

7 Use *File|Print* to print a copy of the display if desired.

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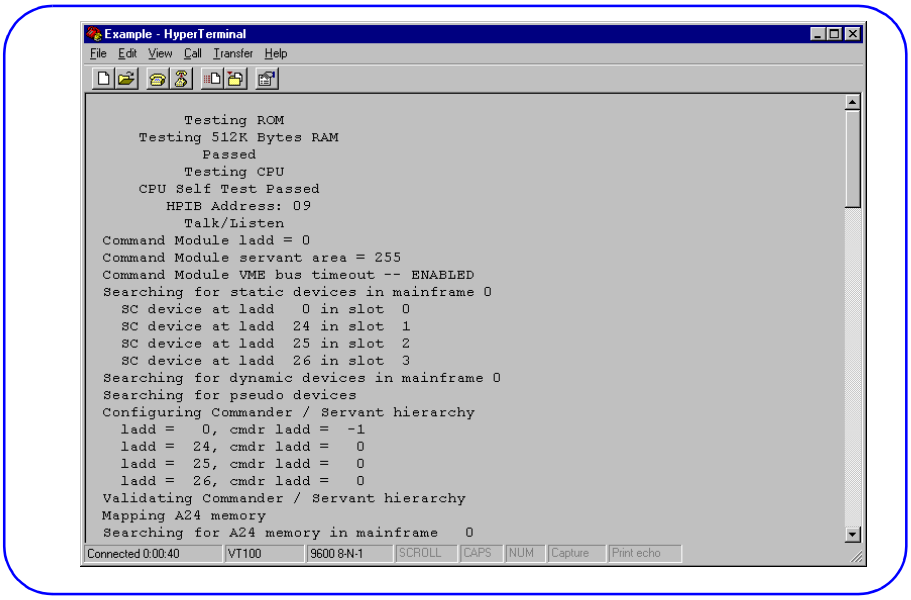


Figure 39. Typical Resource Manager Display

☐ Verify Communication with Resource Manager (IEEE-1394)

For an IEEE-1394 system with an HP E8491A Interconnect, you can communicate with instruments using the Resource Manager. To view the Resource Manager output, run the I_O Config utility (*Start|Programs|I_O Libraries|I_O Config*). See the *HP E8491A Configuration and User's Guide* for details on using the Resource Manager.

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6 Program Your System

Step 6 Overview

☐ What's in This Step?

When your VXI system is assembled and VXI instrument communication is verified, the next step is to create programs to test/evaluate your product. Figure 40 shows suggested steps to connect your product to the VXI system and to program your VXI system.

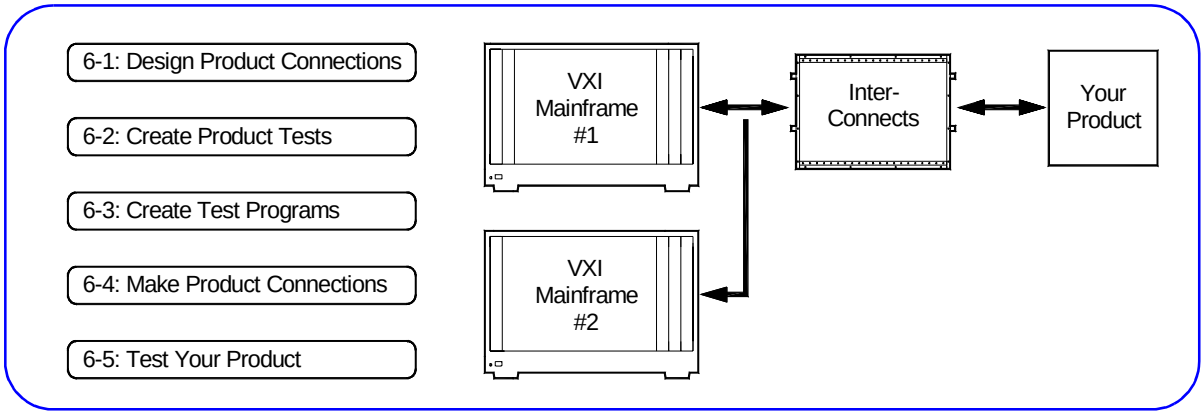


Figure 40. Steps to Program Your System

☐ What You Will Need for This Step:

- Your PC Programmer's Manual
- Application Programming Manual
- User's Guide for Each VXI Instrument
- Mainframe User's Manual
- *HP VISA User's Guide*
- *Controlling Instruments with HP VEE* manual
- *HP Universal Instrument Drivers* CD

Note This step assumes you have installed and configured your VXI hardware/software and have verified communication between your PC and the VXI equipment.

Since your product to be connected will require individualized tests and connections, this step only provides general guidelines and shows where example programs are available. You will need to design the specific tests and/or programs for your system.

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6-1: Design Product Connections

☐ Define Mass Interconnects (OPTIONAL)

The first step in designing your product (typically a Unit Under Test (UUT)) connections is to decide if you will use Mass Interconnects, such as a fixture system.

If your system uses interconnects, define the mass interconnect connections to the VXI mainframe and to your product. See the applicable *Mass Interconnect Installation* instructions to install the interconnects.

Note If you do not use mass interconnects, your product will be connected directly to the VXI instruments in the mainframe, and you will need to define these connections. In this case, skip to *Record Your Product Connections*.

Figure 41 shows one way mass interconnects (ICAs and ITAs) can be used to connect your product to the VXI instruments in the mainframe. You can use the table in the next step to record connections from your product to the VXI instruments via the ICAs and ITAs.

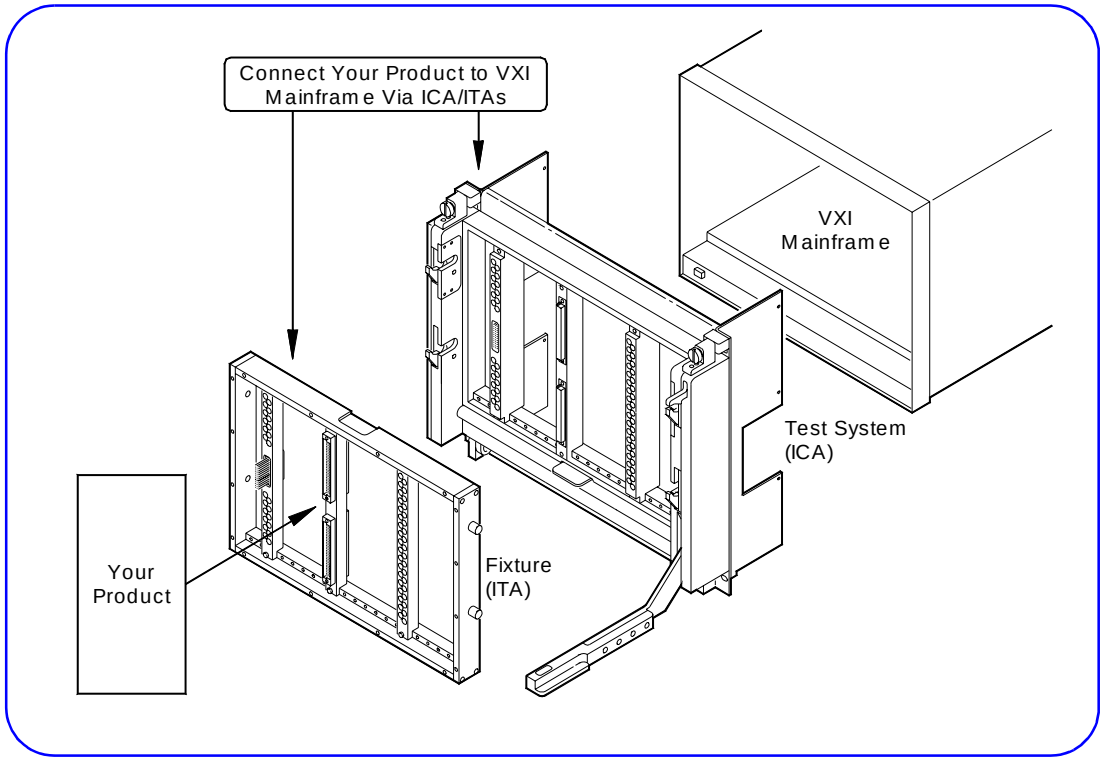


Figure 41. Typical Mass Interconnect Connections

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6-2: Create Product Tests

☐ Defining Tests for Your Product

When you have defined connections from your product to the VXI instruments, the next step is to define the specific test(s) for your product. For example, tests could include voltage, current, or resistance measurements, strain measurements, etc. Create the specific product tests required for your product.

6-3: Create Test Programs

☐ Getting Started Using Example Programs

When you have defined the tests for your product, the next step is to create programs to implement the tests. As desired, you can copy and use the example programs included on the *Hewlett-Packard Universal Instrument Drivers* CD to get started creating your test programs. In addition (for HP-IB) you can program your system using SCPI commands. See *Programming Using SCPI Commands* for details.

☐ Where are the Example Programs?

Several example programs are included on the *Hewlett-Packard Universal Instrument Drivers* CD or in the Vxipnp directory. You can copy and use or modify these programs for your application. Programs are in Visual C/C++, Visual Basic, and HP VEE.

1 For instruments that have an HP VXI*plug&play* driver, Visual C/C++ and Visual Basic example programs are contained in the instrument's VXI*plug&play* Help File. To access these programs, click *Start|Programs |Vxipnp| instrument help icon*. See "Using Visual C/C++ and Visual Basic Programs" for details.

2 If you use HP VEE, some HP VEE example programs are located in the *examples* directory of the *Hewlett-Packard Universal Instrument Drivers* CD. This directory includes C and/or HP VEE programming examples grouped by instrument number. See "Using HP VEE Example Programs" for details.

☐ Using HP VEE Example Programs

1 Be sure all applicable VXI*plug&play* drivers have been installed on the PC (see *Step 4-2: Install VXIplug&play Drivers*).

2 As required, configure the VXI instruments with the HP VEE Instrument Manager (see *Step 5-3: Use HP VEE Instrument Manager*).

3 Insert the *Hewlett-Packard Universal Instrument Drivers* CD into the CD ROM drive and wait a few seconds for the setup instructions to appear.

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4 If the setup screen does not appear in a few seconds, click *Start*|*Run* and type <*drive*>:setup.exe in the Run box, where *drive* is your CD ROM drive.

5 To access HP VEE programs from the CD, use Windows NT Explorer (or equivalent) to access the *examples* directory on the CD. This directory includes C and/or HP VEE programming examples grouped by instrument number. For example, to access the HP VEE E1411 example program, the path is <*drive*>:|*examples\hpe1411\1411*.

6 As required, see the applicable Instrument User's Guide for details on instrument addressing, operation, settings, modes, etc.

Note Online versions of most instrument manuals are included on the *Hewlett-Packard Universal Instrument Driver* CD. To access a specific online instrument manual, run the CD and click VIEW PRODUCT MANUALS from the *Choose Type of Installation* screen. Then, select the manual you want to view.

7 Copy, run, and modify the example programs as desired. We suggest you copy the HP VEE example programs from the CD to your HP VEE working directory set up during HP VEE installation.

8 When you run an example program, you may be prompted to add device drivers and/or to save the instrument configuration. However, doing this may overwrite the default instrument configuration file (*vee.io*). If you do **not** want the *vee.io* file to be overwritten, you can do one of two things:

- In Windows Explorer, re-name the *vee.io* file to another file (such as *vee_mine.io*, etc.) BEFORE you run the example program. After you run the program, delete the new *vee.io* file and restore your configuration file to its original name (*vee.io*). You will need to do this if you want to run the example programs shipped with HP VEE.

OR

- Click NO when asked if you want to save the changes. When you exit HP VEE, the default configuration file (*vee.io*) will remain unchanged. For this action, you will not need to rename *vee.io*.

9 Repeat Steps 5 through 8 for each VXI instrument to be programmed using HP VEE.

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Example: HP E1411 HP VEE Program

An HP VEE example program for the HP E1411B Digital Multimeter that is on the *Hewlett-Packard Universal Instrument Drivers* CD is entitled 1411. To access this program, select <*drive*>:*examples*\ *hpe1411**1411*, where *drive* is the CD-ROM drive letter.

For this example, we will copy the 1411 program to the HP VEE working directory. When HP VEE is run and the program is opened, a display similar to Figure 42 appears. If you have an HP E1411B DVM in your system, you can run this program and observe the results. (Be sure you have configured the instruments as shown in *Step 5-3: Use HP VEE Instrument Manager*.)

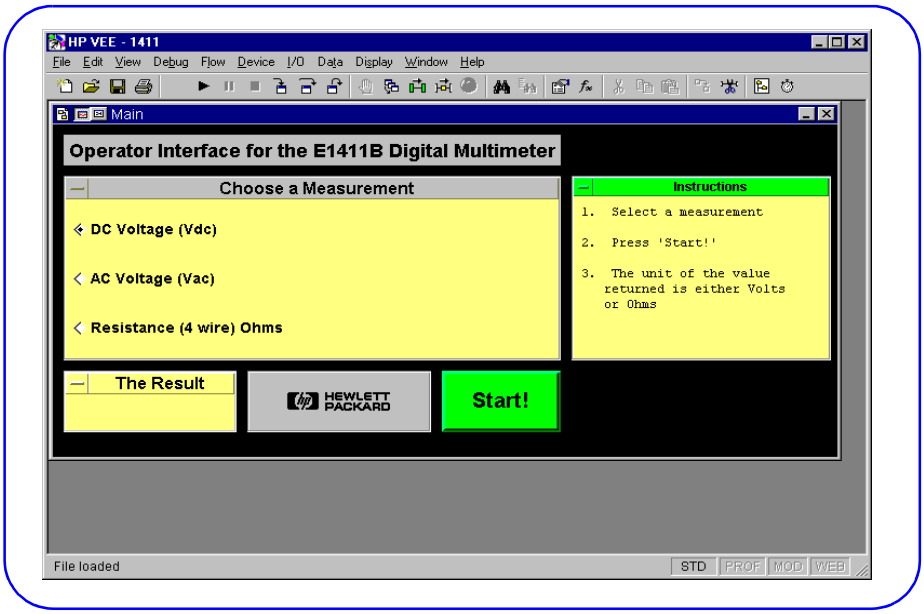


Figure 42. HP VEE Example Program Screen

Using Visual C/C++ and Visual Basic Programs

You can program VXI instruments that have VXI*plug&play* drivers using Visual C/C++ or Visual Basic and the online VXI*plug&play* Help Files for VXI instruments. To use the example Visual C/C++ or Visual Basic programs:

1 Be sure all applicable VXI*plug&play* drivers have been installed on the PC (see *Step 4-2: Install VXIplug&play Drivers*).

2 (HP-IB) Be sure all applicable SCPI instrument drivers have been downloaded to the HP Command Module (see *Step 4-3: Download SCPI Drivers*).

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3 For the first VXI instrument to be programmed, open the applicable instrument VXI*plug&play* Help File (*Start*|*Programs* |*Vxipnp*| *instrument help icon*). Figure 43 shows a typical VXI*plug&play* Help File main menu for the HP E1411 DVM that is displayed when you click *Start*|*Programs*|*Vxipnp*|*HP E1411 Help (32-bit)*.

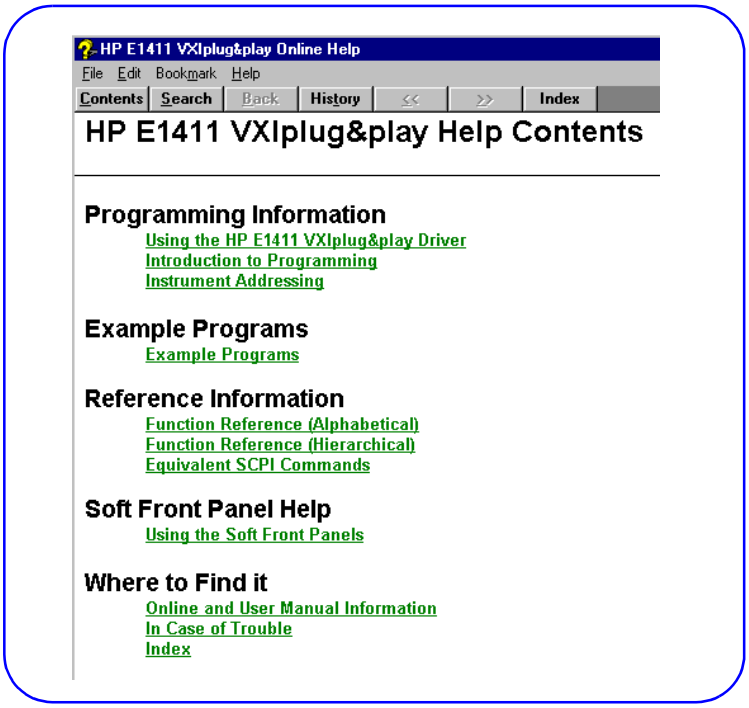


Figure 43. Typical VXI*plug&play* Help File Main Menu

4 Read the *Programming Information* sections for information on using the instrument driver, an introduction to programming the instrument, and specific addressing for the instrument.

5 See the *Reference Information* sections for VXI*plug&play* function references, examples, and equivalent SCPI commands.

6 See the *Example Programs* section for a list of example programs that you can copy and use or modify as desired. As required, see the applicable *Instrument User's Guide* for details on instrument operation, settings, modes, etc.

Note Online versions of most instrument manuals are included on the *Hewlett-Packard Universal Instrument Drivers* CD. To access a specific online instrument manual, run the CD and click VIEW PRODUCT MANUALS from the *Choose Type of Installation* screen. Then, select the manual you want to view.

7 Repeat Steps 3 through 6 for each VXI instrument to be programmed.

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☐ Programming Using SCPI Commands

You can use HP VISA programming and SCPI/IEEE-488.2 Common Commands if your system has an HP E1406 or HP E1306 Command Module or an HP E1300/E1301 Mainframe, and you have downloaded necessary SCPI instrument drivers (see *Step 4-3: Download SCPI Drivers).* Information on SCPI command programming, example programs, Command Reference, and register-based programming for each instrument is contained in the VXI instrument (paper) manual.

Note Online versions of most instrument manuals are included on the *Hewlett-Packard Universal Instrument Drivers* CD. To access a specific online instrument manual, run this CD and click VIEW PRODUCT MANUALS from the *Choose Type of Installation* screen. Then, select the manual you want to view.

To use HP VISA and SCPI commands to program VXI instruments:

1. Be sure SCPI instrument drivers have been downloaded to the HP Command Module (HP E1406A/E1306A), or to the HP E1300/01 mainframe) for each **register-based** instrument (see *Step 4-3: Download SCPI Drivers*).
2. Use the information in the *HP VISA User's Guide* and the applicable Instrument User's Manual (or the online version) to select, copy, and modify program examples for your application.
3. Repeat Steps 1 and 2 for each VXI instrument to be programmed.

6-4: Make Product Connections

☐ Making Product Connections

When you have designed the tests and programs for your product, see the connection table entries (see *Step 6-1: Design Product Connections*), the applicable Mass Interconnect Installation Instructions, and the applicable Instrument User's Guides to connect your product to the VXI instruments.

WARNING **Be sure mainframe power is OFF, and observe all safety precautions when making the connections.**

6-5: Test Your Product

☐ Testing Your Product

The final step in the getting started process is to run the programs you have created to test your product. The procedures in this step are, of course, totally dependent on your application needs. This completes the *Getting Started with VXI* process for external PC VXI Systems.

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Chapter 3
Installing Embedded PC VXI Systems

Using This Chapter

What's in This Chapter?

This chapter shows a suggested six-step process to install, configure, and program an embedded PC VXI system. The chapter contents are:

- Step 1: Identify Your System . . . . . page 53
- Step 2: Install VXI Hardware . . . . . page 56
- Step 3: Configure Your PC . . . . . page 64
- Step 4: Install Libraries/Drivers . . . . . page 65
- Step 5: Verify Instrument Communication . . . . . page 70
- Step 6: Program Your System. . . . . page 78

What is an Embedded PC VXI System?

In this guide, embedded PC VXI systems are defined to consist of a Windows-based PC installed in slots 0 and 1 of a C-Size VXI mainframe. The interface is the VXI backplane. Your product (typically a Unit Under Test (UUT)) is connected via (optional) interconnects to VXI instruments in the mainframe. See Figure 1 for a typical embedded PC VXI system.

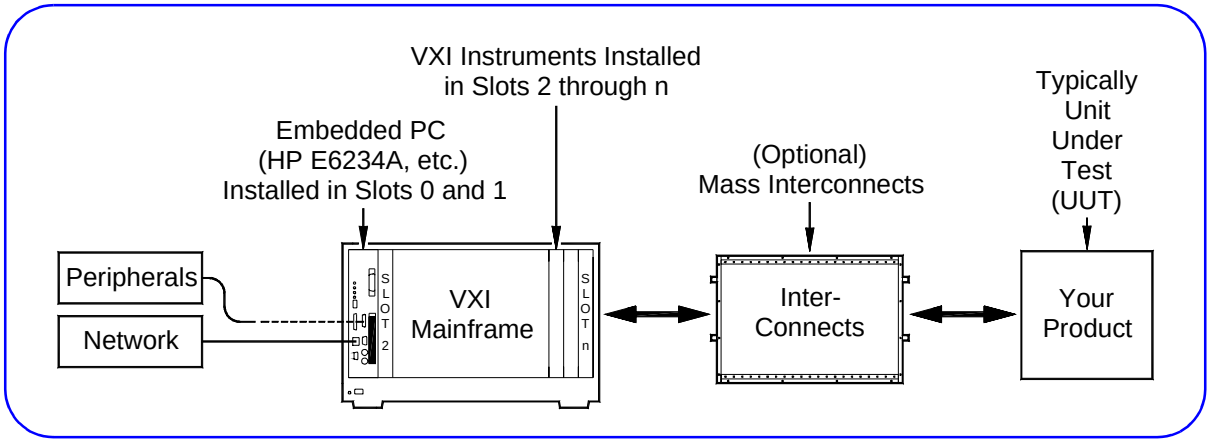


Figure 1. Typical Embedded PC VXI System

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Steps to Install Embedded PC VXI Systems

Figure 2 shows suggested steps to install, configure, and program an External PC VXI system.

Note Since your VXI system may vary from that shown in Figure 1 you may need to modify the steps in this guide. If you received a pre-configured system, skip any steps that have already been accomplished such as VXI instruments already installed in the mainframe, etc.

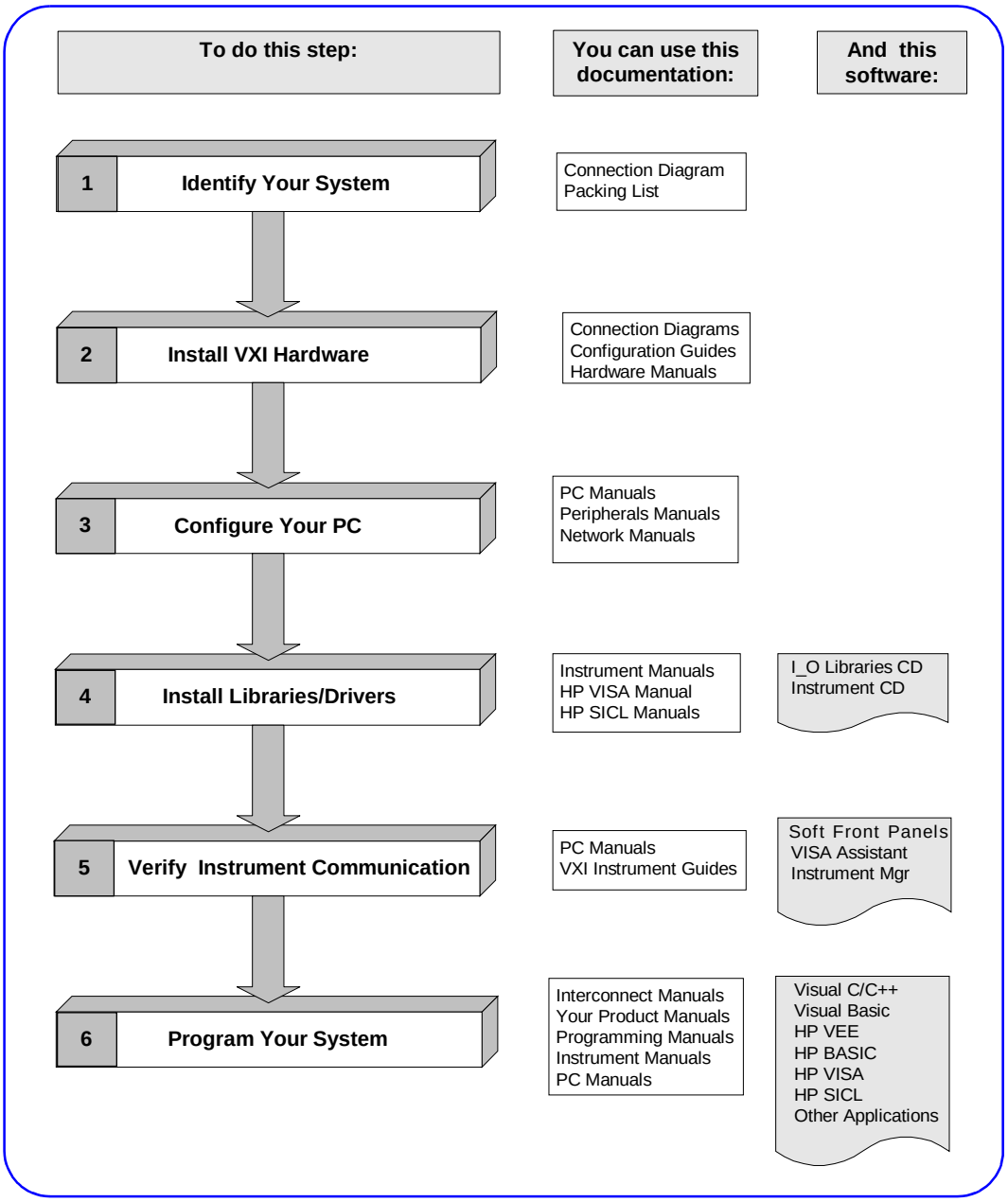


Figure 2. Steps to Install Embedded PC VXI Systems

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1 Identify Your System

Step 1 Overview

What's in This Step?

The first step in installing your VXI system is to unpack and inventory the system, and to identify your specific VXI system type. This step includes the procedures in Figure 3.

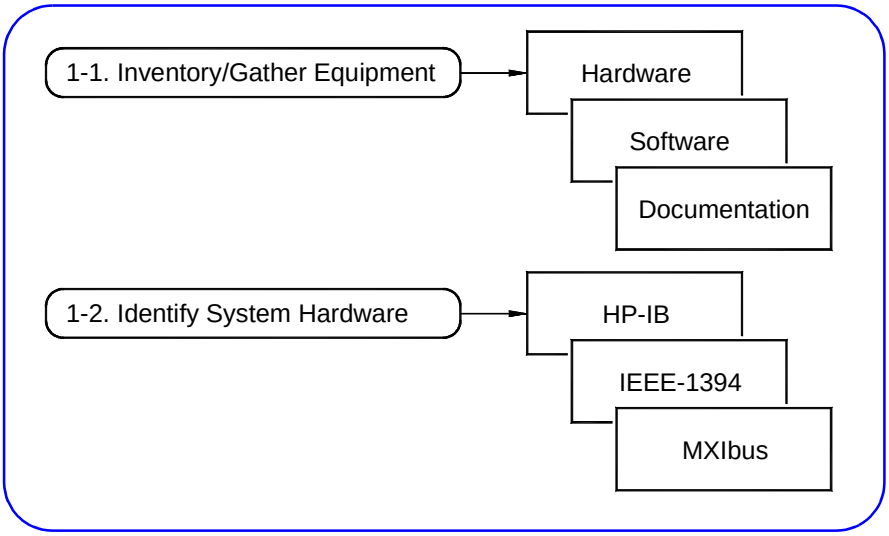


Figure 3. Steps to Identify Your VXI System

WARNING **During all phases of installation, operation, service or repair of any equipment for any step in this guide, you must follow all safety instructions in the applicable manual or guide, as well as the safety instructions in this guide.**

1-1: Inventory/ Gather Equipment

Inventory VXI Equipment/Gather Other Equipment

1 Unpack and inventory hardware, software, and documentation for your VXI system (see Figure 4). For pre-configured systems, you can use the *Packing List* that accompanied this guide to check the equipment contents.

2 Gather other items not received with your system, such as your PC, computer documentation, tools, etc., that you may need to assemble your system (see Figure 4).

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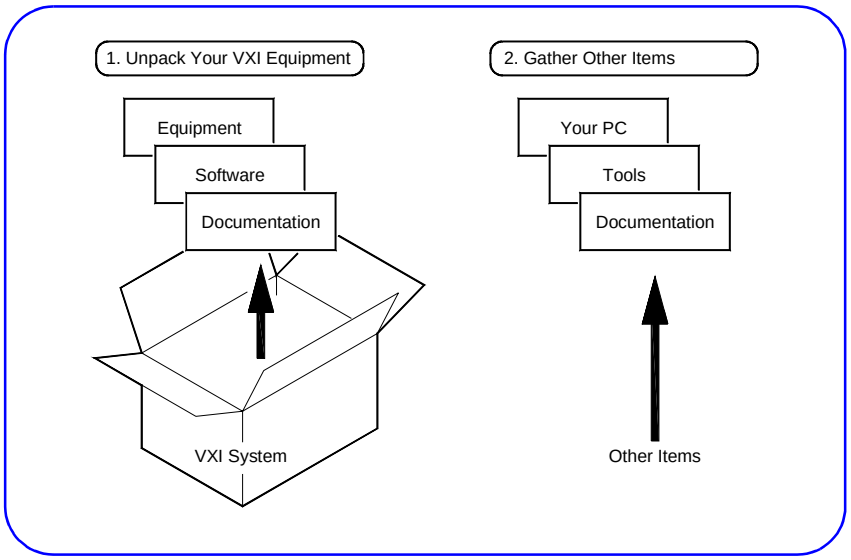


Figure 4. Inventory/Gather Equipment

1-2: Identify System Hardware

☐ **Identify Your System Type**

In this guide, embedded PC VXI systems are categorized as VXI Backplane (Figure 5) or MXIbus (Figure 6). Select the system that is closest to your system.

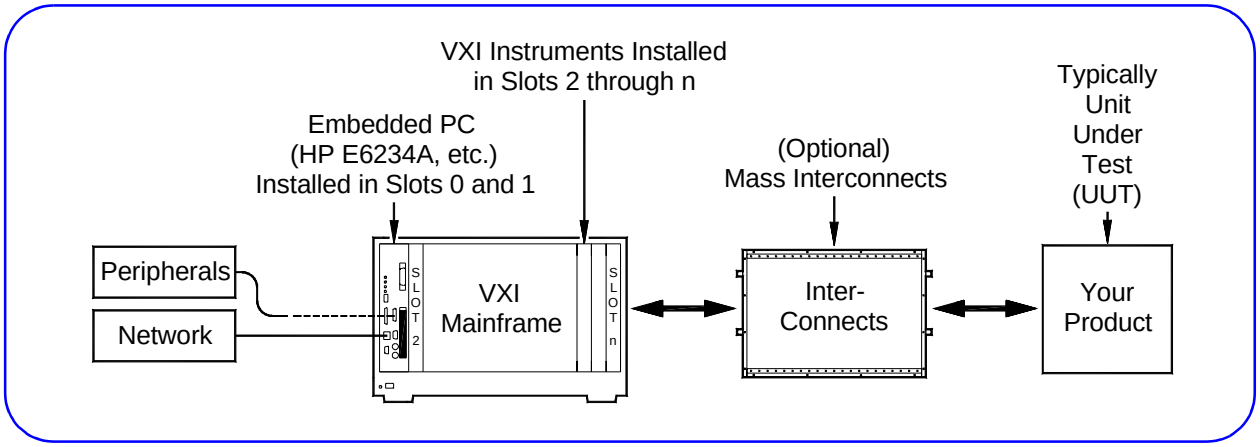


Figure 5. Typical VXI Backplane System

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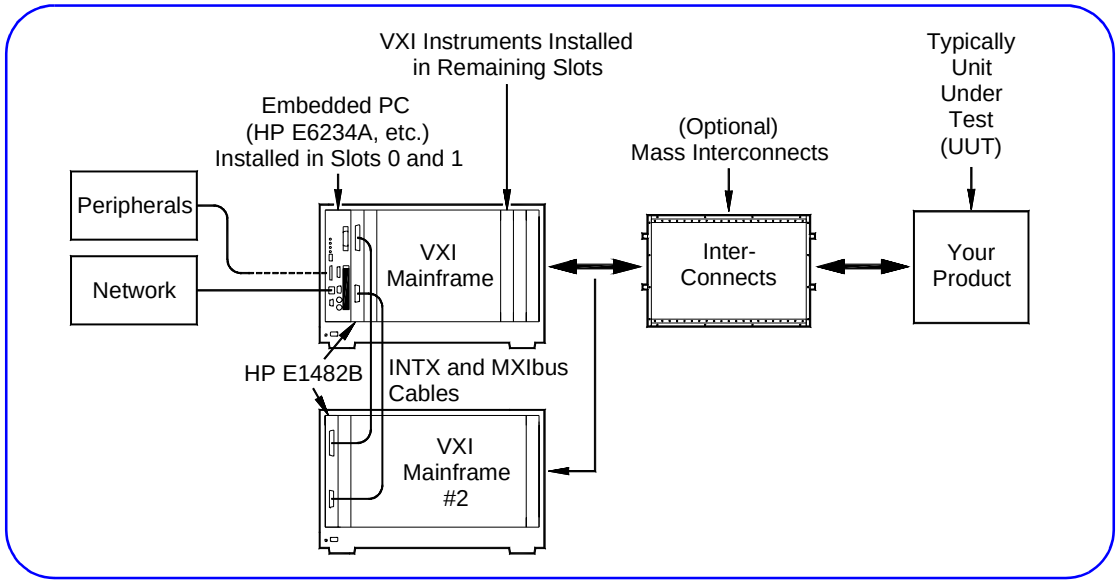


Figure 6. Typical MXIbus System

☐ Identify Hardware

Use Figure 7 to identify the hardware for your VXI system, including the PC controller, mainframe(s), and VXI instruments. You may want to copy this figure and highlight the specific components for your system for use in future steps.

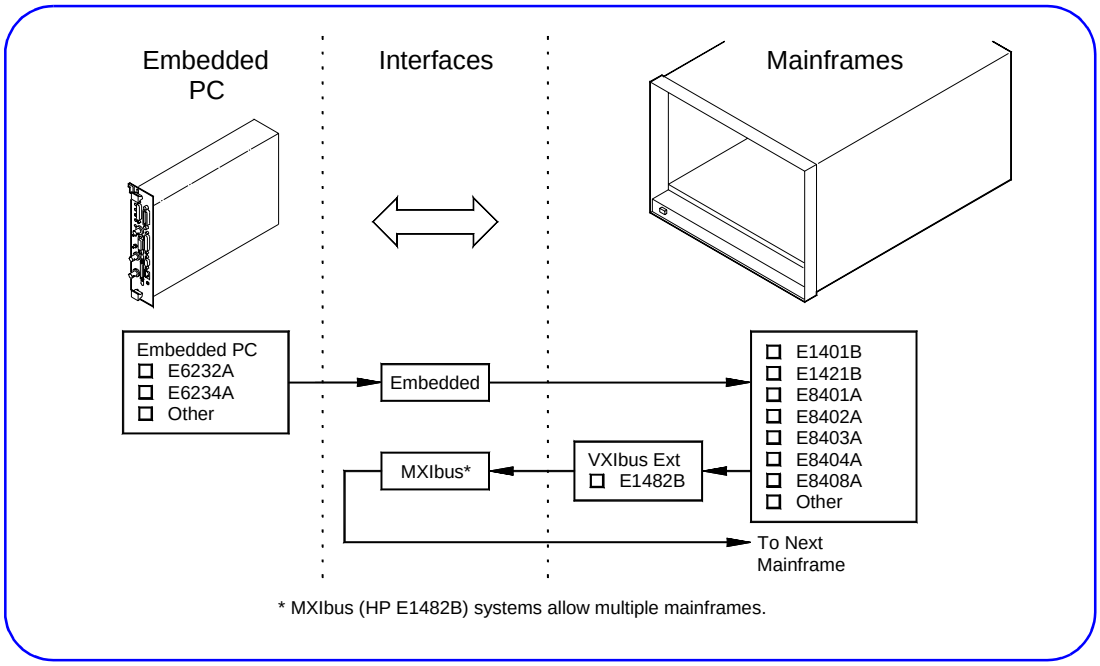


Figure 7. Typical Embedded PC VXI Hardware Elements

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2 Install VXI Hardware

Step 2 Overview

What's in This Step?

This step gives guidelines to install the VXI hardware. Figure 8 shows the parts of this step, and shows the parts of the system installed after this step is completed. For pre-configured systems, skip steps that do not apply to your system.

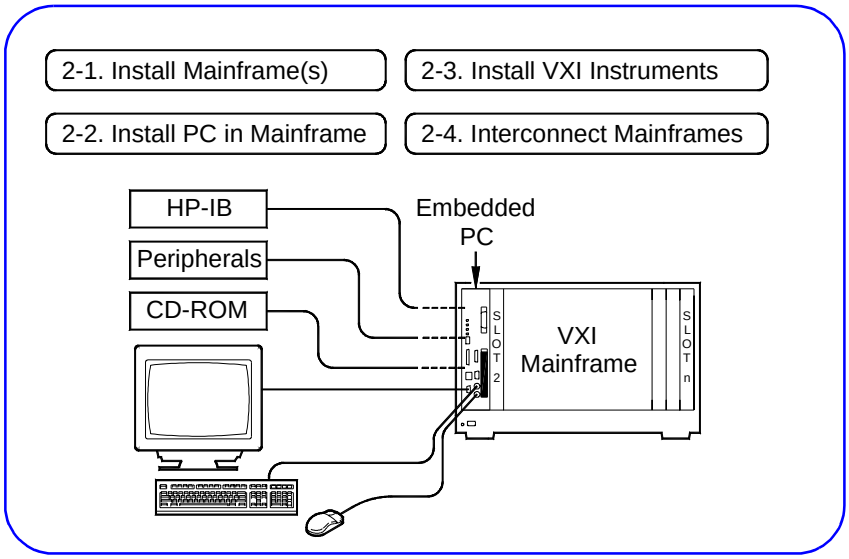


Figure 8. Steps to Install VXI Hardware

☐ What You Will Need for This Step:

- VXI Mainframe(s)
- Rack Mount Installation Kit (as required)
- PC to be Installed in the Mainframe
- VXI Instruments to be Installed

- Mainframe User's/Service Manual
- Rack Mount Installation Instructions (as required)
- Your PC User's Manual
- User's Manuals for each VXI instrument to be installed

2-1: Install Mainframe(s)

☐ Rack Mount VXI Mainframe(s) (OPTIONAL)

As required, rack mount the mainframe(s) for your VXI system using the procedures in the applicable *Rack Mount Installation Guide*. If rack mounting is not required go to the next step, *Configure the VXI Mainframe(s)*.

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☐ Configure the VXI Mainframe(s)

1 If rack mounting is not required, place the mainframe on a bench or table as desired.

2 Install the ground connector (for 66 Hz and above operation ONLY), connect the power cord, and configure each mainframe as required as shown in the applicable Mainframe User/Service Manual.

3 Turn mainframe(s) power ON and observe the power-on sequence (if any) for the mainframe(s). See the applicable Mainframe User/Service Manual for details.

4 Turn mainframe(s) power OFF. If required, correct hardware errors and retest before installing the PC or any VXI instruments.

☐ *Example: HP E8404A Power-On Sequence*

To observe the HP E8404A C-Size mainframe power-on sequence, plug the power cord into an AC outlet.The amber Standby Indicator (see Figure 9) should turn ON. Then, press the Power switch. The Green Light should turn ON, and the Amber Light should turn OFF.

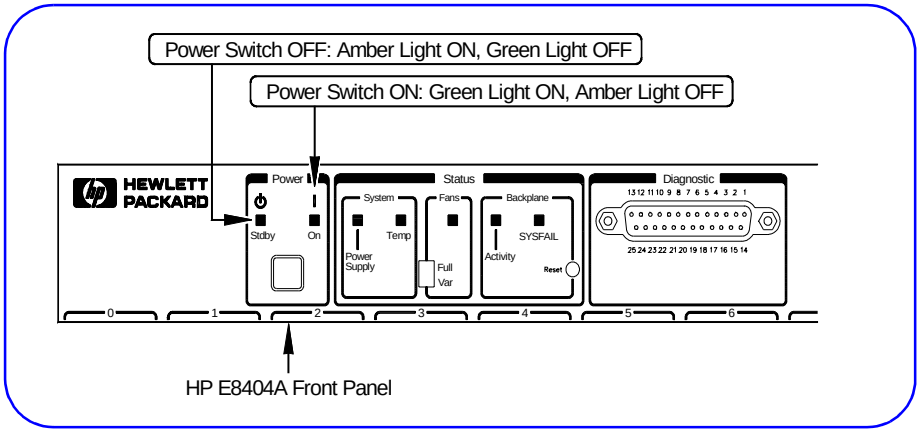


Figure 9. Example: HP E8404A Power-On Sequence

2-2: Install PC in Mainframe

☐ Install PC in Mainframe

Set any required switches on the PC. Then, install the PC in Slots 0 and 1 of the mainframe (see Figure 10). See the applicable PC User's Manual for details. Be sure to observe all ESD precautions when handling, installing, and removing the PC.

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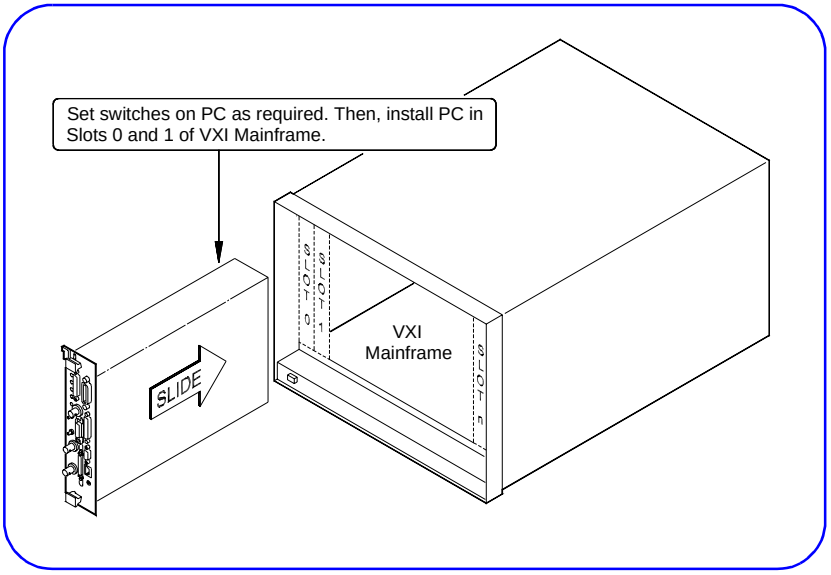


Figure 10. Installing the PC (non-MXIbus System)

☐ Connect Interface Devices to PC

Connect interface devices, such as monitor, keyboard, mouse, external CD-ROM, etc. to the installed PC. See the applicable PC User's Manual for instructions.

☐ Example: Typical Interface Device Connections

Figure 11 shows some typical connections for an HP E6233 PC.

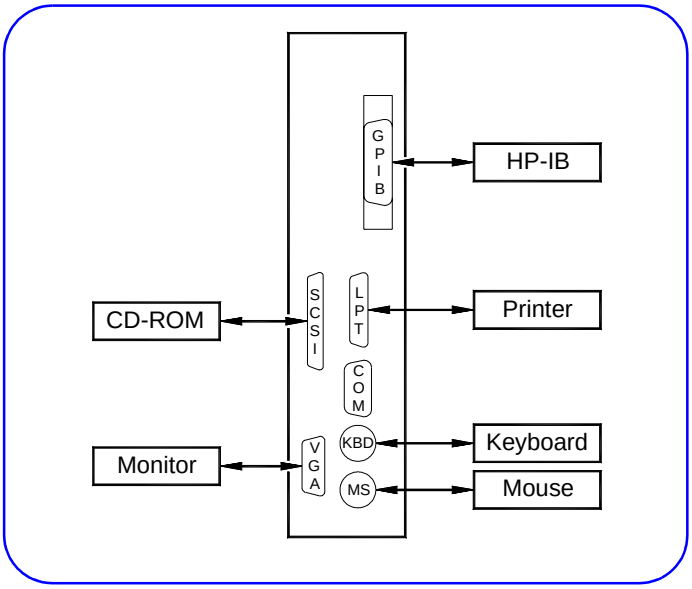


Figure 11. Typical PC Interface Device Connections

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2-3: Install VXI Instruments

☐ Determine Instrument Slot/Logical Address

1 The first step to install VXI instruments is to select the mainframe slot to use for each VXI instrument. See the applicable Mainframe User's/Service Manual or Instrument User's Guide for guidelines.

2 When you have selected a slot for an instrument, enter the instrument model number, name, and serial number for the instrument in Table 1. (The instrument serial number is located on the side of the instrument.) Do this for all instruments to be installed.

Note For pre-configured systems, the *Installed VXI Instruments* List in the *Owner's Pack* lists instrument model number, name, logical address, and serial number for each installed VXI instrument.

Table 1. Instruments Installed in Mainframe

Slot	Model Number	Instrument Name	Logical Address	Serial Number
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

☐ Set VXI Instrument Logical Addresses

1 When you have selected the slot for each VXI instrument, the next step is to set the instrument logical addresses (LADDR) as required. In general, you can use the factory-set (default) logical addresses.

2 If you need to set other logical addresses, use the following guidelines. See the applicable Mainframe User's/Service Manual or Instrument User's Guide for details.

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- The logical address for each VXI instrument is set by the Logical Address (LADDR) switch on the instrument. The logical address value is the sum of the values of the logical address switches set to the closed position (see Figure 12).

- For HP-IB (HP E1406A Command Module) systems, each VXI instrument must have a separate logical address and the logical address **must** be a multiple of 8 (8, 16, 24, etc.).

- For IEEE-1394 (HP E8941A Interconnect) systems, each VXI instrument must have a separate logical address but the logical address does **not** have to be a multiple of 8.

- A multimeter and one or more multiplexers can be used to form a **scanning multimeter**. In this case, the instruments must be in adjacent mainframe slots and must have sequential logical addresses (see Figure 13). In addition, for HP E1406A systems the multimeter must have a logical address that is a multiple of 8.

3 When you have selected the logical address for an instrument, set the address using the LADDR switch on the instrument. Then, record the logical address in Table 1. Repeat for each instrument.

☐ Example: Setting Multimeter Logical Address

Figure 12 shows an HP E1411B multimeter with the Logical Address switch set to 24. Since switch 3 (logical value = 8) and switch 4 (logical value = 16) are both closed, the sum of the logical values (24) is the logical address for the HP E1411B. See the *HP E1326B/E1411B User's Guide* for details.

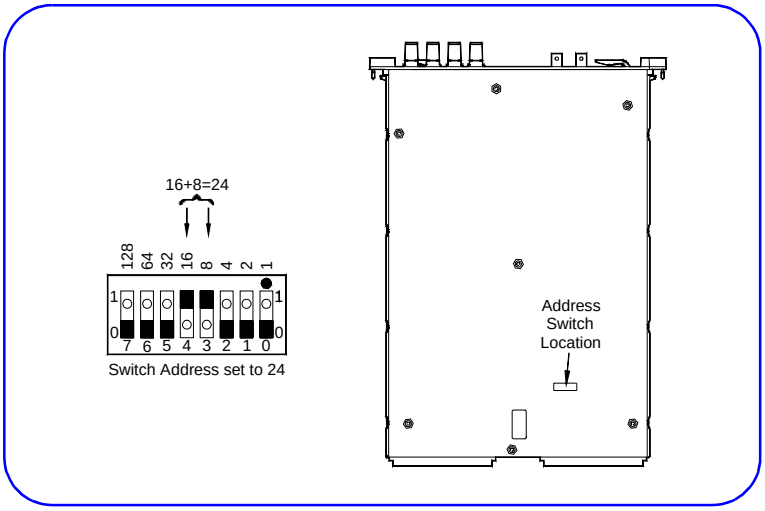


Figure 12. Example: HP E1411B Logical Address Switch

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Example: Scanning Multimeter Logical Addresses

Figure 13 shows an HP E6234A embedded PC installed in Slots 0 and 1 and VXI instruments installed in slots 3 through 6 of an HP E8404A VXI mainframe. The HP E1411B multimeter and the two HP E1460A multiplexers form a scanning multimeter since they are in adjacent mainframe slots, and they have sequential (24, 25, 26) logical addresses.

Since this is an HP-IB (HP E1406A) system, the HP E1411B multimeter must have a logical address that is a multiple of 8 (24 in this case). For an IEEE-1394 (HP E8491A) system, the three instruments must still be in adjacent mainframe slots, but could have any three sequential logical addresses (such as 17, 18, 19).

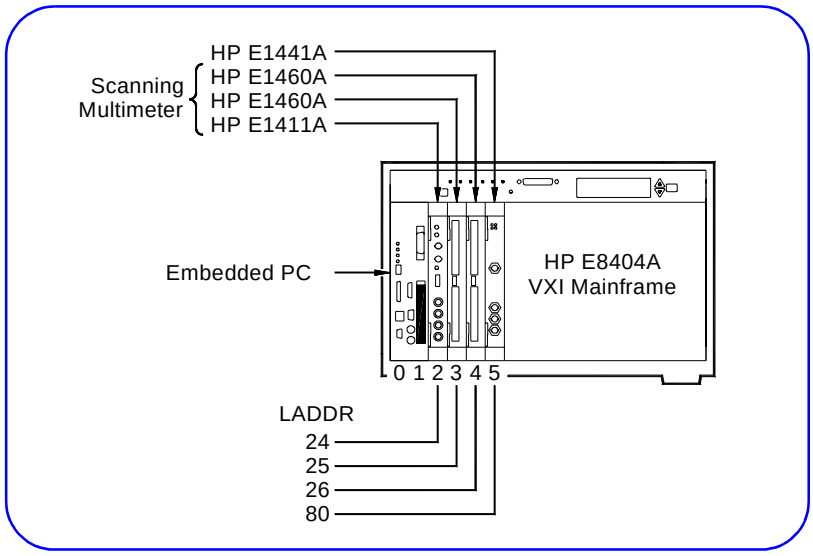


Figure 13. Example: Scanning Multimeter Logical Addresses

Install VXI Instruments in Mainframe

1 As required, perform Logical Address switch (and other switch) setting changes for each VXI instrument. See the previous step and the applicable Instrument User's Guide for details.

2 Turn mainframe power OFF. Then, install each VXI instrument in the slot(s) you previously identified. Figure 14 shows the hardware connected at the end of this step.

3 Turn mainframe power ON and observe each instrument's power-on display sequence (if any). See the applicable Instrument User's Guide for details. Then, turn mainframe power OFF.

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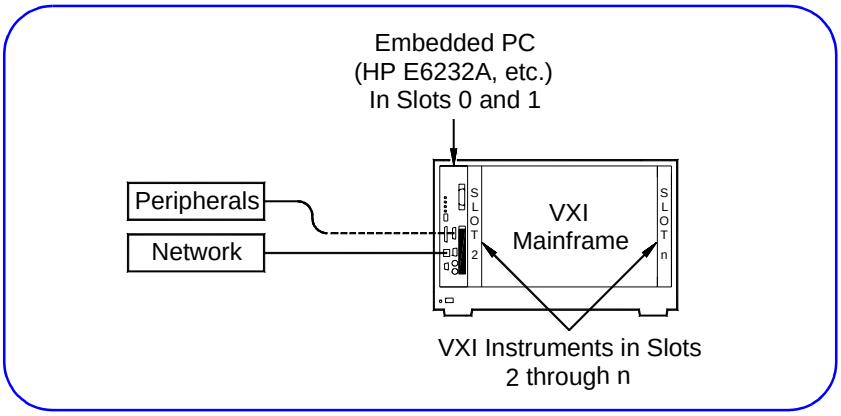


Figure 14. Installing VXI Instruments in the Mainframe

☐ Connect Rack & Stack Equipment (OPTIONAL)

If you have HP-IB Rack & Stack equipment in your system, you can connect an HP-IB cable from the embedded PC to the Rack & Stack instruments (see Figure 15).

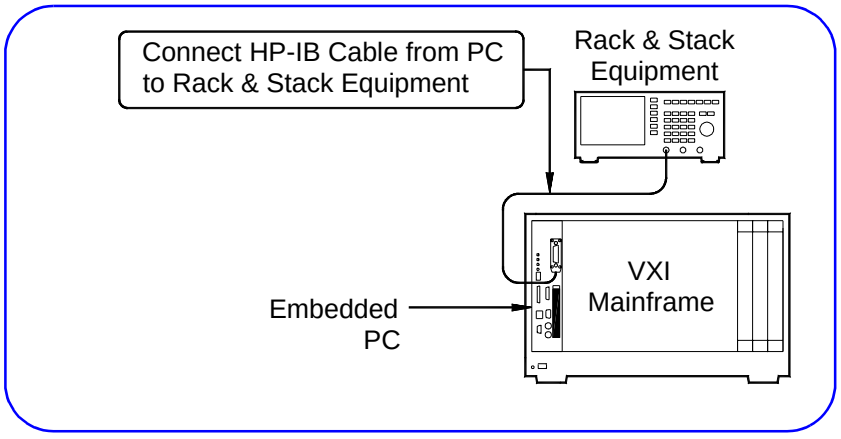


Figure 15. Connecting HP-IB Rack & Stack Equipment

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2-4: Interconnect Mainframes (MXIbus)

☐ Interconnect VXI Mainframes (MXIbus System ONLY)

For a MXIbus interface and multiple mainframes, interconnect the mainframes by connecting MXI and INTX cables between each mainframe. See the *HP E1482B User's Guide* for details.

☐ *Example: Interconnecting Mainframes (MXIbus)*

Figure 16 shows typical interconnections for two mainframes connected via HP E1482B VXIbus Extender cards.

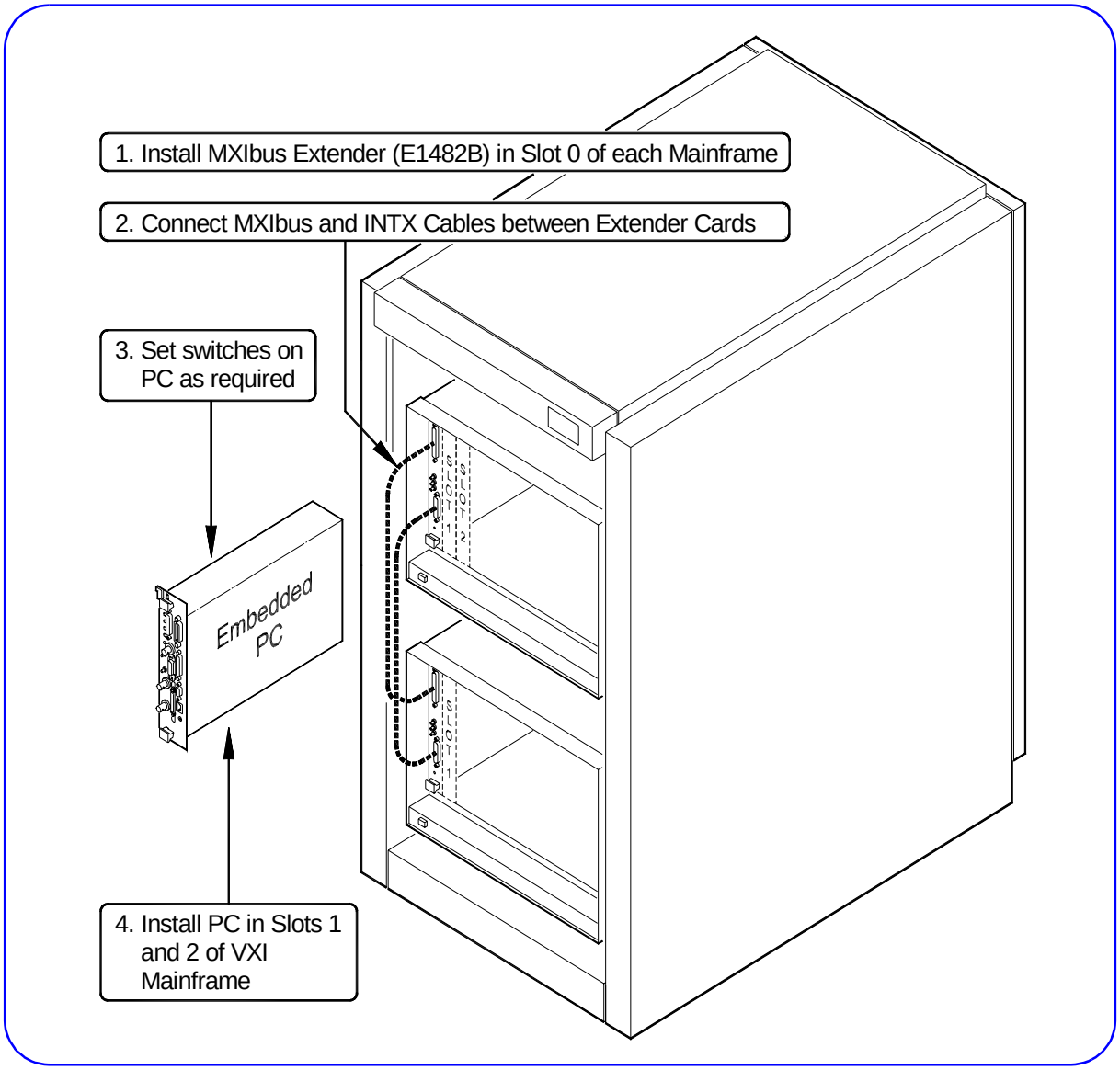


Figure 16. Typical MXIbus Mainframe Connections

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3 Configure Your PC

Step 3 Overview

☐ What's in This Step?

This step gives guidelines to configure an embedded PC for use with a VXI system. Figure 17 shows the parts of the VXI system that are installed when this step is completed.

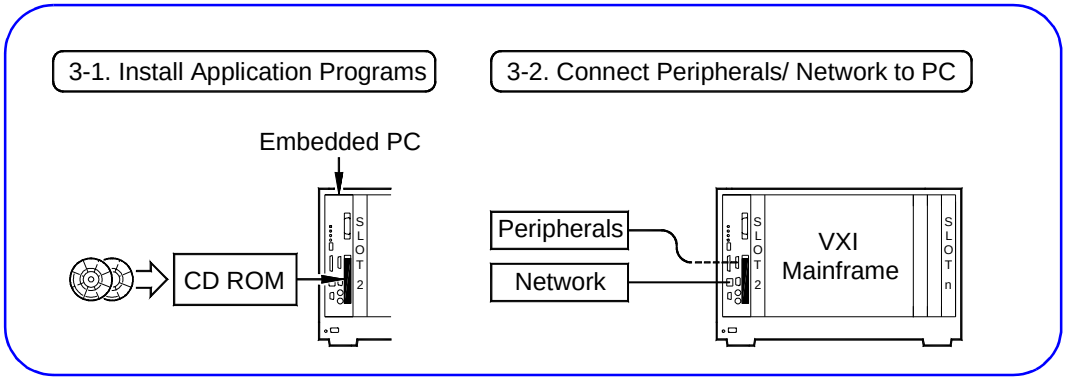


Figure 17. Steps to Configure Your PC

☐ What You Will Need for This Step:

- Your PC Installed in the Mainframe
- Peripherals to be connected to PC (printers, plotters, etc.)
- PC User's Manual
- Peripherals Installation Manuals
- Network Installation Manuals

3-1: Install Application Programs

☐ Install Application Programs in Your PC

If you have not already done so, turn the PC ON and install the application programs you intend to use to program the VXI system, such as Visual C/C++®, HP VEE, Visual Basic ®, etc.

3-2: Connect Peripherals/ Network to PC

☐ Connect Peripherals/Network to PC (OPTIONAL)

If not already done, connect peripherals (printer, plotter, etc.) to the PC as required. See the applicable peripherals documentation for installation instructions. As required, connect the PC to your network. See your System Administrator for connection requirements.

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4 Install Libraries/Drivers

Step 4 Overview

☐ What's in This Step?

This step gives guidelines to install HP I_O Libraries and HP VXI*plug&play* drivers for a VXI system. Figure 18 shows the software installed at the end of this step.

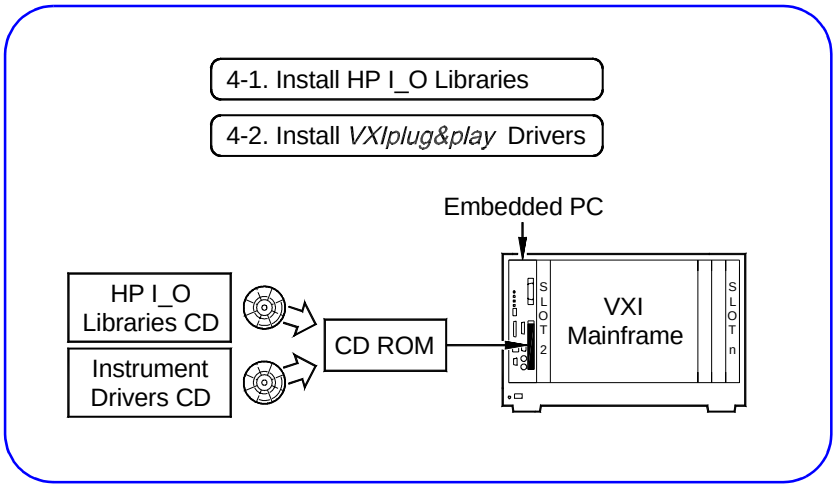


Figure 18. Steps to Install Libraries/Drivers

☐ What You Will Need for This Step:

- *HP Universal Instrument Drivers* CD
- *HP I_O Libraries for Instrument Control* CD
- *HP I_O Libraries Installation and Configuration Guide for Windows*

4-1: Install HP I_O Libraries

☐ Install the HP I_O Libraries on the PC

Note If you have already installed the HP I_O Libraries as part of the HP VEE installation process, skip this step and go to *Step 4-2: Install VXIplug&play Drivers.*

1. Turn the PC ON and close all open applications.
2. Insert the *HP I_O Libraries for Instrument Control* CD into the CD-ROM, and wait a few seconds for the application to run.

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3 The installer should automatically start when the CD is inserted. If not, select *Start*|*Run* and type <drive>:setup.exe.

4 Click *Next* on the first screen and *Yes* on the second screen.

5 When the **Install HP E8491 VXI Components** screen appears (see Figure 19), check the "Install HP E8491 VXI Components" box if your system has an HP E8491A (IEEE-1394 to VXI interface) and you want to install drivers for it. Then, click *Next*.

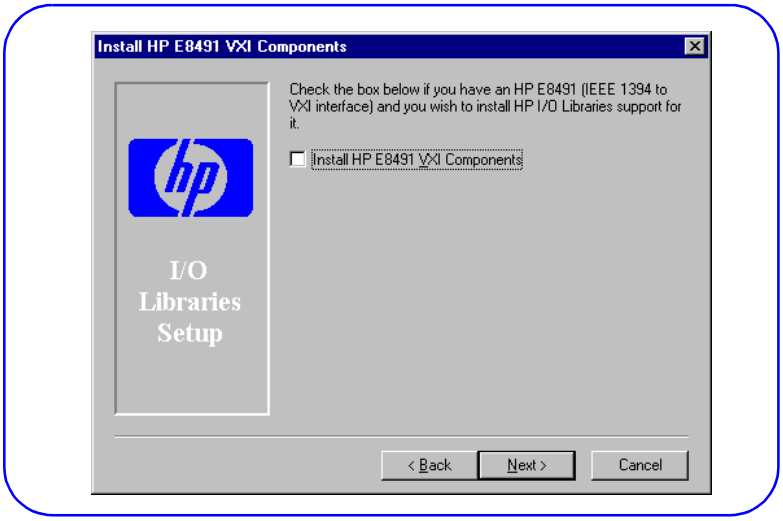


Figure 19. Install HP E8491 VXI Components Screen

6 Follow the instructions to go through the next two screens to select a destination directory and to copy files to the selected directory.

7 When the **View Readme and Configure Interface** screen appears, be sure the *Configure interfaces* box is checked. (You can uncheck the *View Readme* box if desired.) Then, click *Next* to display the **I_O Config** screen (see Figure 20).

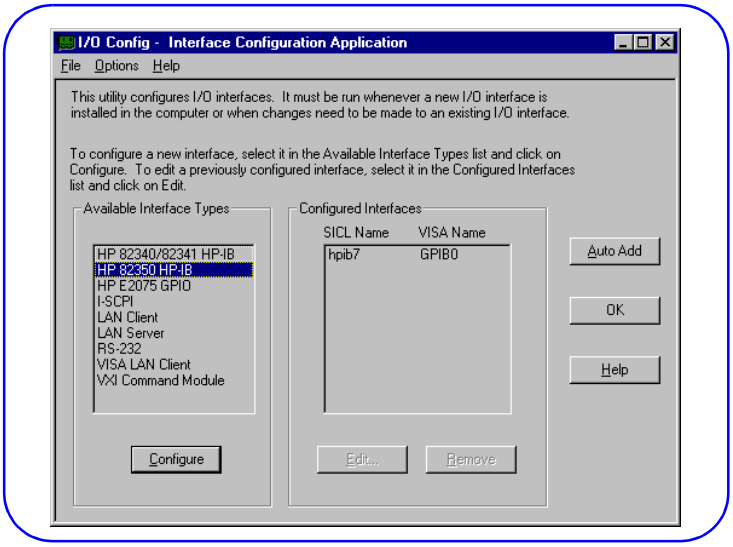


Figure 20. Typical I_O Config Utility Screen

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8 Select the interface you want to configure, and the I_O Config utility will help you configure each interface. Click the Help button for information on using I_O Config, or see the *HP I_O Libraries Installation and Configuration Guide for Windows.*

9 When you have completed I_O configuration, follow the instructions to display the **Restart Windows** screen. Select *Yes, I want to restart my computer now,* and then click *OK*.

10 After the computer has re-started, remove the HP *I_O Libraries* CD.

What Program Groups Are Created?

During installation, an HP I_O Libraries program group is created. Also, a Vxipnp (VXI*plug&play*) program group is created where VXI*plug&play* drivers can be installed.

Note When you install the I_O libraries, both VISA and SICL directories are automatically installed on your system. Do NOT delete the SICL directory as some parts of VISA are dependent on SICL.

4-2: Install VXI*plug&play* Drivers

Where are the VXI*plug&play* Drivers?

VXI*plug&play* drivers can be installed in the Vxipnp directory (created when you loaded the *Hewlett-Packard I_O Libraries for Instrument Control* CD) from the *Hewlett-Packard Universal Instrument Drivers* CD.

Note The *Hewlett-Packard Universal Instrument Drivers* CD you received should contain the latest version of the instrument drivers. See the World Wide Web at *http://www.hp.com/go/inst_drivers* for driver information.

Install VXI*plug&play* Drivers on Your PC

1 Insert the *Hewlett-Packard Universal Instrument Drivers* CD into the CD-ROM and wait a few seconds for the setup instructions to appear.

2 If the setup screen does not appear in a few seconds, click *Start*|*Run* and type <*drive*>:setup.exe in the Run box, where *drive* is your CD-ROM drive.

3 When the main menu appears, click *Launch Installer or View Manuals*. Click *Next* on the next screen and *Yes* on the third screen to go to the **Choose Type of Installation** screen (see Figure 21).

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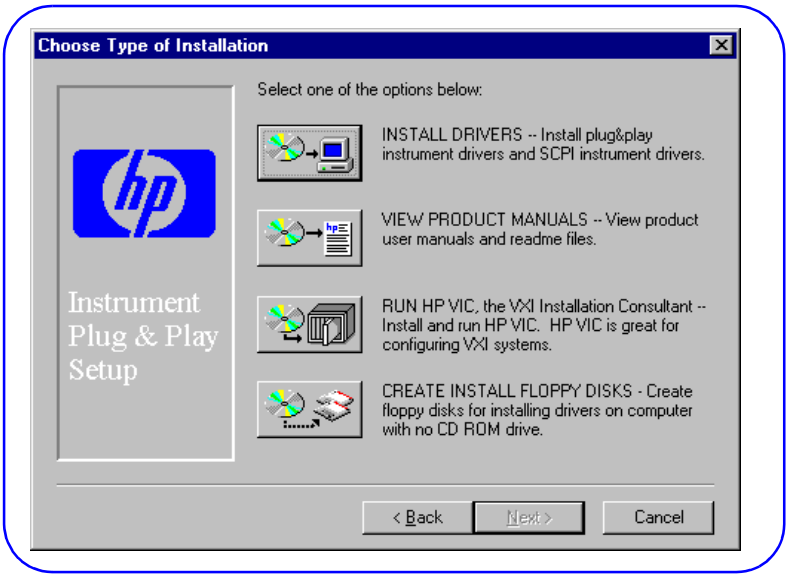


Figure 21. Choose Type of Installation Screen

4 Select *INSTALL DRIVERS* and choose whether or not to view the README.TXT file. Click *No* to display the **Choose Item to Install** screen (see Figure 22).

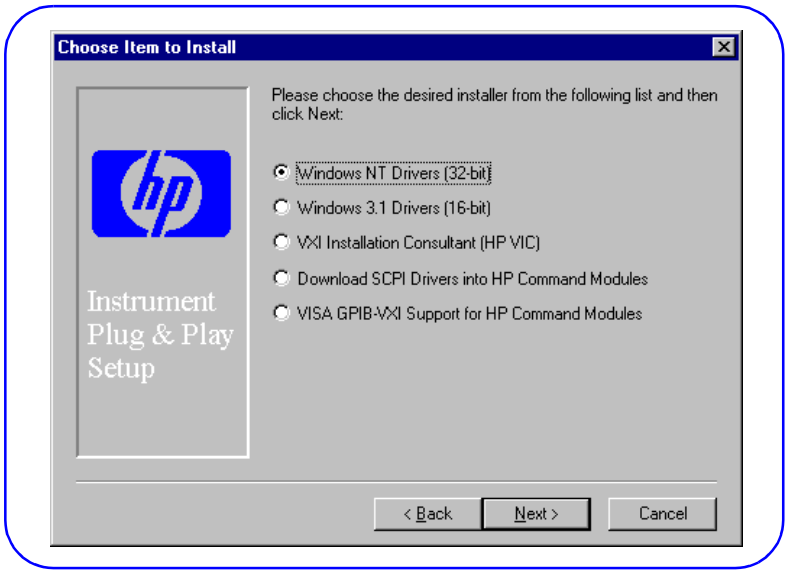


Figure 22. Choose Item to Install Screen

5 For Windows ® 95/Windows NT®, click *Windows NT Drivers (32-bit)*. For Windows ® 3.1, click *Windows 3.1 Drivers (16-bit)*. Click *Next* to display a list of available VXI*plug&play* drivers.

6 Highlight the driver(s) to be installed and press *Next* to begin installation. Follow the on-screen instructions to install the VXI*plug&play* driver(s) for your VXI system.

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Note The list of drivers displayed is for VXI instruments (such as an HP E1411 multimeter, HP E1460A multiplexer, etc.) and does not include Mainframes or Command Modules (HP E1406A, etc.). VXI*plug&play* drivers are not required for Mainframes and Command Modules.

7 When the **Choose Program Folder Items** screen appears (see Figure 23), check *the Soft Front Panel*, *Read Me* and *Help* entries. Then, click *Next*. Follow the instructions to load the driver(s).

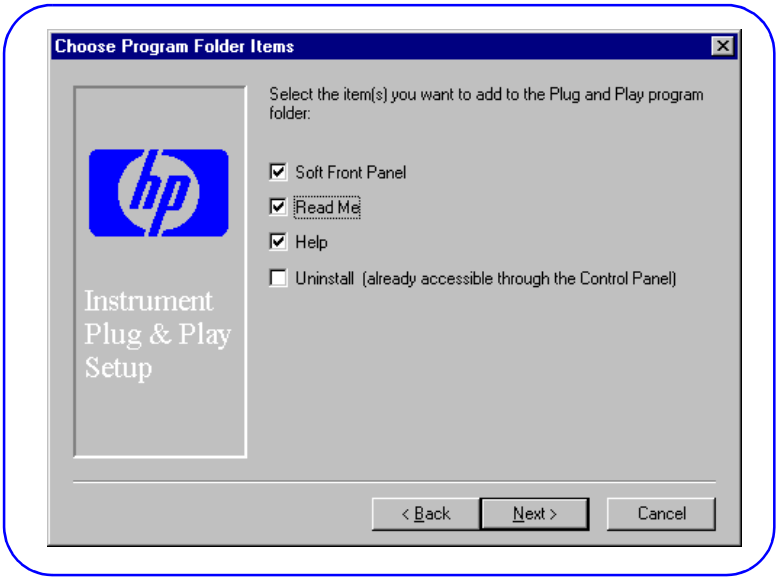


Figure 23. Choose Program Folder Items Screen

8 When installation is complete, click *No* when asked if you want to select another option.

9 Close the taskbar icons (*C:\WINNT\profiles...*, etc.) and then remove the CD.

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5 Verify Instrument Communication

Step 5 Overview

☐ What's in This Step?

This step gives guidelines to use the tools shown in Figure 24 to verify communication with VXI instruments. Although several tools are described in this step to verify communication with instruments, no specific order is implied. You can use any one (or all) of the methods as desired.

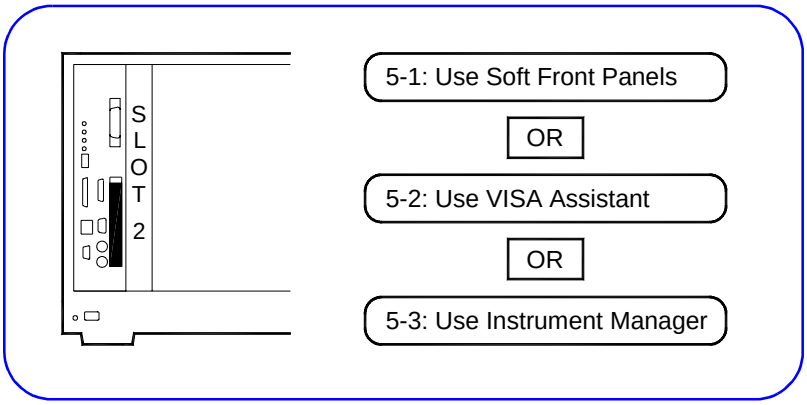


Figure 24. Some Tools to Verify Instrument Communication

☐ What You Will Need for This Step:

- Your VXI hardware system with configured PC connected
- Mainframe User's Manuals
- Slot 0 Controller User's Manuals
- User's Manual for each installed instrument
- Controlling Instruments with HP VEE manual

5-1: Use Soft Front Panels

☐ Verify Communication Using Soft Front Panels

Instrument Soft Front Panels (SFP) are included as part of the instrument VXI*plug&play* drivers, and provide a virtual "front panel" for selected instruments. A soft front panel is activated from the Vxipnp program group when you click the applicable SFP icon (*Start*|*Programs*| *Vxipnp*|<*instrument*> *(SFP)*).

Note To use an Instrument Soft Front Panel, the instrument must have a Soft Front Panel file loaded in the Vxipnp program group. See *Step 4-2: Install VXIplug&play Drivers* for information on loading Soft Front Panels.

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Some features of Soft Front Panels (SFP) are:

- A SFP is a virtual “front panel” for the instrument. Thus, you can use the SFP to communicate with the instrument and to return results.
- SFPs return the slot number (for some instruments) and the instrument description, including the logical address.
- You can use SFPs to set instrument functions, ranges, and other features *without writing a single line of code*.

☐ *Example: Communicate Using HP E1411B Soft Front Panel*

For this example, we will use an HP E1411B multimeter and the HP E1411 Soft Front Panel to measure the voltage of a 9V battery connected to the HP E1411B terminals. To run this example:

1 Turn mainframe power OFF and connect the battery to the HI and LO terminals of the HP E1411B as shown in Figure 25. Then, turn mainframe power ON.

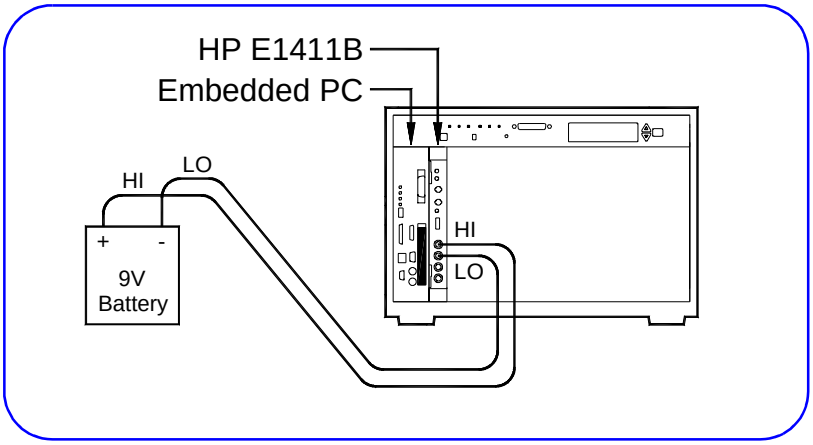


Figure 25. Example: HP E1411B Connections

2 To display the HP E1411B Soft Front Panel, turn the PC ON and click *Start|Programs|Vxipnp|HP E1411 DVM (32-bit SFP)*. Then, to measure the 9V battery value, click the *System|Auto Update* menu item. See Figure 26 for a typical display.

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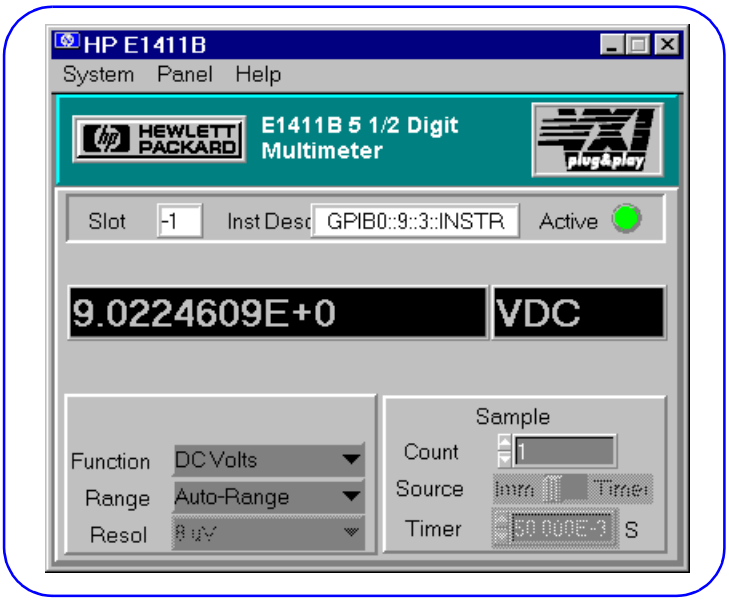


Figure 26. Example: HP E1411B Soft Front Panel Display

3 Some features of the Soft Front Panel display in Figure 26 are:

- Since this is a GPIB environment, the -1 in the **Slot** box indicates no slot information is returned. (Slot information is returned for a GPIB-VXI environment).
- The green **Active** light shows that communication is established with the HP E1411B.
- The **Instr Desc** box (GPIB0::9::3::INSTR) shows this is a GPIB environment, 9 is the HP-IB interface, 3 is the secondary address (logical address/8) of the instrument, and INSTR shows this is an instrument.
- The measured value (9.0224690E+0 VDC) is displayed in the **Display Panels**.
- You can set the **Function, Range, Resolution,** and **Sample** parameters of the instrument using the boxes at the bottom of the display.
- The **System** menu items allow you to control instrument operation. The **Panel** menu items allow you to select six different display panels. See the **Help** menu for help on using the Soft Front Panel. Click the **Close** [x] box to exit.

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5-2: Use VISA Assistant

Verify Communication Using VISA Assistant

VISA Assistant is an application program that uses the VISA I_O Library to communicate with and control VXI (GPIB-VXI), HP-IB (GPIB), and Serial (ASRL) Instruments. Some features of VISA Assistant are:

- VISA Assistant can automatically detect and assign VXI*plug&play* instrument drivers to instruments.
- VISA Assistant can also be used to send and receive I/O strings to instruments that support formatted I/O. You can execute any SCPI command from VISA Assistant.
- For other instruments, VISA Assistant allows you to read from and write to memory areas. VISA Assistant also describes attributes associated with instruments.

To use VISA Assistant, turn the PC ON and click the VISA Assistant icon in the Vxipnp program group (*Start|Programs|HP I_O Libraries|VISA Assistant*).

Example: Communicate Using VISA Assistant

For this example, we will use an HP E1411B multimeter and VISA Assistant to measure the voltage of a 9V battery connected to the HP E1411B terminals. To run this example:

1 Turn mainframe power OFF and connect the battery to the HI and LO terminals of the HP E1411B as shown in Figure 27. Then, turn mainframe power ON.

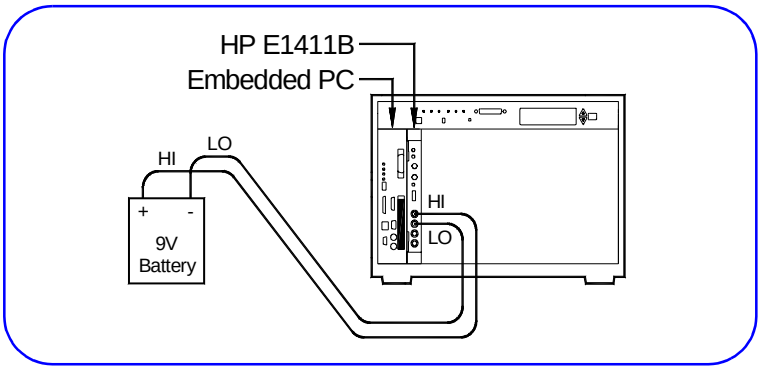


Figure 27. Example: HP E1411B Connections

2 To display the VISA Assistant Main Menu, click *Start|Programs|HP I_O Libraries|VISA Assistant*) for a display similar to that in Figure 28. (For this example, we will assume only the HP E1406A Command Module and HP E1411B DVM are installed in the mainframe.)

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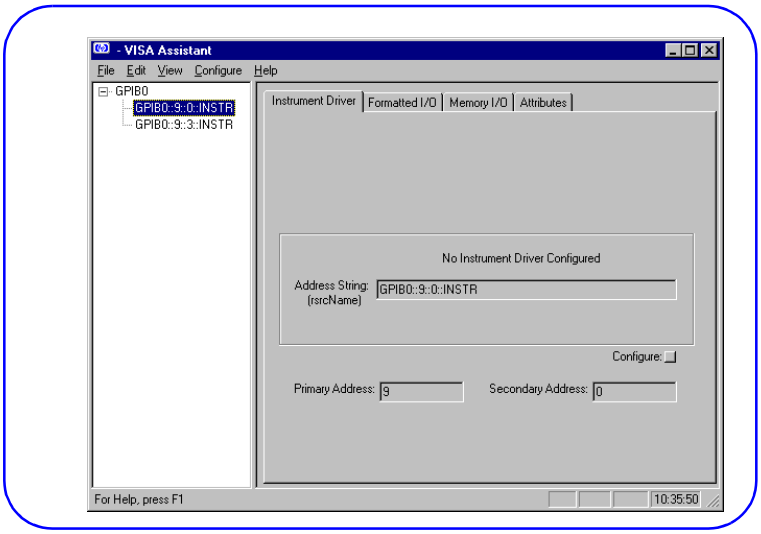


Figure 28. VISA Assistant Main Menu

3 To measure the 9V battery voltage, we will send the SCPI command MEAS:VOLT? from the Formatted I/O tab, and display the results and equivalent C-language code for MEAS:VOLT?. To do this:

- Highlight the **GPIB0::9::3::INSTR** entry
- Select the **Formatted I/O** tab
- Select **SCPI** in the *Instr. Lang.* box
- Click the ***RST** box to reset the HP E1411B

- Type MEAS:VOLT? in the **Enter String to Print or Query:** box
- Click the **viQueryf** box to display the SCPI command and result
- Check the **Show C Code** box
- Click the **viQueryf** box again to display the equivalent C code
- The result should be similar to that in Figure 29.

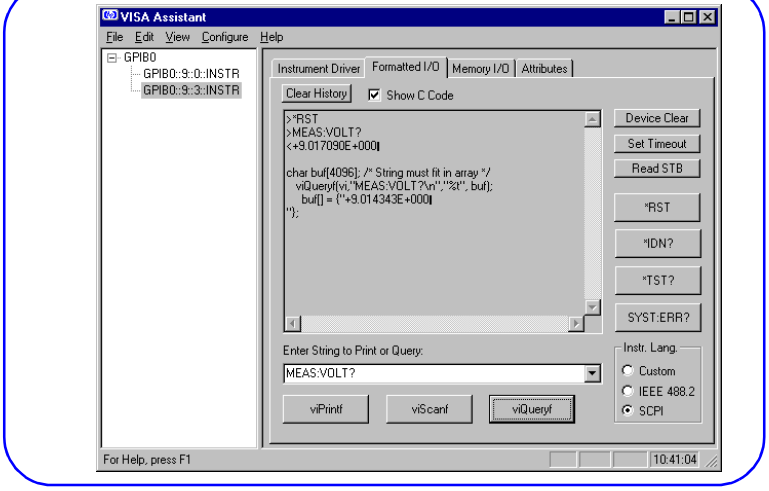


Figure 29. Example: Typical VISA Assistant Display

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5-3: Use HP VEE Instrument Manager

Verify Communication Using HP VEE Instrument Manager

You can use the HP VEE Instrument Manager to communicate with VXI instruments. See the *Controlling Instruments with HP VEE* manual for information on using Instrument Manager.

Example: Communicate Using Instrument Manager

For this HP-IB example, we will use the HP VEE Instrument Manager to communicate with an HP E1411B 5.5-Digit Multimeter at logical address 70903. The instrument name we will use is *dmm_scan*.

1 To run this example, turn PC and mainframe power ON and open HP VEE. Then, select the *I/O|Instrument Manager...* menu item to display the default Instrument Manager screen (see Figure 30).

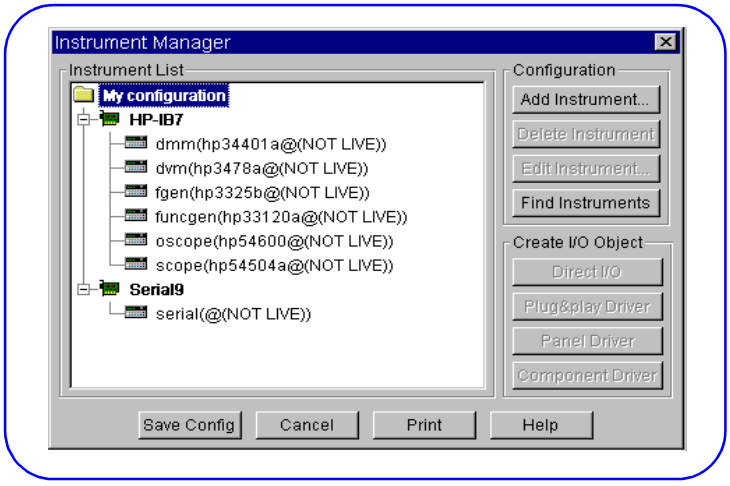


Figure 30. HP VEE Instrument Manager - Default Screen

2 Be sure *My configuration* is highlighted. Then, click the *Find Instruments* button to find all instruments (see Figure 31).

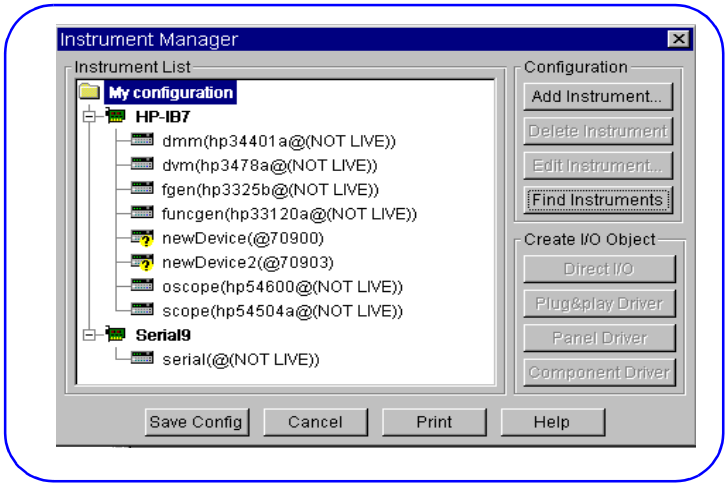


Figure 31. Instrument List Screen

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3 For an instrument at Logical Address 70903, highlight *newDevice2(@70903)*. Then, click *Edit Instrument* and set the instrument name to *dmm_scan* (see Figure 32).

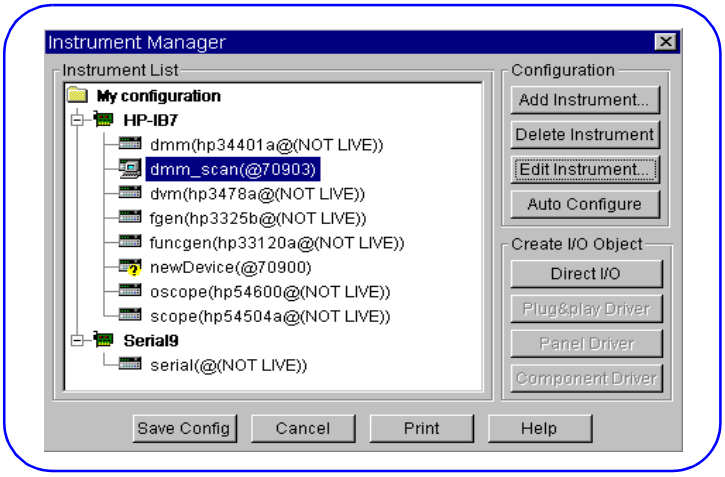


Figure 32. HP VEE Instrument Manager - Configuration

4 To verify communication with the HP E1411B, highlight the *dmm_scan (@70903)* line and then click *Auto Configure* to display an *IDN? message box similar to Figure 33.

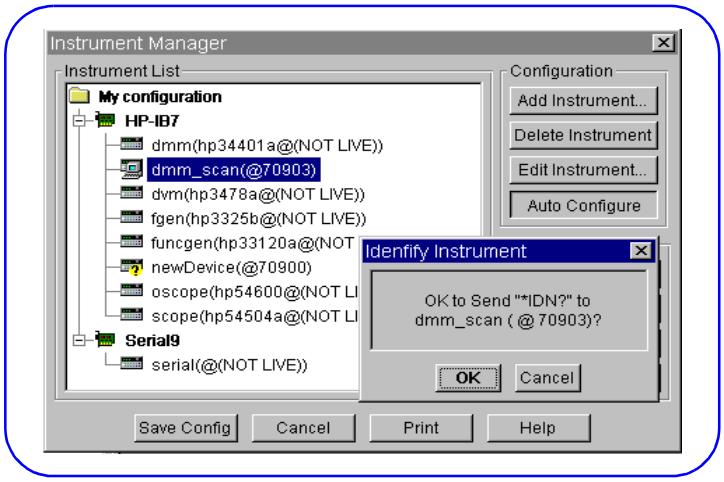


Figure 33. HP VEE Instrument Manager - Auto Configure

5 Click OK to send *IDN? to the HP E1411B. If the query is successful, instrument communication is verified and the instrument model number (hpe1411b) appears (see Figure 34).

6 Click *Save Config* to return to the HP VEE main menu.

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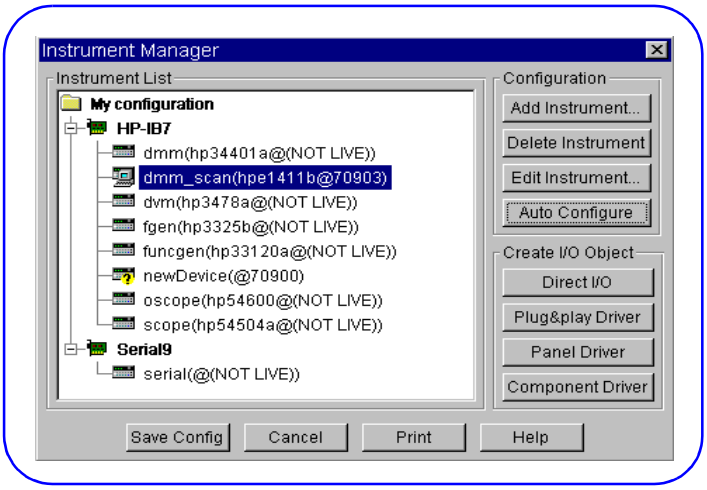


Figure 34. Typical HP VEE Instrument Manager Display

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6 Program Your System

Step 6 Overview

☐ What's in This Step?

When your VXI system is assembled and VXI instrument communication is verified, the next step is to create programs to test/evaluate your product. Figure 35 shows suggested steps to connect your product to the VXI system and to program your VXI system.

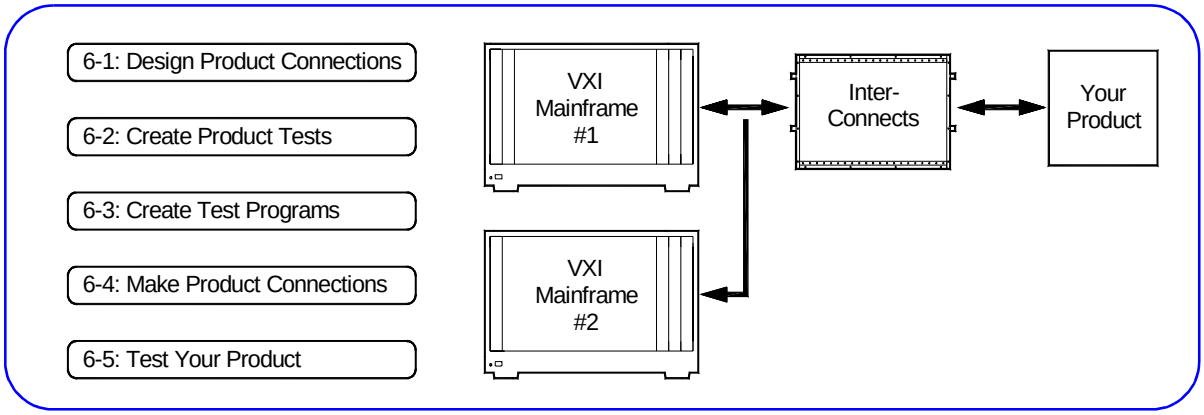


Figure 35. Steps to Program Your System

☐ What You Will Need for This Step:

- Your PC Programmer's Manual
- Application Programming Manual
- User's Guide for Each VXI Instrument
- Mainframe User's Manual
- HP VISA User's Guide
- *Controlling Instruments with HP VEE* manual
- *HP Universal Instrument Drivers* CD

Note This step assumes you have installed and configured your VXI hardware/software and have verified communication between your PC and the VXI equipment.

Since your product to be connected will require individualized tests and connections, this step only provides general guidelines and shows where example programs are available. You will need to design the specific tests and/or programs for your system.

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6-1: Design Product Connections

☐ **Define Mass Interconnects (OPTIONAL)**

The first step in designing your product (typically a Unit Under Test (UUT)) connections is to decide if you will use Mass Interconnects, such as a fixture system.

If your system uses interconnects, define the mass interconnect connections to the VXI mainframe and to your product. See the applicable Mass Interconnect Installation instructions to install the interconnects.

Note If you do not use mass interconnects, your product will be connected directly to the VXI instruments in the mainframe, and you will need to define these connections. In this case, skip to *Record Your Product Connections*.

Figure 36 shows one way mass interconnects (ICAs and ITAs) can be used to connect your product to the VXI instruments in the mainframe. You can use the table in the next step to record connections from your product to the VXI instruments via the ICAs and ITAs.

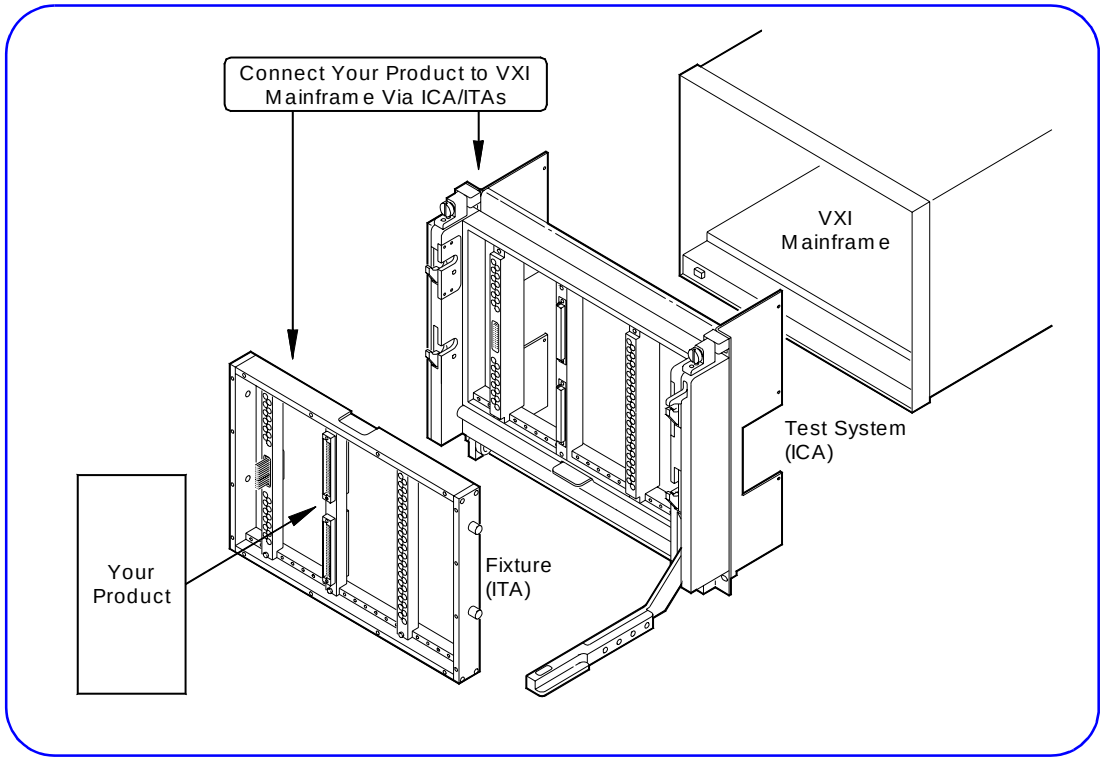


Figure 36. Typical Mass Interconnect Connections

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6-2: Create Product Tests

☐ Defining Tests for Your Product

When you have defined connections from your product to the VXI instruments, the next step is to define the specific test(s) for your product. For example, tests could include voltage, current, or resistance measurements, strain measurements, etc. Create the specific product tests required for your product.

6-3: Create Test Programs

☐ Getting Started Using Example Programs

When you have defined the tests for your product, the next step is to create programs to implement the tests. As desired, you can copy and use the example programs included on the *Hewlett-Packard Universal Instrument Drivers* CD to get started creating your test programs.

☐ Where are the Example Programs?

Several example programs are included on the *Hewlett-Packard Universal Instrument Drivers* CD or in the Vxipnp directory. You can copy and use or modify these programs for your application. Programs are in Visual C/C++, Visual Basic, and HP VEE.

1. For instruments that have an HP VXI*plug&play* driver, Visual C/C++ and Visual Basic example programs are contained in the instrument's VXI*plug&play* Help File. To access these programs, click *Start*|*Programs* |*Vxipnp*|*instrument help icon*. See "Using Visual C/C++ and Visual Basic Programs" for details.

2. If you use HP VEE, some HP VEE example programs are located in the *examples* directory of the *Hewlett-Packard Universal Instrument Drivers* CD. This directory includes C and/or HP VEE programming examples grouped by instrument number. See "Using HP VEE Example Programs" for details.

☐ Using HP VEE Example Programs

1. Be sure all applicable VXI*plug&play* drivers have been installed on the PC (see *Step 4-2: Install VXIplug&play Drivers*).

2. As required, configure the VXI instruments with the HP VEE Instrument Manager (see *Step 5-3: Use HP VEE Instrument Manager*).

3. Insert the *Hewlett-Packard Universal Instrument Drivers* CD into the CD ROM and wait a few seconds for the setup instructions to appear.

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4 If the setup screen does not appear in a few seconds, click *Start*|*Run* and type <*drive*>:setup.exe in the Run box, where *drive* is your CD ROM drive.

5 To access HP VEE programs from the CD, use Windows NT Explorer (or equivalent) to access the *examples* directory on the CD. This directory includes C and/or HP VEE programming examples grouped by instrument number. For example, to access the HP VEE E1411 example program, the path is <*drive*>:|*examples\hpe1411\1411*.

6 As required, see the applicable Instrument User's Guide for details on instrument addressing, operation, settings, modes, etc.

Note Online versions of most instrument manuals are included on the *Hewlett-Packard Universal Instrument Driver* CD. To access a specific online instrument manual, run the CD and click VIEW PRODUCT MANUALS from the *Choose Type of Installation* screen. Then, select the manual you want to view.

7 Copy, run, and modify the example programs as desired. We suggest you copy the HP VEE example programs from the CD to your HP VEE working directory set up during HP VEE installation.

8 When you run an example program, you may be prompted to add device drivers and/or to save the instrument configuration. However, doing this may overwrite the default instrument configuration file (*vee.io*). If you do **not** want the *vee.io* file to be overwritten, you can do one of two things:

- In Windows Explorer, re-name the *vee.io* file to another file (such as *vee_mine.io*, etc.) BEFORE you run the example program. After you run the program, delete the new *vee.io* file and restore your configuration file to its original name (*vee.io*). You will need to do this if you want to run the example programs shipped with HP VEE.

OR

- Click NO when asked if you want to save the changes. When you exit HP VEE, the default configuration file (*vee.io*) will remain unchanged. For this action, you will not need to rename *vee.io*.

9 Repeat Steps 5 through 8 for each VXI instrument to be programmed using HP VEE.

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Example: HP E1411 HP VEE Program

An HP VEE example program for the HP E1411B Digital Multimeter that is on the *Hewlett-Packard Universal Instrument Drivers* CD is entitled 1411. To access this program, select <*drive*>:*examples*\ *hpe1411**1411*, where *drive* is the CD-ROM drive letter.

For this example, we will copy the 1411 program to the HP VEE working directory. When HP VEE is run and the program is opened, a display similar to Figure 37 appears. If you have an HP E1411B DVM in your system, you can run this program and observe the results. (Be sure you have configured the instruments as shown in *Step 5-3: Use HP VEE Instrument Manager*.)

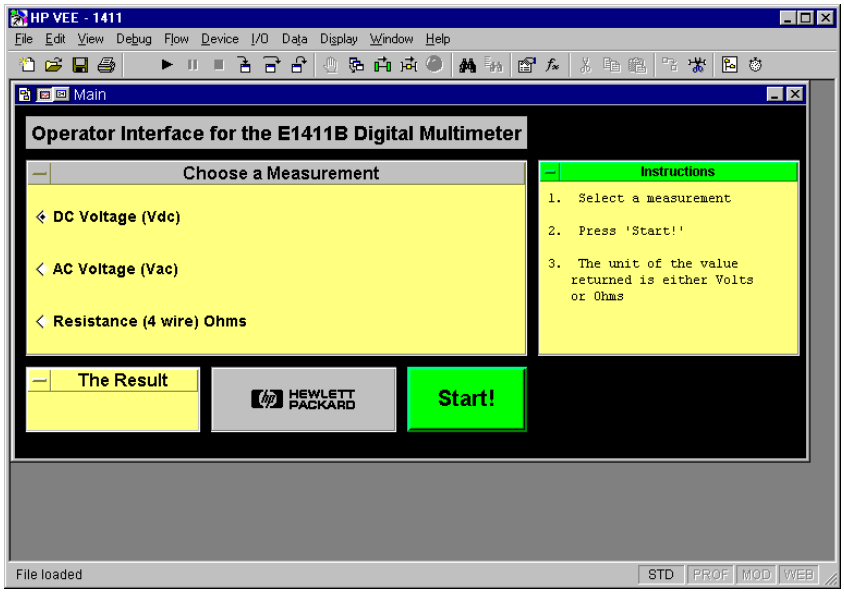


Figure 37. HP VEE Example Program Screen

Using Visual C/C++ and Visual Basic Programs

You can program VXI instruments that have VXI*plug&play* drivers using Visual C/C++ or Visual Basic and the online VXI*plug&play* Help Files for VXI instruments. To use the example Visual C/C++ or Visual Basic programs:

1. Be sure all applicable VXI*plug&play* drivers have been installed on the PC (see *Step 4-2: Install VXIplug&play Drivers*).

2. For the first VXI instrument to be programmed, open the applicable instrument VXI*plug&play* Help File (*Start*|*Programs* |*Vxipnp*| *instrument help icon*). Figure 38 shows a typical VXI*plug&play* Help File main menu for the HP E1411 DVM that is displayed when you click *Start*|*Programs*|*Vxipnp*|*HP E1411 Help (32-bit)*.

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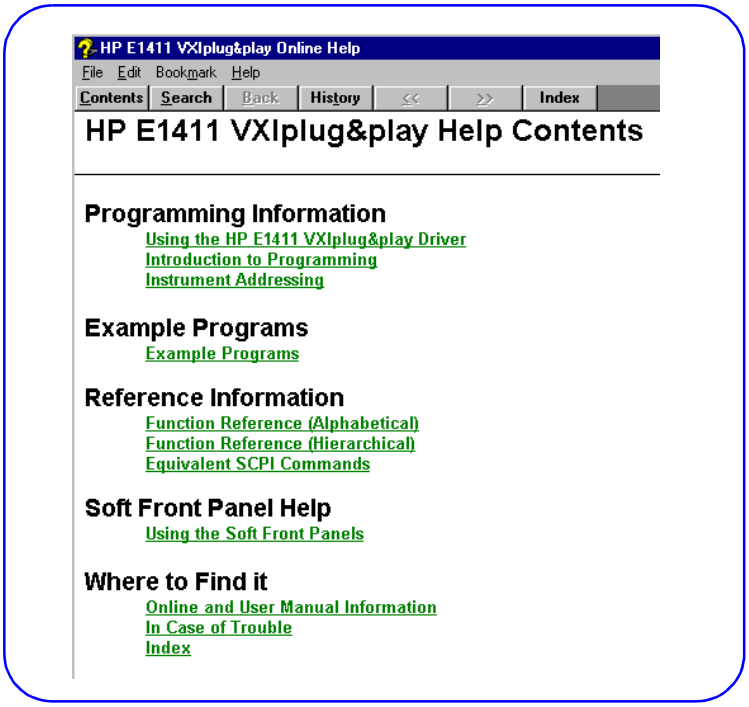


Figure 38. Typical VXI*plug&play* Help File Main Menu

3 Read the *Programming Information* sections for information on using the instrument driver, an introduction to programming the instrument, and specific addressing for the instrument.

4 See the *Reference Information* sections for VXI*plug&play* function references, examples, and equivalent SCPI commands.

5 See the *Example Programs* section for a list of example programs that you can copy and use or modify as desired. As required, see the applicable Instrument User's Guide for details on instrument operation, settings, modes, etc.

Note Online versions of most instrument manuals are included on the *Hewlett-Packard Universal Instrument Drivers* CD. To access a specific online instrument manual, run the CD and click VIEW PRODUCT MANUALS from the *Choose Type of Installation* screen. Then, select the manual you want to view.

6 Repeat Steps 3 through 6 for each VXI instrument to be programmed.

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6-4: Make Product Connections

☐ Making Product Connections

When you have designed the tests and programs for your product, see the connection table entries (see *Step 6-1: Design Product Connections*), the applicable Mass Interconnect Installation Instructions, and the applicable Instrument User's Guides to connect your product to the VXI instruments.

WARNING **Be sure mainframe power is OFF, and observe all safety precautions when making the connections.**

6-5: Test Your Product

☐ Testing Your Product

The final step in the getting started process is to run the programs you have created to test your product. The procedures in this step are, of course, totally dependent on your application needs. This completes the *Getting Started with VXI* process for embedded PC VXI Systems.

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