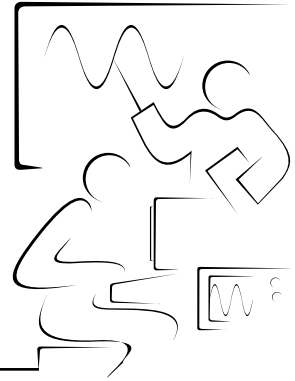# Using Measurement & Automation Explorer™ (MAX) with VXI

Introduction

Measurement & Automation Explorer (MAX) provides access to all your National Instruments DAQ, GPIB, IMAQ, IVI, Motion, VISA, and VXI devices. With MAX, you can configure your National Instruments hardware and software, add new channels, interfaces, and virtual instruments, execute system diagnostics, and view the devices and instruments connected to your system.

MAX installs automatically with NI-VISA version 2.5 or higher or NI-VXI version 3.0 or higher. MAX is available only for Win32-based operating systems.

In this course manual addendum, you will examine MAX and use it to configure a VXI system.

Exercise 1

Objective: To examine MAX.

MAX icon

1. Launch MAX by double-clicking on the desktop icon or selecting **Start»Programs»National Instruments»Measurement & Automation**.

2. After launching, MAX displays the dialog box shown below. You can use this dialog to configure MAX to search for new devices each time you launch it or only when you refresh (<F5> or **View»Refresh**). Also, you can configure the dialog box to appear the next time you launch MAX.

   Do not change the settings and click on **OK**.

Figure 1. MAX User Preferences

Note You selected not to search for new devices when MAX launches, so MAX will not show the updated system view if there are any changes to it. Remember to refresh after making any changes. To change these preferences, you can access this dialog box by selecting **Tools»User Preferences...**.

3. Expand the **Devices and Interfaces** folder by clicking on the plus (+) sign next to it. Select **VXI System 0** and expand it also. Expand **Frame 0**. The MAX interface should appear as shown below.
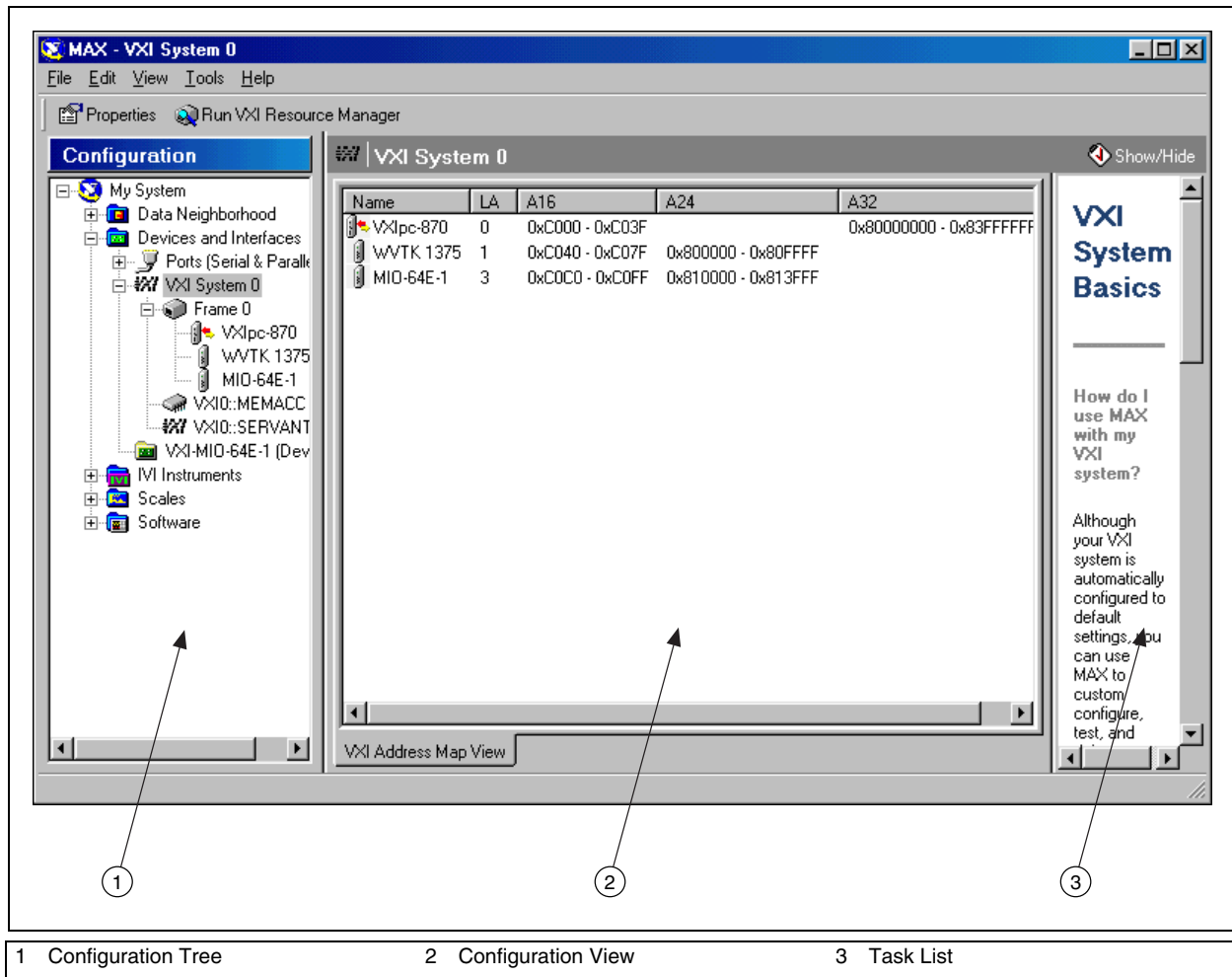

| 1 | Configuration Tree | 2 | Configuration View | 3 | Task List |

Figure 2. The MAX Interface

Configuration Tree

The configuration tree shows a hierarchical view of the instruments in your system. In the setup shown in Figure 2, MAX shows a VXI system with one VXI chassis (Frame 0), a National Instruments VXIpc-870 embedded controller, a Wavetek 1375 arbitrary waveform generator, and a National Instruments MIO-64E-1 multifunction data acquisition board.

The following MAX toolbar appears when you select the VXI system in the Configuration Tree:
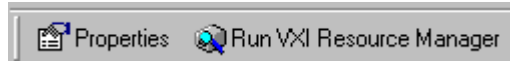
Properties—Displays properties of the selected VXI system.

Run VXI Resource Manager—Runs VXI Resource Manager (Resman) for the selected VXI system.

Note   Because NI-VXI 3.0 or higher supports multiple VXI systems, properties apply to the currently selected VXI system. Resman also runs for only the selected VXI system. To run Resman for all VXI systems, select **Tools»NI-VXI»VXI Resource Manager**.

System Properties

You can examine the properties for the selected VXI system by clicking on the **Properties** button from the toolbar or right-clicking on the particular VXI system and selecting **Properties**, as shown below.
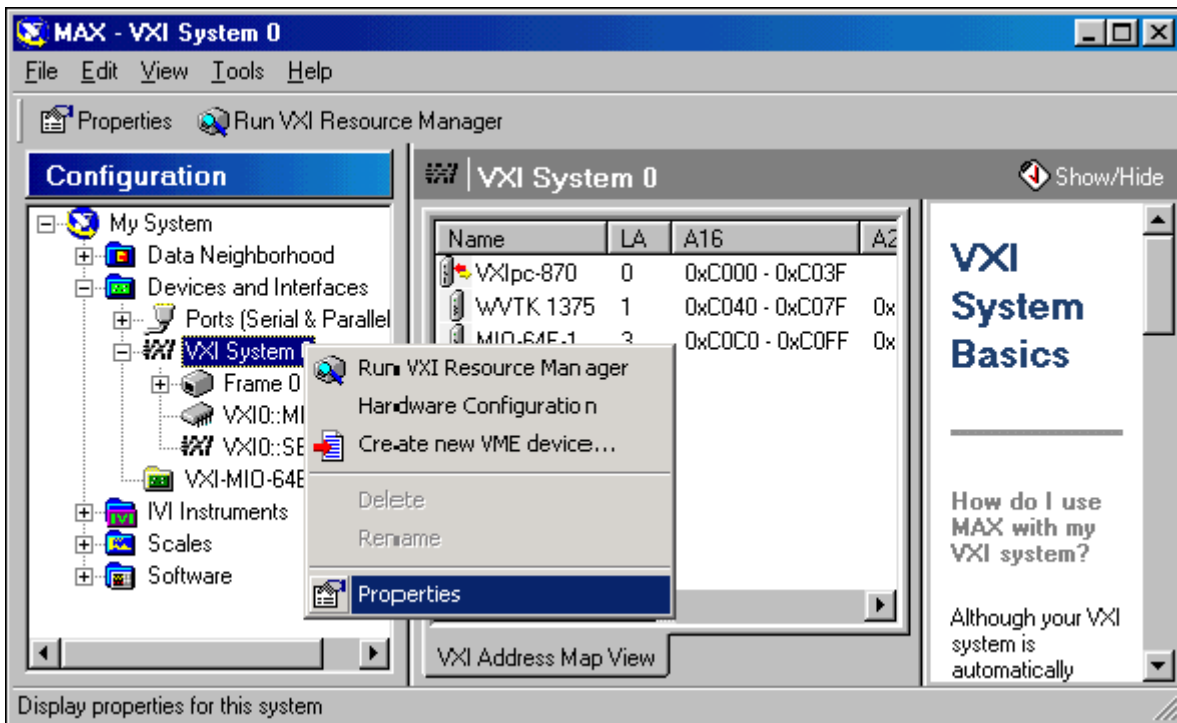

Figure 3. System Properties for VXI System 0

In addition to viewing the properties, you can also launch Resman for this VXI system, access the hardware configuration for the system controller, and create a new VME device.

4. Examine the VXI System 0 properties. Right-click on **VXI System 0** and select **Properties**. The properties dialog box appears as shown below.
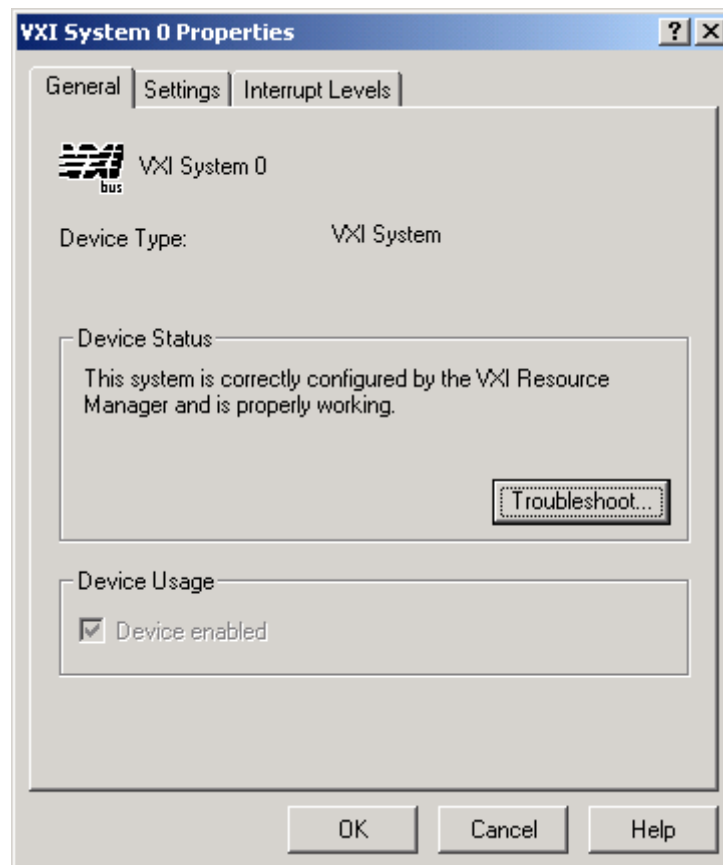

Figure 4. Properties Dialog for VXI System 0

This dialog box reports the device status. If there is a problem with this system, you can access online help by clicking on the **Troubleshoot…** button. The properties dialog box also shows you the device type and whether the device is enabled.
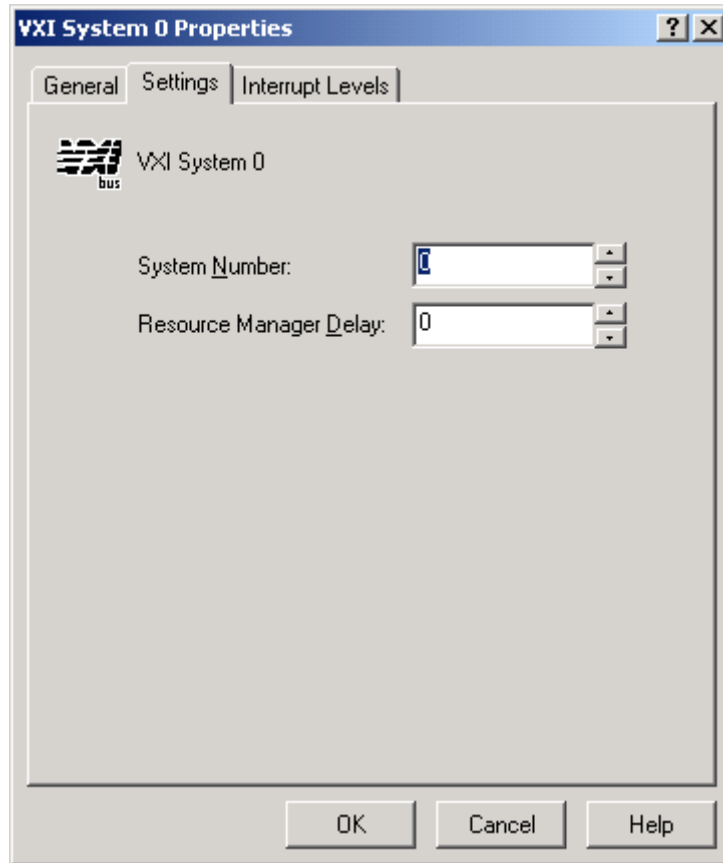
5. Select the **Settings** tab, shown below.

Figure 5. VXI System 0 Settings

You can use this tab to change the VXI system number and Resman delay for this specific VXI system. (In this exercise, do not change the settings.)

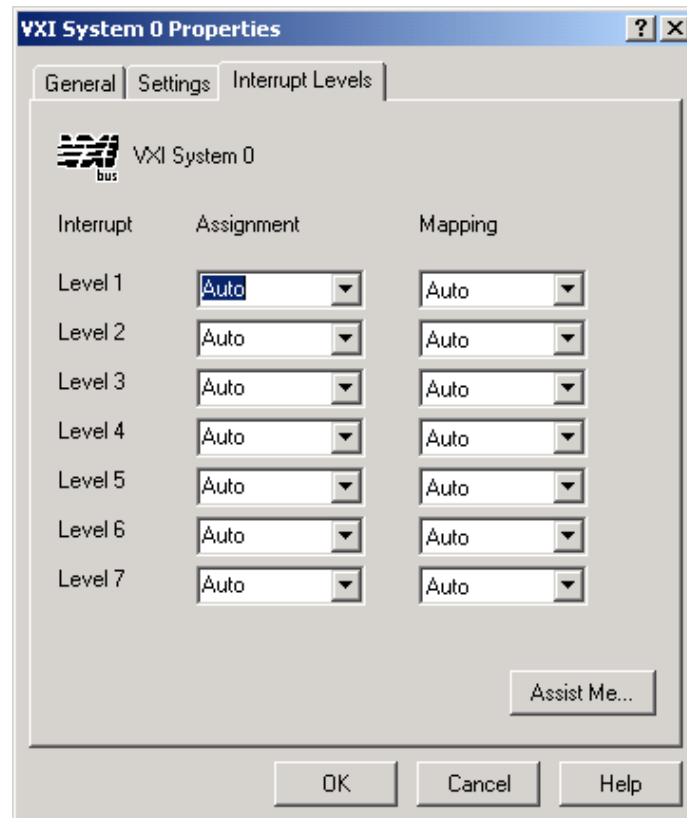6. Select the **Interrupt Levels** tab, shown below.

Figure 6. VXI System 0 Interrupt Levels

You can use this tab to assign interrupts to specific controllers and set the mapping for each interrupt level. (In this exercise, do not change the settings.)

In the **Assignment** field, you can select four options from the pull-down menu:

- **Auto**—Automatically assign to a programmable handler, usually the local controller.
- **Local**—Assign the interrupt level to the local controller.
- **Choose LA**—Choose the Logical Address of the controller that will handle this interrupt.
- **None**—Do not assign the interrupt level to any controller.

In the **Mapping** field, you can select three options for mapping the interrupts:

- **Auto**—Auto mapping (maps toward root if root is the handler; otherwise, does not map).
- **Source**—Map away from the root (source the interrupt).
- **None**—Do not map.

7. Click on the **Assist Me…** button. The **Interrupt Levels** dialog box appears, as shown below.
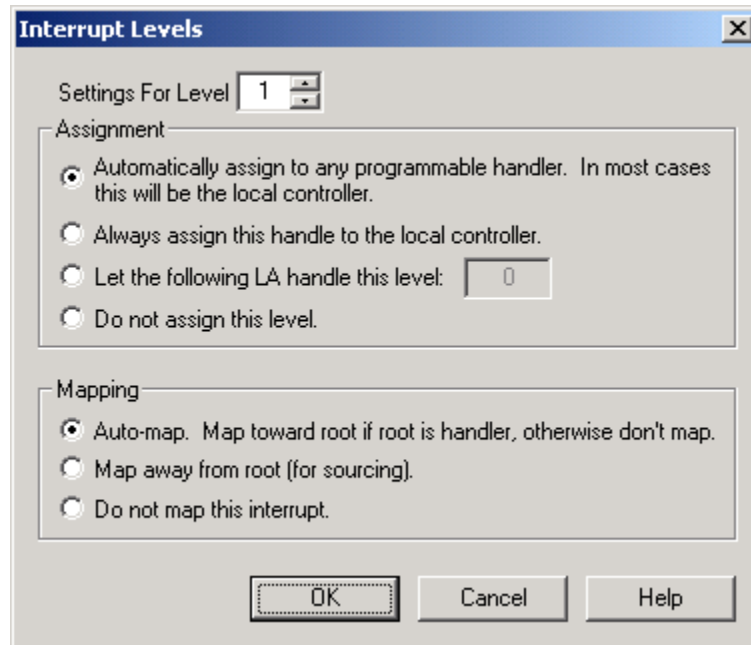

Figure 7. VXI System 0 Interrupt Assistant

If you are not sure how to set the interrupt assignments and mapping, you can use this dialog box for detailed descriptions of all the settings and to set the options separately for each interrupt. (In this exercise, do not change the settings.)

8. Close the **Interrupt Levels** and **VXI System 0 Properties** dialog boxes.

Configuration View

Name	LA	A16	A24	A32
VXIpc-870	0	0xC000 - 0xC03F		0x80000000 - 0x83FFFFFF
WVTK 1375	1	0xC040 - 0xC07F	0x800000 - 0x80FFFF	
MIO-64E-1	3	0xC0C0 - 0xC0FF	0x810000 - 0x813FFF	

VXI Address Map View

Figure 8. VXI Address Map View—System Resources Window

The configuration view (the center window) shows the registers/address space requested by various devices in A16, A24, and A32 space. In this particular setup, the two devices have registers in A16 and A24 address space, and the system controller (VXIpc-870) has registers in A16 and A32 address space.

9. Look carefully at the ranges being used in A16 address space by each instrument. Recall the formula for the base of these 64 byte (0x40) windows:

base address = 0xC000 + (logical address * 0x40)

Task List

The task list (the right window) includes an interactive task list to guide you through VXI system configuration and other basic tasks.

10. Select various items in the configuration tree and review the information in the task list. Notice that the task list contents change according to the interface and device you select.

Device Properties in MAX

11. Select the Wavetek 1375 in the configuration tree. Notice that MAX displays the information about the device in the **Attributes** tab of the configuration view. Here you can see that the Wavetek 1375 is at Logical Address 1, the manufacturer ID is 4094, and the device resides in slot 2 in your VXI chassis. Also, this window shows the resources used by the Wavetek 1375. The A16 space for this device contains the Configuration Registers. The A24 space is scratch pad RAM for storing waveforms.
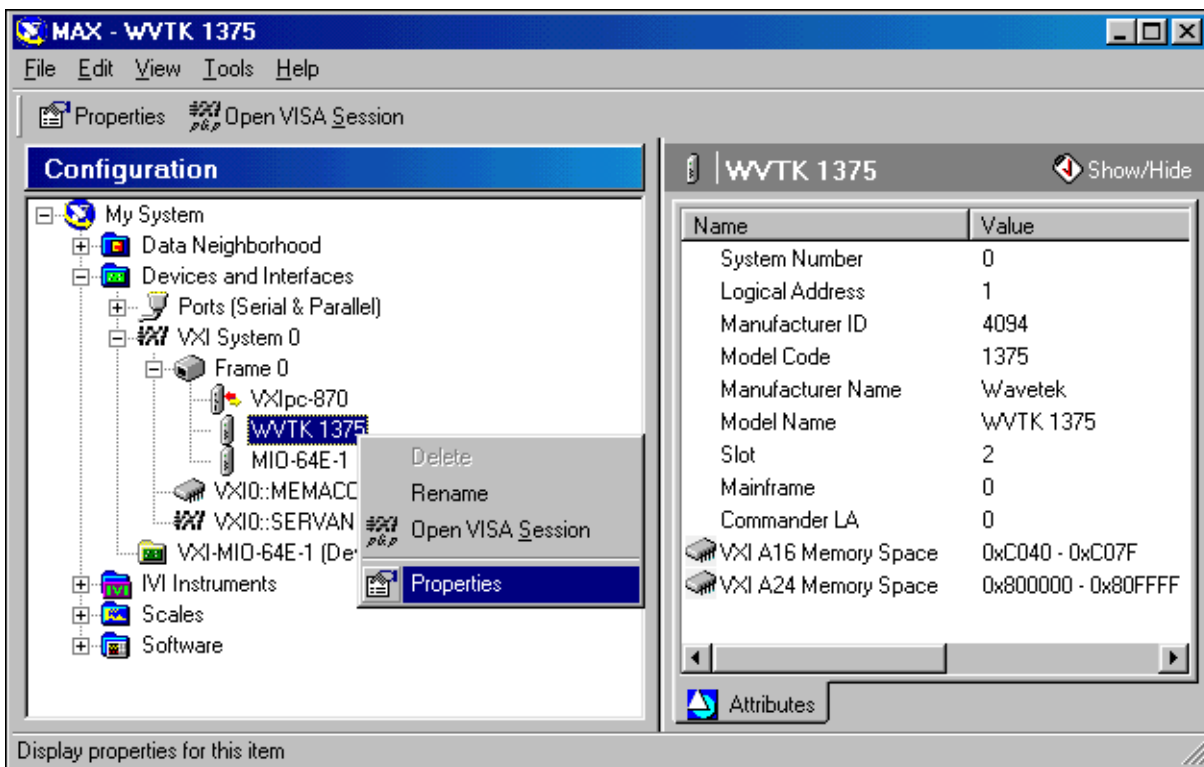

Figure 9. Right-Clicking on a Device to Examine Its Properties

12. You can examine properties of devices in the system by right-clicking on a device and selecting **Properties** or highlighting the device and clicking on the **Properties** button on the toolbar. Right-click on the Wavetek 1375, as shown above. Review the properties information and close the dialog box.

Configuring Devices in MAX

You can configure some VXI devices (for example, all National Instruments MITE-based controllers) through software. You can use MAX to configure these devices.

13. Right-click on the VXIpc-870 controller in the Configuration Tree and select **Hardware Configuration**. The dialog box shown below appears.
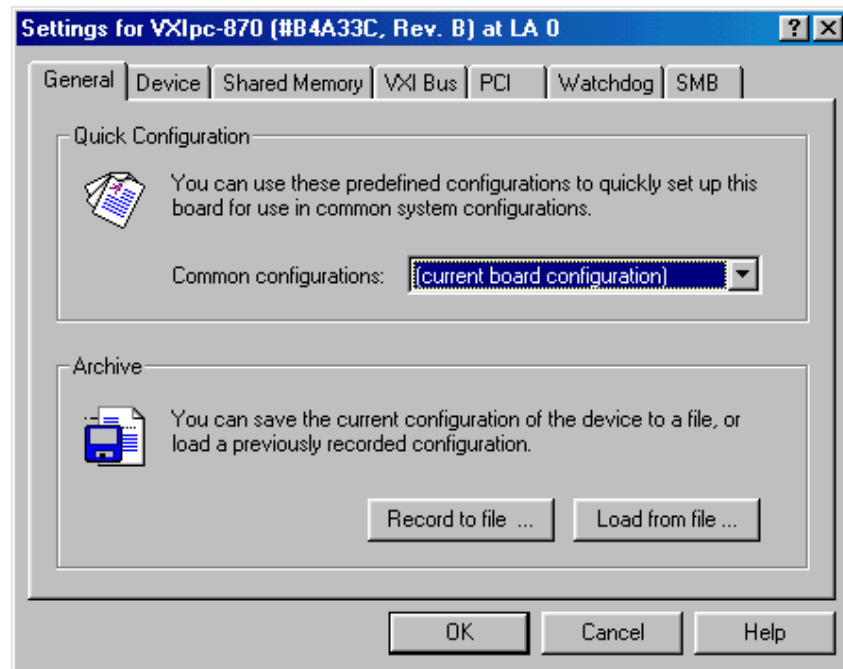

Figure 10. VXIpc-870 Hardware Configuration through MAX

General—Use this tab to load and save configurations from file. This is useful when backing up your system.

Device—Use this tab to configure the MITE-based device logical address and interrupt configuration.

Shared Memory—Use this tab to set up the shared memory. For more details on shared memory, see the online help or visit the National Instruments Web site to download the shared memory application note.

VXI Bus—Use this tab to configure how MITE-based controllers interface to the VXI bus (timeout, etc.).

PCI—Use this tab to configure the MITE chip (which resides on the PCI bus, hence the tab name).

Watchdog—Use this tab to enable the watchdog timer.

SMB—Use this tab to configure the front panel SMB connectors to provide or source clocks and triggers.

14. Close the hardware configuration dialog box.

Configuring MAX

15. You can customize MAX to meet your system needs. Select **Tools»NI-VXI»VXI Options** to get the VXI options dialog box shown below. Review the options and close the dialog box.
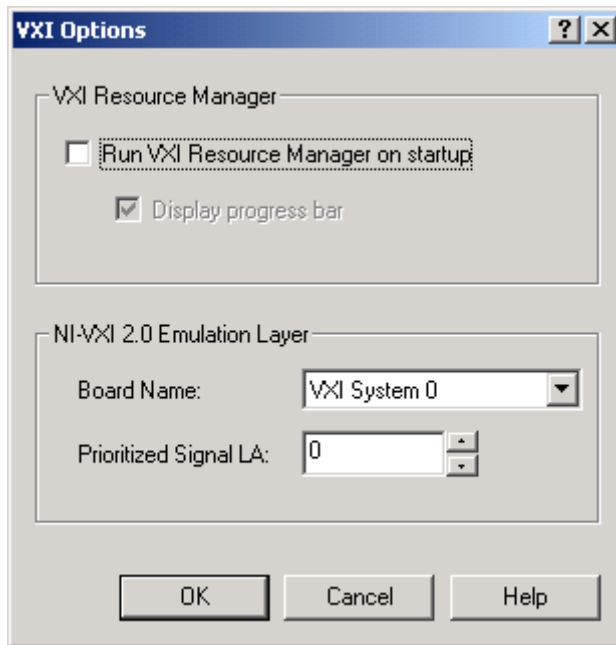

Figure 11. VXI Options

16. To set the NI-VISA options, select **Tools»NI-VISA»VISA Options**.

   Use this dialog box to tell the driver to run Resman on startup. You can also set the VISA options shown below.

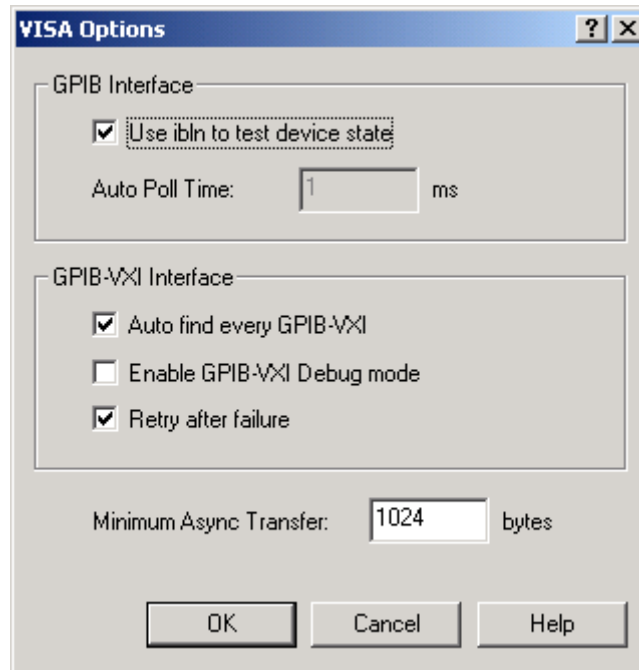   Review the options and close the dialog box.

Figure 12. VISA Options

Help in MAX

MAX brings online support to a new level. The MAX help files feature common questions gathered from several years of technical support calls, as well as helpful hints, references to application notes, and procedures for setting up a large variety of systems. If MAX resides on a networked computer, you have a Web link from MAX to the National Instruments Technical Support home page and the NI-VISA and NI-VXI home pages. You can access the following help resources through links in MAX.

Online Problem Solving and Diagnostic Resources

* *KnowledgeBase*—A searchable database containing thousands of frequently asked questions (FAQs) and their corresponding answers or solutions, including special sections devoted to our newest products. The database is updated daily in response to new customer experiences and feedback.

* *Troubleshooting Wizards*—Step-by-step guides lead you through common problems and answer questions about our entire product line. Wizards include screen shots that illustrate the steps being described and

provide detailed information ranging from simple getting started instructions to advanced topics.

- *Product Manuals*—A comprehensive, searchable library of the latest editions of National Instruments hardware and software product manuals.

- *Hardware Reference Database*—A searchable database containing brief hardware descriptions, mechanical drawings, and helpful images of jumper settings and connector pinouts.

- *Application Notes*—A library of more than 100 short papers addressing specific topics such as creating and calling DLLs, developing your own instrument driver software, and porting applications between platforms and operating systems.

Software-Related Resources

- *Instrument Driver Network*—A library of hundreds of instrument drivers for control of standalone instruments via GPIB, VXI, or serial interfaces. You also can submit a request for a particular instrument driver if it is not in the library.

- *Example Programs Database*—A database with numerous example programs for National Instruments programming environments. You can use them to complement the example programs already included with National Instruments products.

- *Software Library*—A library with updates and patches to application software, links to the latest versions of driver software for National Instruments hardware products, and utility routines.

17. Examine some of the help resources available in MAX. Open **Help»HelpTopics»NI-VXI**. Suppose you want to configure a multimainframe VXI system. From the **Contents** tab, select **How Do I…?»Configuration»Configure a multiple-mainframe system**. You can resize this window and read about the issues involved with this type of configuration. Notice the reference to an application note available from the National Instruments Web site. You can easily download this application note by returning to the MAX interface and selecting **Help»National Instruments on the Web»VXI Home Page** to launch your browser. On this page is a link to the **Support Resources** page, where you can download application notes.

18. Close the MAX help.

Software Information

19. Another helpful MAX feature is its ability to gather and display information about your system for your reference. Expand the **Software** folder in the configuration tree. Expand the **NI-VISA** icon and select **visa32.dll**. The window should appear as shown below.
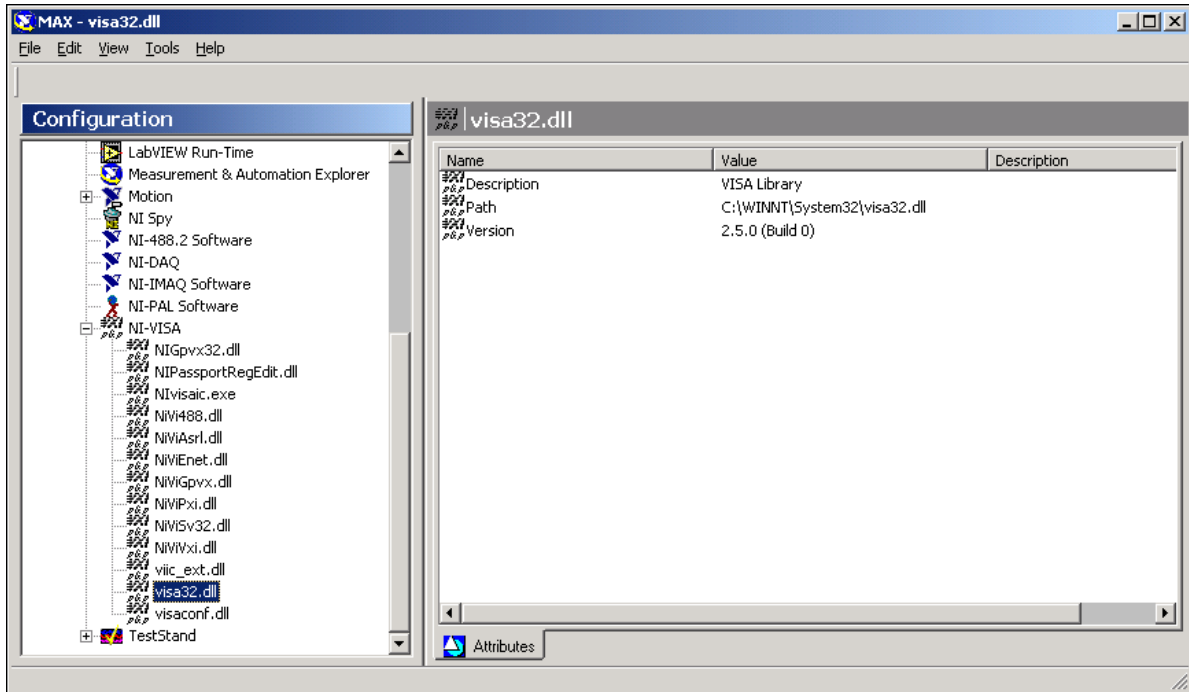

Figure 13. The MAX Software Information

In this window, you can view the versions of all pertinent National Instruments drivers in your system. This information is very important when troubleshooting a system.

End of Exercise 1

Exercise 2

Objective: To add a fictitious VME device to your system.

It is often necessary to use a VME device in a VXI system. Because the VME specification does not implement configuration registers, if you want to use VME devices in your VXI system, you must tell the NI-VXI driver what resources a particular VME device uses.

In a VXI system, Resman uses the VXI configuration registers to identify each VXI device, its device class, model and manufacturer, and address space requirements. Because VME devices do not have the standardized VXI register set, you must manually enter the information (normally encoded in this VXI-defined register set) for your VME device before Resman can properly configure it. You can use MAX to add a VME device to your system manually.

1. Launch MAX if it is not already running. Expand the **Devices and Interfaces** folder in the configuration tree and right-click on **VXI System 0.** From the pop-up menu, select **Create new VME device…**. The **Create New…** window appears as shown below.
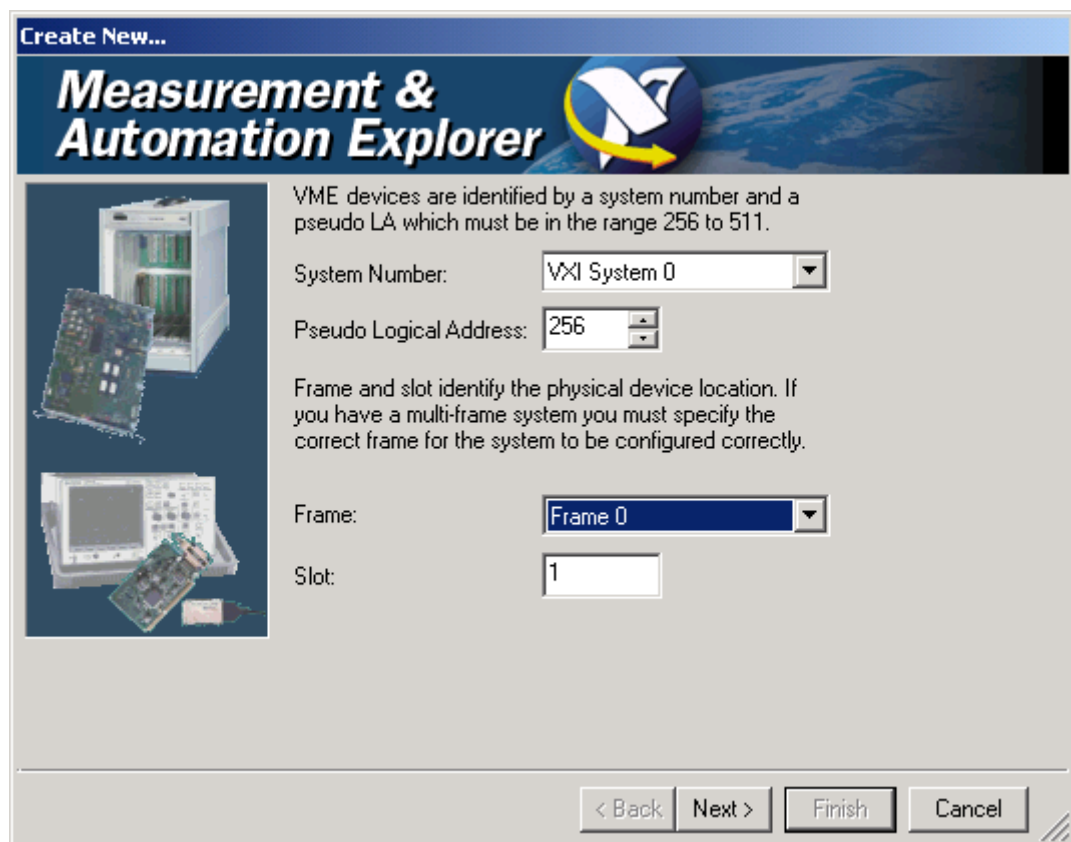

Figure 14. Create New VME Device Window

Because you can have multiple VXI systems in the same configuration, there is a **System Number** pull-down menu. Because there is currently only one VXI system, keep the **VXI System 0** selection. Next, assign this device a pseudo logical address between 255 and 512. (Select any number in this range.) Finally, specify the frame and the slot within the frame where this device resides. The only frame in your system is Frame 0, so keep this selection. Because this VME device does not really exist, you may select any slot you want.

2. Click on the **Next >** button to continue. In the next window (shown below), you can create a new VME profile.
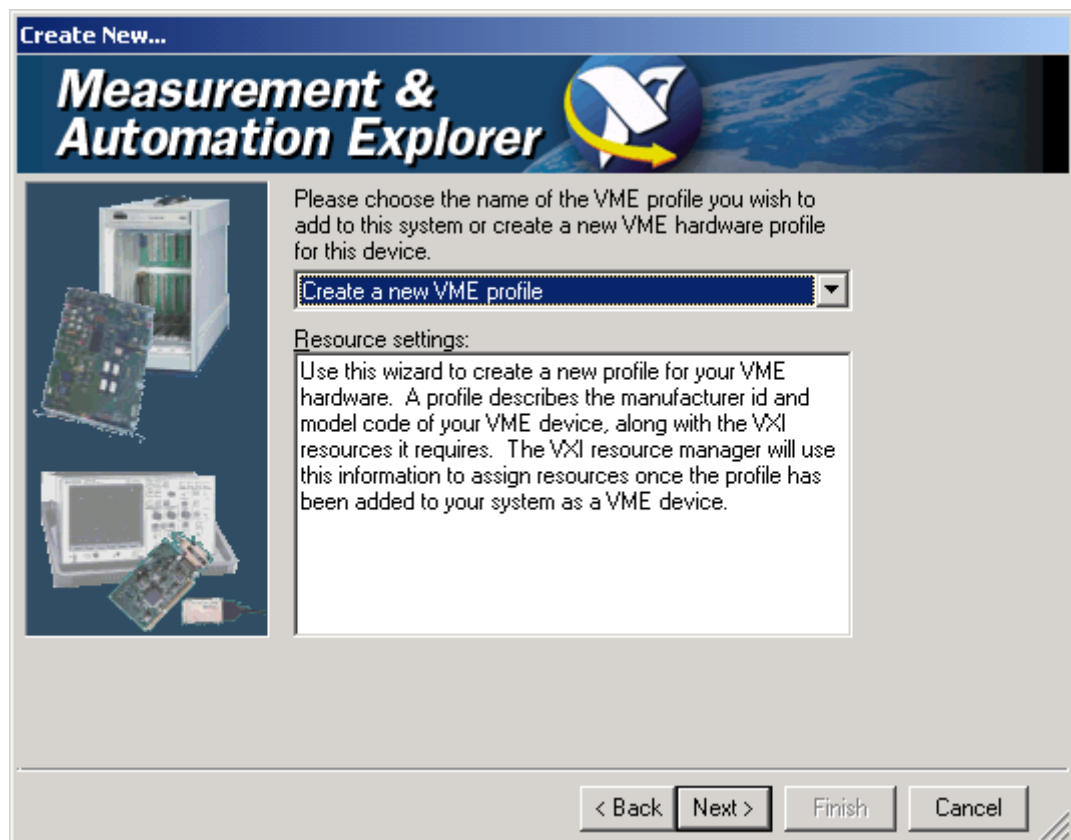

Figure 15. Create a New Profile Window

3. You can use the pull-down menu in this window to select previously created VME profiles or create a new one. A profile describes the manufacturer ID, model code, and resources that this VME device requires. No VME profiles are created yet, so click on **Next >** to create one.
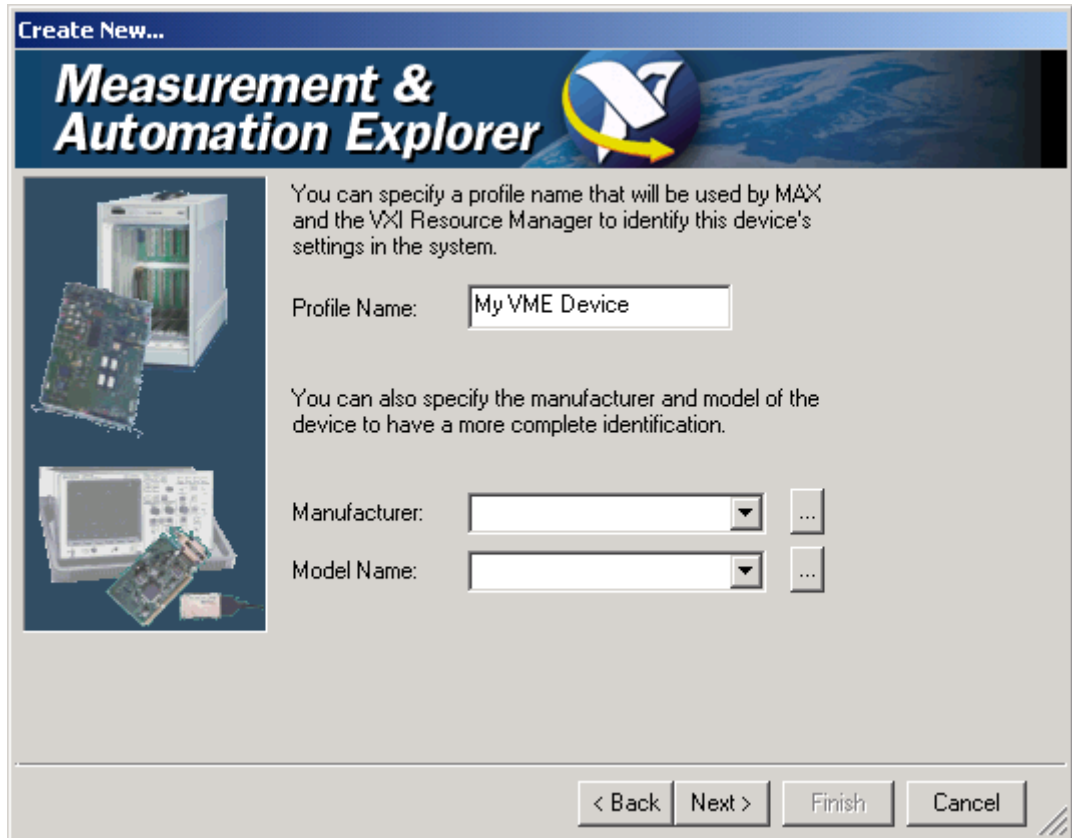
    Name your VME device *My VME Device*, as shown below.

Figure 16. Profile Name, Manufacturer ID, and Model Code

4. In the **Manufacturer** pull-down menu, select **Act Tech** as the manufacturer for this fictitious device.

5. Select the **Model Name** pull-down menu for a list of known VME devices manufactured by Act Tech. This list is empty, so you need to add this new device yourself. Click on the **...** button next to the **Model Name** pull-down menu. The dialog box shown below appears.
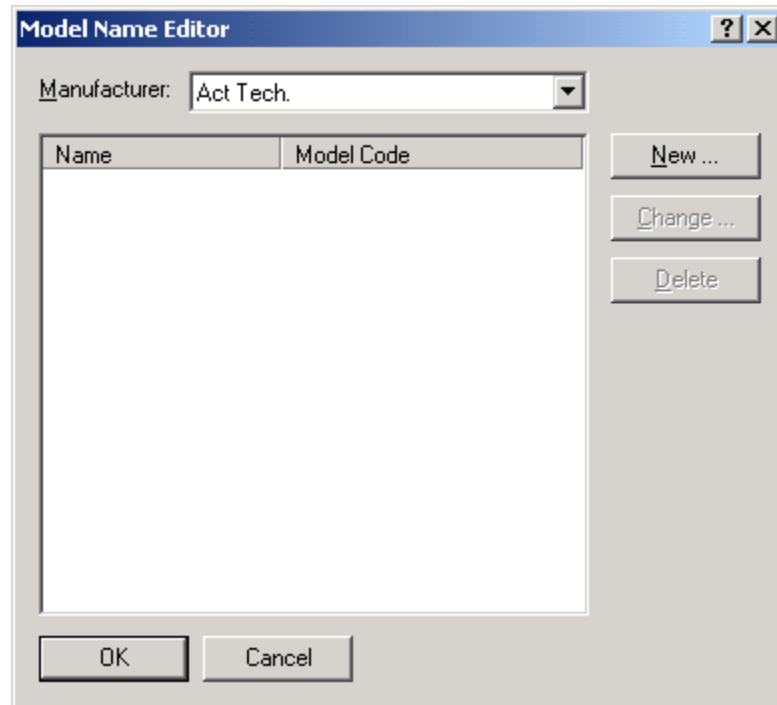

Figure 17. Adding a New Act Tech VME Device

6. Click on **New…** and fill in the parameters shown below. Click on **OK**.
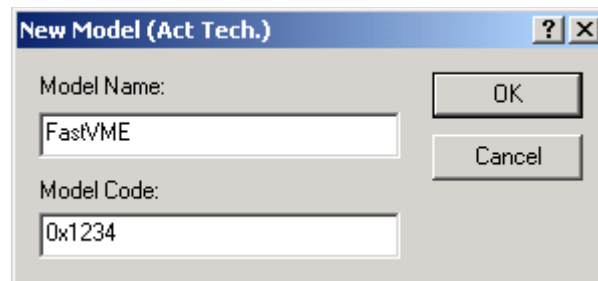

Figure 18. The New VME Model From Act Tech

7. The new VME device appears in the Model Name Editor window. Click on **OK** again to confirm the change and return to the Device Wizard.

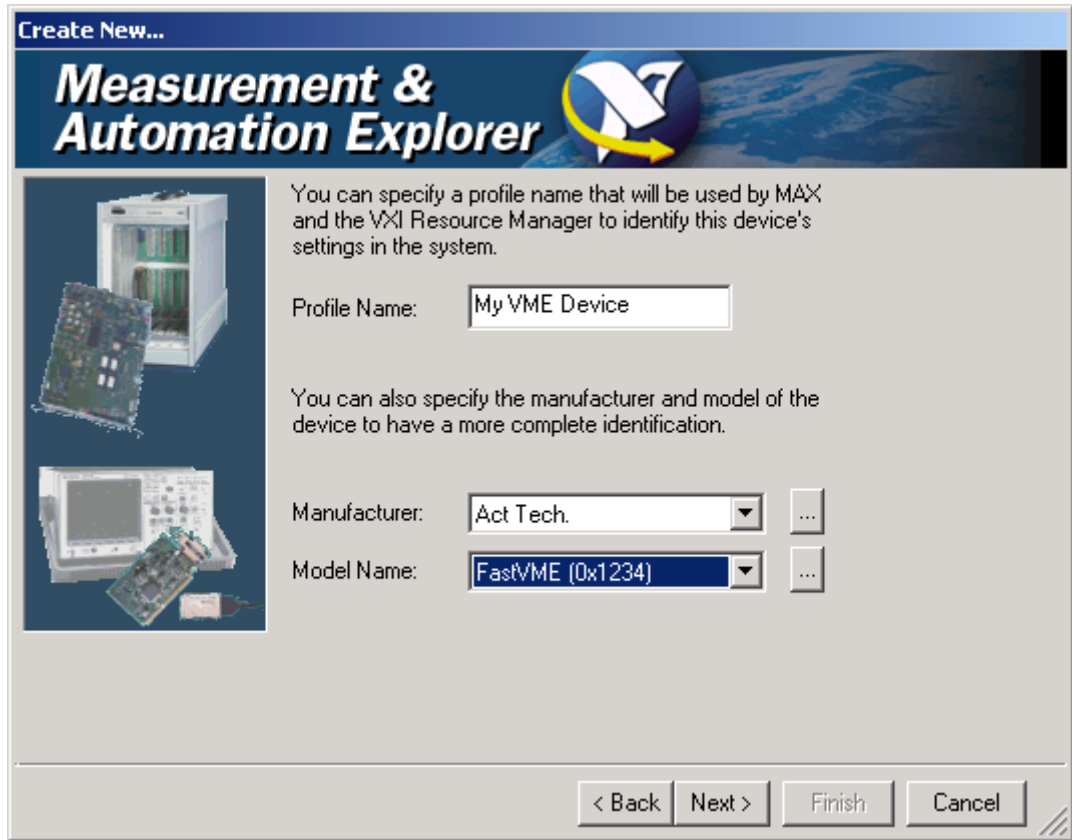8. Select the device you just added in the **Model Name** menu. Your screen should appear as shown below.

Figure 19. Device Wizard Showing New VME Model and Manufacturer

9. Click on the **Next >** button to add resources used by this device.

10. Click on the **Add…** button and select **Address Range»A24**. In the **Setting** column, you can enter the range of registers this device uses. Type in the value `0x0 - 0x100000` and press <Enter>.
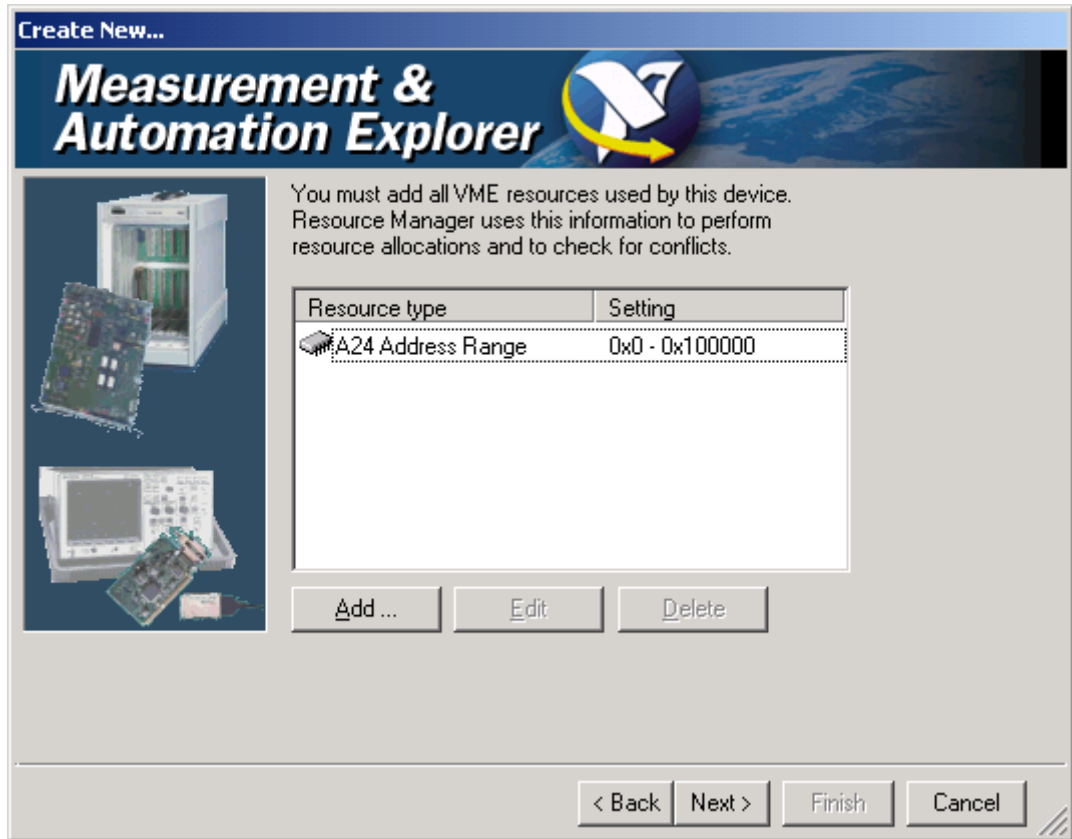

Figure 20. Requested Address Space for the New VME Device

11. Click on **Next >** and **Finish** to complete the process of adding a VME device. Notice that in the MAX configuration tree, your VME device has an exclamation point. This means you need to run Resman again to reconfigure the system.

12. Run Resman and notice that the VME device remains in the system and the exclamation point disappears, as shown below. You can edit the configuration parameters of this fictitious VME device through its properties. You can access the **Properties** menu by right-clicking on the VME device or selecting **Tools»NI-VXI»VME Profiles**. In the VME Profiles window, you can manipulate the profiles you created. You can remove them, add a new one, or change their properties.
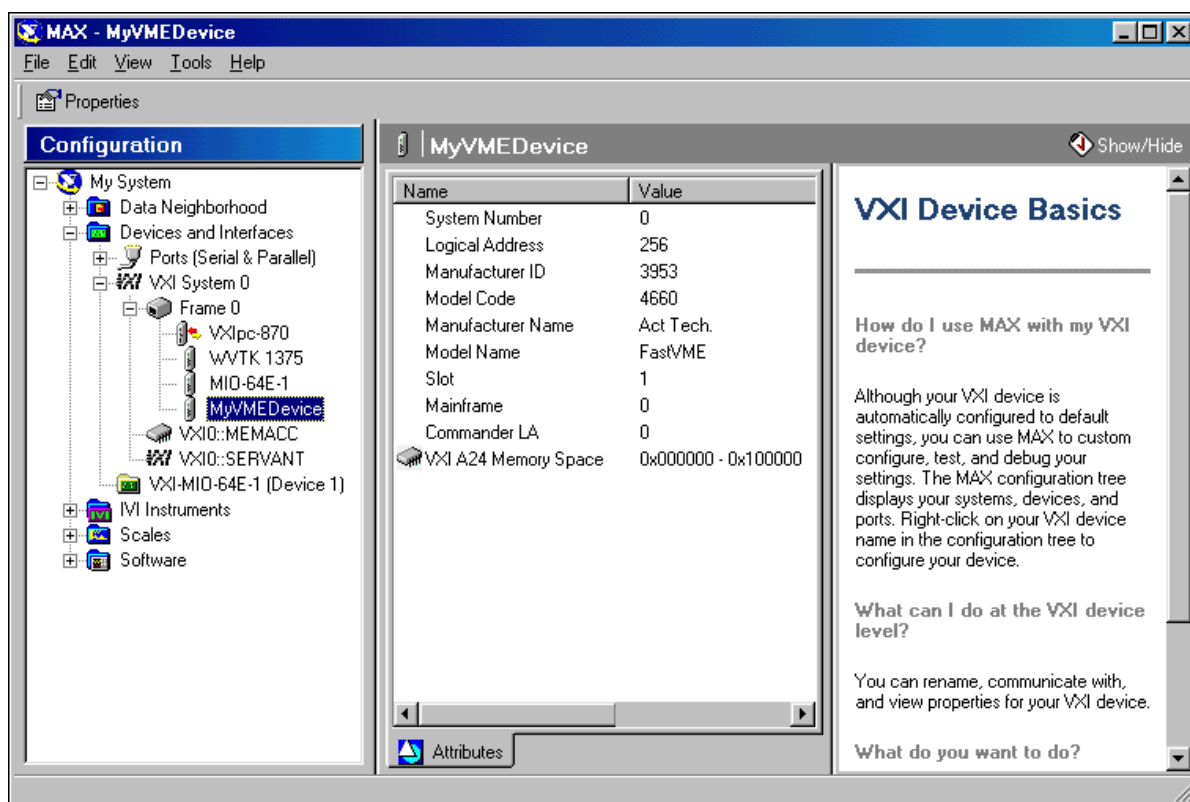

Figure 21. MAX Showing VME Device in Configuration Tree

13. To remove the VME device, right-click on it and select **Delete**. The device disappears, but its profile is still available for future use.

End of Exercise 2

Worldwide Technical Support and Product Information

`ni.com`

National Instruments Corporate Headquarters

11500 North Mopac Expressway   Austin, Texas 78759-3504   USA   Tel: 512 794 0100

Worldwide Offices

Australia 03 9879 5166, Austria 0662 45 79 90 0, Belgium 02 757 00 20, Brazil 011 284 5011, Canada (Calgary) 403 274 9391,
Canada (Ottawa) 613 233 5949, Canada (Québec) 514 694 8521, China (Shanghai) 021 6555 7838,
China (ShenZhen) 0755 3904939, Denmark 45 76 26 00, Finland 09 725 725 11, France 01 48 14 24 24, Germany 089 741 31 30,
Greece 30 1 42 96 427, Hong Kong 2645 3186, India 91805275406, Israel 03 6120092, Italy 02 413091, Japan 03 5472 2970,
Korea 02 596 7456, Mexico 5 280 7625, Netherlands 0348 433466, New Zealand 09 914 0488, Norway 32 27 73 00,
Poland 0 22 528 94 06, Portugal 351 1 726 9011, Singapore 2265886, Spain 91 640 0085, Sweden 08 587 895 00,
Switzerland 056 200 51 51, Taiwan 02 2528 7227, United Kingdom 01635 523545