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E985x VXI Embedded Pentium Controller Information

This page contains information about the E985x VXI Embedded Pentium family of controllers

Click on the links below for information on the following subjects:

- General Information
- SICL Considerations
- Reloading the Hard Drive (Disaster Recovery)
- Contact Support

General Information

The E985x VXI Embedded Pentium controller allows you to run VISA and SICL programs to do both GPIB and VXI I/O. VISA (Virtual Instrument Software Architecture) is an industry standard API for instrument control. SICL (Standard Instrument Control Library) is an Agilent instrument control API.

The Agilent IO Libraries Control (in the system tray next to the clock on the Windows NT task bar) gives you convenient access to on-line configuration and documentation. Click on this control and you can:

1. **Run Resman**

   This will re-run the VXI Resource Manager. By default, the VXI Resource manager is run when the controller boots and it is only necessary to run it from here if SYSRESET is asserted by a VXI device or if the VXI software has become unstable or unresponsive.

2. **View Resman Output**

   View the text file output from the VXI Resource Manager. This is useful for troubleshooting resource manager errors.

   Run T&M Explorer

   From T&M Explorer you can change the hardware configuration:

   - You can configure whether or not the VXI Resource Manager runs when the controller boots from the Tools | Options | Resource Manager menu.
   - In the device tree view, you can right-click on the controller at logical address 0 and select 'Hardware Configuration' to do such things as modify the controller's shared memory setup or enable the watchdog timer.

2. **Run IO Config**

   IO Config allows you to modify the configuration of the gpib0 and vxi0 interfaces used by SICL. These interfaces are pre-configured on the E985x controller but if you delete them, they can be added by selecting 'SICL on NI GPIB' to configure the GPIB interface or 'SICL on NI-VXI (E985x)' to

configure the VXI interface.

Note: the default names, gpib0 and vxi0 differ from the default names used on other Agilent controllers. If you are porting code from another controller, such as the E623x Embedded Pentium Controller, you may want to change these names to the previous defaults of hpib7 and vxi. This can be done by running IO Config and editing the appropriate configured interface.

4. **View Documentation**

   From this menu, you can easily access the SICL and E985x documentation:

   - IO Libraries Readme
   - SICL Manual
   - SICL Help
   - E985x Manual
   - E985x Readme

4. **Run Event Viewer**

   This launches the Windows NT event viewer. SICL writes diagnostic information and error messages to the event viewer's application log.

Additional links to VISA information and utilities are available from the Start | Programs | Vxipnp folder.

Additional links to SICL information and utilities are available from the Start | Programs | Agilent IO Libraries folder.

SICL Considerations

On E985x controllers, SICL communicates with the controller's VXI and GPIB hardware by using NI-VXI and NI488.2 through a translation layer. Due to hardware constraints and differences between the SICL architecture and the architecture of the underlying drivers, it is not possible to perfectly map all SICL-specified functionality. The resulting SICL considerations are documented here.

Mixing SICL and VISA

1. **Mixing SICL and VISA calls in the same process is not supported.**

2. **Using SICL and VISA calls in separate processes must be done carefully. SICL and VISA locking use different mechanisms so that a SICL lock in one process will not prevent VISA in another process from accessing a device or interface and vice versa.**

SICL on NI-VXI (E985x)

1. **Termination reasons on iread() are sometimes incomplete. If I_TERM_CHR is detected, I_TERM_END is not returned even if it is true.**

2. **If two processes have enabled interrupts on an interface session and an interrupt occurs, only one process will receive the interrupt.**

3. **Killing a process that is waiting in a hung iwrite() call causes all subsequent VXI I/O to fail until the VXI resource manager is re-run.**

4. **Timeouts don't always behave as expected.**

   Underlying NI-VXI calls are serialized -- that is a call in progress will complete before another call can start. The timeout timer for the second call isn't started until the first call returns. This means that the second call may succeed when it was expected to timeout.

5. **The NI VXI resource manager (Resman) is not run programmatically when an interface iclear() is issued.**

   If an interface iclear() is issued, SYSRESET is asserted on the VXI backplane. This causes all VXI devices in the cage to reset. Resman must be manually run before attempting further VXI operations. Note: The E985x can be configured to reboot on SYSRESET. The default is to not reboot.

6. **VXI trigger information:**
   - Supported triggers are I_TRIG_TTL0-7, I_TRIG_ECL0-1 and I_TRIG_EXT0.
   - When I_TRIG_EXT0 is used as an input it maps to the front panel Trig In connector.
   - When I_TRIG_EXT0 is used as an output it maps to the front panel Trig Out connector.
   - I_TRIG_EXT0 cannot be asserted (ivxitrigon / ivxitrigoff), its state cannot be determined with ivxibusstatus and it cannot be enabled to interrupt. Route other trigger lines to/from I_TRIG_EXT0 if you need to assert, check status or interrupt with I_TRIG_EXT0.

7. **SICL should not write to arbitrary locations in the E985x VXI shared memory.**

   The controller's VXI shared memory maps areas that are not safe to access. Safe access is provided in VISA by the viMemAlloc() function. SICL does not provide a similar mechanism so writing to arbitrary locations in the controller's shared memory area may damage important data structures that are stored in that area and subsequently cause unexpected behavior.

SICL on NI GPIB (NI-488.2)

1. **ilock() on an interface session will block an iopen() in another process on the same interface or on any devices on that interface .**

   If an iopen() is attempted on a locked interface, the iopen() will timeout if the interface is not unlocked before the timeout period. The default timeout is 10 seconds. This can be changed by manually editing the registry value of the IopenTimeout key. (See below for more information about manually editing registry values.) A possible workaround is to have all processes do their iopen()'s before any process attempts to lock.

2. **If SRQ is asserted and then removed while an iread() or iwrite() call is in progress, that SRQ will not be detected.**

Note that most instruments that can assert SRQ will leave it asserted until an ireadstb() is performed and the underlying reason for the SRQ is handled so this should not be an issue for most SICL users.

3. **If an attempt is made to iopen() more than 100 different devices in a process, an I_ERR_OS will be returned.**

   This is true even if some of the devices are closed before opening others.

4. **A device iopen() in one process will unaddress the bus and can interfere with another process that is doing I/O on an interface session using igpibsendcmd() followed by iread() or iwrite().**

   The workaround for this problem is to ilock() around the igpibsendcmd() / iread() or iwrite() calls to prevent another process from changing the addressed state of the bus between these calls.

5. **Timeouts don't always work as expected.**

   Underlying NI-488.2 calls are serialized -- that is a call in progress will complete before another call can start. Also timeout timing is performed by the underlying NI-488.2 library not by SICL. This has two implications: 1) NI-488.2 has a few discrete timeouts so the actual timeout value, while never shorter than the specified time, can be considerably longer; and 2) The timeout timer for a SICL call doesn't start until the underlying NI-488 call is made. Thus a SICL call which is waiting for another SICL call to complete may not timeout as expected because it is waiting in SICL where the timeout timer is not running.

6. **It is possible to miss transient interrupts.**

   The underlying NI-488.2 architecture requires a polling scheme for interrupts. By default this polling is done every 30 ms. If an interrupt condition does not last at least 30 ms, it is possible that the interrupt will be missed. The polling rate can be changed by manually editing the registry value of IrqLoopDelay for the interface. (See below for more information about manually editing registry values.) Note that shorter IrqLoopDelay times will reduce interrupt response latency but use more CPU bandwidth.

7. **If you decide to manually edit the IopenTimeout or IrqLoopDelay parameters in the registry:**

   Be aware that making mistakes when manually editing the registry can make Windows NT unstable and possibly prevent the controller from booting. Be sure you know what you are doing before attempting to manually edit the registry!

   Note that the default value for IopenTimeout is 10000, and the default value for IrqLoopDelay is 30. These values represent milliseconds.

To manually edit the registry:

- In the Start | Run box type 'regedit' (without the single quotes) and then click OK.
- Navigate to HKEY_LOCAL_MACHINE\Agilent\IO Libraries\CurrentVersion.
- Look at the INTFn keys to find the interface you want to edit.
- Click the INTFn key you want.
- In the right-hand pane, right-click the key you want to change (either IopenTimeout or IrqLoopDelay) and select Modify.

- Enter the value you want (the number is in units of milliseconds) and then click OK.

Reloading the Hard Drive (Disaster Recovery)

If for some reason, your hard drive fails or your system cannot be booted, it may be necessary to re-install the operating system, peripheral drivers and I/O software on the controller's hard drive.

In order to reload the hard drive, you will need the following hardware which is not supplied with your E985x controller:

1. An external SCSI CD-ROM drive.
2. A cable and adapter combination to connect your CD-ROM drive to the 68 pin Ultra Wide SCSI connector on the E985x controller.
3. A SCSI Terminator (if required by the CD-ROM drive).

Cables and connectors may be purchased on-line at the Adaptec Online Store and other vendors.

External SCSI CD-ROM Drives may be purchased on-line from Hewlett-Packard and other vendors.

Note that in some cases, due to hardware or software failure, existing data on the hard drive will be lost. For this reason, it is important that you regularly backup your data!

The following steps must be followed to re-load the hard drive:

A. **Re-load the Windows NT 4.0 operating system**
B. **Apply Windows NT 4.0 Service Pack 4**
C. **Install Internet Explorer 4.01**
D. **Install the peripheral drivers**
E. **Re-apply Windows NT 4.0 Service Pack 4**
F. **Apply Y2K Updates**
G. **Install the I/O software**
H. **Set controller configuration defaults**

Note: You will need the Product ID from your Microsoft Windows NT Workstation Certificate of Authenticity to re-load Windows NT 4.0.

When Windows NT 4.0 has been successfully reloaded, the additional drivers and software you need to load are located in the *c:\images* directory on the hard drive. A copy of these drivers can also be found on the E9850A CD-ROM in the *\images* directory.

By following the instructions below, you re-install the software that was originally shipped with your system. If you have later versions of some of this software, you may want to load the later versions rather than the original software.

A. Re-load the Windows NT 4.0 operating system

If the c:\images directory on the hard drive is readable and not corrupted:

If the operating system needs to be re-installed but the hard drive is okay you can remove the installed

operating system and install from the images on the hard drive. To do so make a bootable MS-DOS floppy and copy deltree.exe to it. Boot from the floppy and run deltree from the C drive. Run a:deltree *.* and answer yes to all files and directories EXCEPT the IMAGES directory. Once that is complete go to the *c:\images\i386* directory and run *'winnt.exe /b'* to re-install the operating system.

If the c:\images directory on the hard drive is damaged or unreadable:

The three Windows NT 4.0 boot floppies and the E9850A CD-ROM that were shipped with your system were provided to enable you to re-load your hard drive. You will need to attach an external SCSI CD-ROM drive to the controller to re-load the hard drive. Note that you must use the boot floppies that were shipped with this system. They contain a SCSI driver for the E985x hardware that is not a part of the standard Windows NT 4.0 system. The E9850A CD-ROM contains an image of these three floppies in the \floppies directory. If you use generic Windows NT 4.0 boot floppies, you will not be able to access the external SCSI CD-ROM drive.

1. Make sure that VXI mainframe power is turned off.
2. Attach the external SCSI CD-ROM drive to the controller, turn the on the CD-ROM driver power and insert the E9850A CD-ROM into the CD-ROM drive.
3. Insert the Windows NT 4.0 Boot Disk 1 and power up the VXI mainframe.
4. If the controller does not automatically boot from the floppy, you may have to change the boot order in the BIOS to allow booting from the floppy drive.
5. Follow the on-screen instructions to load Windows NT 4.0.
    - If you are installing on an unpartitioned drive and want to use a FAT16 file system, when prompted, you will need to create a 2047Mb or smaller partition.
    - When prompted about networking, choose 'Do not connect this computer to the network at this time'.
    - Use default video settings.
6. Restart the controller when prompted.
7. When the controller reboots, log on as administrator.
8. Copy the '*images*' directory to the C: drive: by double-clicking 'My Computer' and navigate to the CD-ROM drive. Then double-click the 'cpimages' icon at root of the CD to copy the directory. *Note: this copy must be performed by Windows NT 4.0. The directory contains files with long filenames that are not preserved if the copy is performed from MS-DOS.*

B. Apply Windows NT 4.0 Service Pack 4

After reloading Windows NT 4.0 and copying the '*images*' directory, it is necessary to apply Service Pack 4 before installing Internet Explorer 4.01 and loading the peripheral drivers.

1. Double-click the 'My Computer' icon and navigate to the C:\images\sp4 directory. Then double-click the 'spsetup' icon to install Windows NT 4.0 Service Pack 4.
2. Reboot the controller when prompted after the service pack is installed.
3. To avoid the Service Control Manager warning about a driver or service that failed to start, bring up the control panel ('Start | Settings | Control Panel') and double-click on 'Devices'. Scroll to and select 'Pcmcia', then click on the 'Startup' button and change the 'Startup Type' to 'Disabled'. Click 'OK' and then click 'Yes' in the warning box. You may then close the 'Devices' application and exit the control panel. (Note: the PCMCIA driver supplied with Windows NT 4.0 is incompatible with the SCSI driver on the E985x controller.)

C. Install Internet Explorer 4.01

Internet Explorer 4.01 is required to read the README files for the Agilent IO Libraries.

1. Double-click the 'My Computer' icon and navigate to the C:\images\sp4 directory.
2. Double-click 'ie4setup' to install Internet Explorer 4.01.
3. Follow the on-screen instructions and accept the defaults, except choose 'No' for installing the Windows Desktop Update.
4. Reboot your computer when prompted.

D. Install the peripheral drivers

1. Load the Video Driver

The AGP video driver is located in the *C:\images\e985x\video\nt40* directory. The following directions are adapted from the readme.txt file in that directory.

a. From 'Start', select the 'Settings group', then click on the 'Control Panel' icon.
b. In the 'Control Panel', double click on the 'Display' icon.
c. In the 'Settings' screen, click on the 'Display Type...' button.
d. From the 'Display Type' screen, and in the 'Adapter Type' section, click on the 'Change...' button.
e. In the 'Change Display' screen, click on the 'Have Disk...' button.
f. Browse to the *c:\images\e985x\video\nt40* directory, then click on the 'Open' button, then the 'OK' button in the 'Install from Disk' dialog box.
g. Select 'S3 Incorporated Display Driver ...' in the 'Display' box and click 'OK'.
h. From 'Third-party Drivers', click on the 'Yes' button to proceed.
i. When the message 'The drivers were successfully installed' is displayed, click on the 'OK' button.
j. Back at the 'Display Type' window, click on the 'Close' button.
k. Back at the 'Display Properties' window, click on the 'Close' button.
l. When you see the 'System Settings Change' window, asking if you wish to restart your computer, click on the 'Yes' window to reboot now.

2. Load the Network Drivers

a. Right-click 'Network Neighborhood' and select 'properties'
b. Answer 'Yes' to the '...install it now?' question.
c. Choose 'Wired to the Network'.
d. Choose 'Select from list...'
e. Choose 'Have disk...'
f. Enter the path: *C:\images\e985x\Enet-SCSI\enet\Winnt*
g. Choose 'NT 4.0 NDIS 4 Symbios Logic 53C885 Fast Ethernet Driver'
h. Continue with the installation choosing the configuration you desire.
i. When prompted for the location of Windows NT files, enter C:\images\i386
j. Continue the installation entering the requested information. Use default values when in doubt.
k. Re-boot after completing the network drivers installation.
l. It is necessary to re-install Windows NT 4.0 service pack 4 for networking to work *(This will eliminate the Service Control Manager warning about a service that failed to start.)*

E. Re-apply Windows NT 4.0 service pack 4

1. Double-click the 'My Computer' icon and navigate to the *C:\images\sp4* directory. Then double-click the 'spsetup' icon to install Windows NT 4.0 Service Pack 4.
2. Reboot the controller when prompted after the service pack is installed.

F. Apply Y2K Updates

1. Double-click the 'My Computer' icon and navigate to the *C:\images\sp4\i386\update* directory. Then double-click the 'Y2ksetup.exe' icon and follow the on-screen instructions to apply the Y2K fixes.
2. Reboot the controller when prompted.

G. Install the I/O Software

SICL support using the Agilent IO Libraries is layered on top of the NI-488.2 and NI-VXI drivers. For that reason, the National Instruments software must be loaded prior to loading the Agilent IO Libraries.

1. Loading NI-488.2 Driver

a. Double-click the 'My Computer' icon and navigate to the *C:\images\e985x\gpib* directory. Then double-click the 'Setup' icon.
b. Follow the on-screen instructions to install the NI-488.2 software.
c. *Note: You can safely ignore the message about the Adobe Acrobat reader not being installed. It will be installed later when you load the Agilent IO Libraries.*
d. Reboot the controller when prompted.
e. After rebooting and logging in, the NI-488.2 Getting Started Wizard will appear.
f. Using the Getting Started Wizard, configure your GPIB interface. Note: choose a board type of 'PCI-GPIB'.
g. Using the Getting Started Wizard, verify your hardware and software installation.
h. If desired, you may communicate with you instrument to verify the setup if you have a GPIB instrument attached to the system.
i. Be sure that the 'Do not show at Windows startup' box is checked before quitting the wizard.

2. Loading NI-VXI and NI-VISA Drivers

a. Double-click the 'My Computer' icon and navigate to the *C:\images\e985x\NIVXI-VISA* directory. Then double-click the 'Setup' icon.
b. Follow the on-screen instructions to install the NIVXI-VISA software.
c. Reboot the controller when prompted.

3. Loading Agilent IO Libraries (SICL) Drivers

1. Double-click the 'My Computer' icon and navigate to the *C:\images\e985x\iolibs* directory. Then double-click the 'Setup' icon.
2. Follow the on-screen instructions accepting the defaults to install the Agilent IO Libraries software.

H. Set controller configuration defaults

1. Automatically run the VXI Resource manager (Resman) on startup.

a. Click on the 'Agilent IO Libraries Control' in the system tray (next to the clock on the Windows NT 4.0 task bar) to bring up the menu.

b. Select 'Run T&M Explorer'.
c. On the T&M Explorer tools menu, choose 'Options'.
d. Choose the 'Resource Manager' tab and check the 'Run VXI Resource Manager on computer startup' box.
e. Click 'OK' to close the 'Options' dialog box.
f. Exit T&M Explorer.

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