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Embedded High-Performance VXIbus Controllers

NEW

NI VXIpc-870B Series

- VXI *plug&play* compliant
- VXIpc-871B, VXIpc-872B
 - 1.26 GHz Pentium III processor
- VXIpc-874B, VXIpc-875B
 - 1.4 GHz Pentium III processor
- Intel 815E chipset
- High-performance PCI-based peripherals
 - 10/100BaseT Ethernet
 - Wide Ultra2 SCSI
 - CardBus controller for PCMCIA (16-bit) and CardBus (32-bit)²
 - GPIB
- NI MITE-based VXIbus interface
 - DMA
 - VME64
- Storage and memory
 - 256 MB, upgradeable to 512 MB
 - Internal 1.44 MB floppy drive
 - Internal hard drive, 30 GB minimum¹
- Programmable NI watchdog timer
- Complete VXI Slot 0 resource manager
- Jumperless configuration

NI-VXI/NI-VISA Software

- Windows 2000/XP/NT
- VxWorks
- Linux 2.2/2.4 kernel

¹Minimum drive size does not apply to solid-state flash drive options. Because of rapidly changing hard drive technology, please contact National Instruments for the latest hard drive options.

²Windows XP and 2000



Overview

The National Instruments VXIpc-870B Series embedded controllers are flexible, high-performance Pentium III-based controllers in a rugged package ideal for VXI systems. An NI VXIpc-870B Series controller in a VXI chassis gives you direct control of VXI registers, memory, interrupts, and triggers while maintaining compatibility with the scores of software packages and tools available for general-market desktop PC computers.

The NI VXIpc-870B Series controllers come in four models with various options that provide the most cost-effective VXI embedded control solution available. Table 1 details the standard features of the VXIpc-870B Series controllers. The VXIpc-870B Series controllers require two VXI C-size slots. The VXIpc-871B and VXIpc-874B include all the standard features, but also add an integrated 24X max CD-ROM drive. The VXIpc-872B and VXIpc-875B also contain all standard features, but instead of a CD-ROM drive, they offer one PCI expansion slot.

If you require a solid-state storage medium for operation in harsh

environments, you can use the VXIpc-870B Series controllers with an internal solid-state flash drive in place of the internal hard drive, or a removable solid-state flash drive that you can install and remove directly from the front panel.

Options

VXIpc-871B and 874B (with integrated 24X max CD-ROM drive)

- Windows 2000 installed, internal hard drive
- Windows NT installed, internal hard drive
- Windows XP installed, internal hard drive
- No OS installed, internal hard drive
- VxWorks software available
- Linux software available
- Internal IDE flash drive available
- Removable ATA flash drive available

VXIpc-872B and 875B (with PCI expansion slot)

- Windows 2000 installed, internal hard drive
- Windows NT installed, internal hard drive
- Windows XP installed, internal hard drive
- No OS installed, internal hard drive
- VxWorks software available
- Linux software available
- Internal IDE flash drive available
- Removable ATA flash drive available

Feature	Description
Processor	Intel Pentium III, 1.26 GHz/1.4 GHz
Floppy Drive	Integrated 3.5 in., 1.44 MB
IDE Controller	Ultra ATA 100/66/33, BMIDE and PIO modes
Ethernet	10/100BaseT (RJ45)
SCSI	Wide Ultra2 SCSI (LVD/SE)
Video	Integrated Intel 82815 graphics controller
Memory	256 MB PC133 SDRAM, (2 SO-DIMM slots upgradeable to a total of 512 MB)
PC Card Controller	2 slots (2 Type I/II or 1 Type III) ²
GPIB	IEEE 488.2 (26-pin miniature connector)
Serial Ports	2 RS232 (9-pin miniature connector)
Parallel Port	IEEE 1284-compatible
PS/2	2 ports (keyboard ¹ /mouse ¹)
USB	2 ports, USB 1.1-compliant ²

¹Not included. ²Supported in Windows 2000 only.

Table 1. VXIpc-870B Series Features



Embedded High-Performance VXIbus Controllers

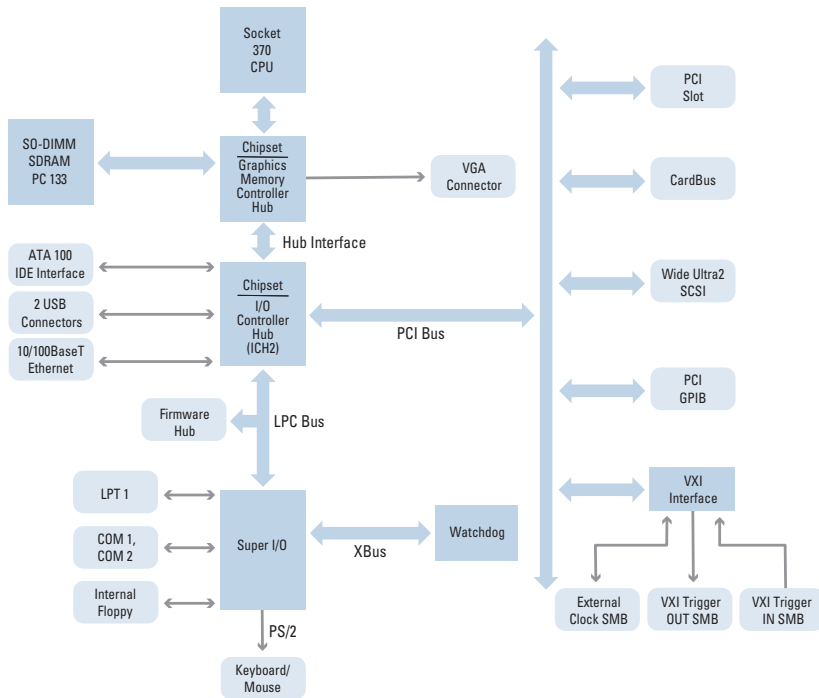


Figure 1. VXIpc-870B Series Block Diagram

The VXIpc-870B Series uses industry-standard VXI *plug&play* software, including NI-VXI/NI-VISA and NI-488.2 software. The NI-VXI/NI-VISA bus interface software is a comprehensive software package for configuring, programming, and troubleshooting your VXI system. With NI-VXI/NI-VISA, you can be confident that your software development will not become obsolete as your needs change and VXI technology evolves over time.

Hardware

NI VXIpc-870B Series controller hardware consists of a double-width module that fits directly in a C-size VXI mainframe. You can use the VXIpc-870B Series in Slot 0 or in non-Slot 0 operation, so you can use several VXIpc-870B Series controllers in a system together. The VXIpc-870B Series uses the Intel 815E chipset to deliver maximum performance and flexibility for your VXI system. Figure 1 shows the block diagram for the VXIpc-870B Series embedded controllers.

Hardware Architecture

State-of-the-art packaging technology gives the VXIpc-870B Series controllers the full functionality of a desktop PC in a VXI module. National Instruments made a number of technological advances to make the VXIpc-870B Series controllers possible, including the MITE and MANTIS custom ASICs for high-performance VXI control, as well as the PCI MITE and TNT4882 ASIC for GPIB control. Many expansion options exist on the VXIpc-870B Series controllers, including CardBus, SCSI, and GPIB. These expansion options interface to the microprocessor through the PCI bus to realize the fastest performance possible.

You can easily add external SCSI drives through the Wide Ultra2 SCSI interface located on the front panel. All VXIpc-870B Series controllers have a 10/100BaseT Ethernet port, so you can quickly and easily integrate the VXIpc-870B into a LAN or WAN. The VXIpc-870B Series also comes with at least a 30 GB hard drive (as technology continues to advance, hard drive sizes change. Be sure to check with National Instruments for the latest hard drive offerings. Please note that the 30 GB minimum does not apply to the solid-state flash drive options). You can also configure the VXIpc-870B Series with an internal 24X max CD-ROM drive for installation of application software (available only on the VXIpc-871B/VXIpc-874B), or you can use it to run test software like a standard desktop PC. The VXIpc-870B Series motherboard also provides you with one PCI expansion slot for either one full-length or one short-length PCI expansion card (available only on the VXIpc-872B/VXIpc-875B).

Processor

The VXIpc-870B Series features 1.26 or 1.4 GHz Intel Pentium III processors in the FC-PGA2 package. The processors come with 512 KB of level 2 cache and interface to the chipset through the 133 MHz AGTL+ system bus.

Memory

VXIpc-870B Series controllers come with two SO-DIMM sockets for memory. The system handles a maximum of 512 MB of PC133 memory. You can purchase additional 256 MB memory modules and upgrade your system memory.

Intel 82815 Graphics Controller

The NI VXIpc-870B Series uses the integrated Intel 82815 graphics controller and dynamic memory video technology (DMVT). Using DMVT, the integrated graphics controller achieves optimum graphics and memory performance by dynamically sharing the high-speed PC133 system memory. With this video memory management, the VXIpc-870B Series offers a wide range of video resolutions and colors, a few of which are listed in Table 2.

Resolution	Colors
640 x 480	16 M colors
800 x 600	16 M colors
1024 x 768	16 M colors
1280 x 1024	16 M colors
1600 x 1200	256 colors

Table 2. VXIpc-870B Series

Graphics Support

10/100BaseT Ethernet

The VXIpc-870B Series uses the Intel integrated LAN controller and the 82562 Platform LAN Connect Fast Ethernet controller. The controller automatically negotiates connections for 10BaseT and 100BaseTX.

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SCSI

The LSI53C895A is a PCI controller providing Wide Ultra2 SCSI performance to the VXIpc-870B Series controllers. The controller can perform transfers as fast as 40 Mtransfers/s (80 MB/s). The SCSI controller operates in low-voltage differential mode and is backward compatible with single-ended devices.

PC Card Expansion

You can also add third-party peripheral cards through two PC card slots on the front panel. The VXIpc-870B Series handles two Type I/II or one Type III PC card. The controller uses the Texas Instruments PCI1450 PCI-PC card bridge. You can boot from an ATA solid-state flash memory card in VxWorks or Linux if you configure the controller through the BIOS.¹

¹Please refer to National Instruments KnowledgeBase entry for flash memory booting on ni.com for the latest information on this feature.

IEEE 488.2/HS488 Interface

The VXIpc-870B Series uses the PCI mini-MITE and TNT4882 ASIC (PCI-GPIB-compatible) for full GPIB control of external instruments via a front panel connector. GPIB control capability is fully IEEE 488.2-compatible. The GPIB interface on the VXIpc-870B Series is fully compatible with the National Instruments industry-standard NI-488.2 driver software for a variety of operating systems. Any software using NI-488.2 runs on a VXIpc-870B Series controller. Using the HS488 protocol, the VXIpc-870B Series can handle speeds up to 8 MB/s.

NI Watchdog

NI watchdog is a counter/timer that can monitor an application program by having the software check in with NI watchdog. Please call National Instruments technical support for more information on this feature.

Real-Time Clock

The VXIpc-870B Series uses the integrated real-time clock along with a user-replaceable battery for CMOS setting backup. The battery is a hermetically sealed lithium battery, making it suitable for use in industrial applications.

BIOS

The Phoenix BIOS was developed specifically for the VXIpc-870B Series controllers. The BIOS incorporates both a SCSI option ROM and PXE network boot ROM, so you have the option of either SCSI or network booting.

Another special feature of this BIOS is a PC card booting from an ATA flash memory PC card. The BIOS can configure the TI PCI1450 PC card controller in IDE mode, so some operating systems, such as VxWorks or Linux, can boot from a PC card.¹

¹Operating systems that enumerate the PCI bus can reconfigure the PC card controller, which causes boot failure. Please refer to National Instruments KnowledgeBase entry for flash memory booting on ni.com for the latest information on this feature.

USB CD-ROM Drive

National Instruments offers an optional external USB CD-ROM drive for use with the VXIpc-872B embedded controller. Using the USB interface, you can connect this CD-ROM drive to your embedded controller for easy system software recovery, installation, and upgrades. Because USB is not available with Windows NT, the external CD-ROM drive works only as a recovery device under this operating system. This drive is completely powered through the USB port, so no external power connections are required.

VXIbus

VXI Addressing – The VXIpc-870B Series controllers feature the MITE and MANTIS custom ASICs for accessing the VXI backplane resources. To access VXI memory or VXI devices, VXIpc-870B Series controllers use the multiple windowing scheme of the MITE, so you can access all of the VXI address space. The MITE exports independent VXI address windows, providing you with three completely user-configurable windows. You can also set each window size and location. This multiple windowing scheme alleviates the performance penalty related to the context switching of one window that you must constantly move between the different address spaces.

DMA Transfers to and from VXI – Using the VXIpc-870B, you can perform block-mode transfers using one of the two on-chip DMA controllers on the MITE. Controlling external VXI devices often takes valuable CPU time, because the microprocessor typically shoulders the burden of transferring data to and from devices. However, MITE-based VXI controllers, such as those of the VXIpc-870B Series, free up CPU processing time by moving the burden of block data transfers to one of the DMA controllers on the MITE. Instead of the computer microprocessor transferring the data and/or commands, NI-VXI/NI-VISA software uses the MITE ASIC to execute the block data transfers. While the MITE transfers the data, the processor can perform application-specific tasks, such as data presentation and analysis.

VXI Slot 0 Functionality – The VXIpc-870B Series controllers have full VXI Slot 0 capability, including a MODID register and a CLK10 source, as required by the VXIbus specification. You can also install a VXIpc-870B Series controller in another slot and use it in the non-Slot 0 mode. No matter what your configuration needs, a VXIpc-870B Series controller can automatically detect whether it is inserted into Slot 0 and automatically enable or disable the Slot 0 onboard circuitry without switches and jumpers.

External VXI CLK10 Synchronization – The VXIpc-870B Series controllers have an SMB connector on the front panel for an external clock. Onboard programmable logic can configure the VXIpc-870B Series to drive its 10 MHz VXI CLK10 signal to this connector as an output or to use this connector as an input for the 10 MHz VXI CLK10 signal. In this way, you can configure multiple mainframes to operate off a single 10 MHz system clock.

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Advanced Trigger/Timing – With the VXIpc-870B Series, you have full software and hardware control of the VXI trigger lines. The VXIpc-870B Series controllers have two SMB trigger I/O connectors on the front panel for routing any TTL trigger line between the backplane and external devices. The VXIpc-870B Series can respond to all VXI-defined protocols on all P2 TTL and ECL trigger lines at the same time. The hardware also includes an internal counter, which gives sophisticated counting of events and interrupting on trigger edges and pulses, as well as generating pulse trains, variable length pulses, and pulse stretching.

VXI Interrupts – The VXIpc-870B Series can function as an interrupter and an interrupt handler for any or all of the VXIbus interrupt lines in a VXI mainframe. Using NI-VXI/NI-VISA software, your application can be notified when any interrupt is asserted, and can assert any interrupt level with a programmable status. You can use the NI-VXI configuration software to assign which interrupt levels should be handled by each device in the system.

Software

The VXIpc-870B Series includes NI-VXI/NI-VISA software, making it completely compliant with *VXIplug&play* Systems Alliance specifications. NI-VXI/NI-VISA is the combination of the popular NI-VXI VXIbus interface software and new-generation virtual instrumentation software architecture VISA I/O software, also standardized by the *VXIplug&play* Systems Alliance. Because the VXIpc-870B Series is completely *VXIplug&play*-compliant, you can run all the latest *VXIplug&play* software, including executable

soft front panels, with which you can operate the instrument immediately, and standardized LabVIEW, LabWindows/CVI, and Measurement Studio instrument drivers to simplify your programming tasks.

NI-VXI/NI-VISA comes with a VXI bus interface library that you can use with a number of popular programming environments and compilers, including LabVIEW, LabWindows/CVI, and Measurement Studio, as well as Microsoft Visual C++, Borland C++, and Microsoft Visual Basic. NI also offers industry-standard NI-488.2 software for controlling external GPIB instruments through the VXIpc-870B Series front-panel GPIB port. Application software developed using the VXIpc-870B Series and the NI-VXI/NI-VISA bus interface software is compatible with many other VXI controller platforms, including computers equipped with a MXI-2- or MXI-3-based interface. NI-VXI and NI-VISA I/O software compatibility across platforms protects your software investment in the future. Because the software for all these configurations is compatible, you can program both general-purpose external PCs and embedded VXIpc controllers using the same programming tools and concepts. You can easily port VXI software to other platforms as your controller requirements change or expand in the future. The NI-VXI and NI-DAQ software for the VXIpc-870B Series controllers is not compatible with National Instruments legacy VXI data acquisition and signal conditioning devices. Please see technical support at ni.com for additional information.

Ordering Information

NI VXIpc-871B

No OS installed on internal hard drive	778295-00
Windows 2000 installed on internal hard drive.....	778295-01
Windows NT 4.0 installed on internal hard drive	778295-02
Windows XP installed on internal hard drive.....	778295-03

NI VXIpc-872B

No OS installed on internal hard drive	778296-00
Windows 2000 installed on internal hard drive.....	778296-01
Windows NT 4.0 installed on internal hard drive	778296-02
Windows XP installed on internal hard drive.....	778296-03

Additional Software Options

NI-VXI/NI-VISA for Linux ¹	778130-01
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¹For Linux, order a VXIpc-870B Series controller with no OS and NI-VXI/NI-VISA for Linux.

NI-VXI/NI-VISA for VxWorks ²	778597-01
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²For VxWorks, order a VXIpc-872B/875B controller with no OS and NI-VXI/NI-VISA for VxWorks.

Memory Upgrade Options

The VXIpc-870B Series controllers come with two SO-DIMM sockets accessible for memory expansion. These controllers come with 256 MB of PC133 SDRAM in one socket with the other socket available for expansion. The system handles a maximum of 512 MB of PC133 memory. You can purchase the following SDRAM module to add to your controller.

256 MB SDRAM	778469-256
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Flash Drive Options

Internal IDE flash drive ³	778600-01
Removable ATA flash PC card ³	778600-02

³Please contact National Instruments for the latest flash drive options.

Additional Accessories

USB CD-ROM drive	778492-01
Parallel port adapter cable (6 in) ¹	777169-01
GPIB adapter cable (2 m) ¹	183285-02
Serial adapter cable (8 in) ¹	183286-08

¹Every VXIpc-870B Series controller comes with one parallel port adapter cable, one GPIB adapter cable, and one serial adapter cable.

NI VXIpc-874B

No OS installed on internal hard drive	779523-00
Windows XP installed on internal hard drive.....	779523-01
Windows 2000 installed on internal hard drive.....	779523-02
Windows NT 4.0 installed on internal hard drive	779523-03

NI VXIpc-875B

No OS installed on internal hard drive	779524-00
Windows XP installed on internal hard drive.....	779524-01
Windows 2000 installed on internal hard drive.....	779524-02
Windows NT 4.0 installed on internal hard drive	779524-03

Embedded High-Performance VXIbus Controllers

Specifications

Complies with VXI Specification 3.0
Complies with IEEE 488.2

Physical

Size Fully enclosed,
shielded VXI C-size board
Dimensions 233.35 by 340 mm
(9.187 by 13.386 in.)
Weight
VXIpc-871B 2.4 kg (5.3 lb)
VXIpc-872B 2.2 kg (4.9 lb)
Number of VXI slots 2

Power Requirements

VDC	Current	
	DC (Typical)	Dynamic (Typical)
+5	9.75 A	4.25 A
+12	150 mA	150 mA
-12	50 mA	150 m
-2	100 mA	125 mA
-5.2	200 mA	125 mA

Total power (typical) 52.4 W

Operating Environment

Ambient temperature range 5 to 50 °C
Relative humidity range 10 to 90%, noncondensing

Storage Environment

Ambient temperature range -20 to 70 °C
Relative humidity range 5 to 95%, noncondensing

Mean Time Between Failures (MTBF)

VXIpc-871B/VXIpc-874B 88,000 hours
VXIpc-872B/VXIpc-875B 86,000 hours
(Predictions performed in accordance with Bellcore Reliability Methods)

Shock and Vibration

Functional shock 30 g peak, half-sine, 11 ms pulse
(Meets IEC 60068-2-27. Test profile developed
in accordance with MIL-T-28800E Class 3.)
Random vibration
Operational 5 to 500 Hz, 0.3 _{grms}
Nonoperational 5 to 500 Hz, 2.4 _{grms}
(Meets IEC 60068-2-64. Nonoperating test profile
developed in accordance with MIL-T-28800E and
MIL-STD-810E Method 514.)

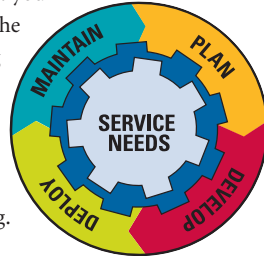
Safety Compliance

EN 61010-1, IEC 61010-1

Specifications subject to change without notice.

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