Single-Slot Low-Cost Embedded VXIbus Computer

VXIpc-700 Series

VXIplug&play compliant
Low-cost, 1-slot, C-size
100 MHz 486 microprocessor
High-performance peripherals
PC Card (PCMCIA)
Enhanced IDE hard drive
3.5 in. floppy drive
Super VGA
Optional GPIB and Ethernet
Up to 64 MB RAM
DMA block-mode transfers
11 Mbytes/s maximum
Automatic Slot 0 detection for easy configuration

NI-VXI/VISA Software
Windows NT
Windows 95
Windows 3.1
VxWorks

NI-VXI Software
DOS

NI-488.2M Software
Windows NT
Windows 95

NI-488.2 Software
Windows 3.1
DOS

Application Software
LabVIEW
LabWindows/CVI

Overview

The VXIpc-700 Series are low-cost, single-slot embedded VXI computers that use state-of-the-art technology and packaging to create fully PC-compatible controllers for VXI systems. These computers use an integrated local bus design centered on the high-performance peripheral computer interface (PCI) bus. The VXIpc-700 Series uses the PCI local bus as the direct connection to the VXIbus as well as the primary connection to its peripheral devices, such as the Super VGA video, PC Cards, and the enhanced IDE hard drive. By using the PCI bus and our advanced ASIC technology, the VXIpc-700 Series achieves superior VXI and PC performance levels.

Placing a computer directly in a VXI mainframe 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 low-cost VXIpc-700 Series offer flexible, high-performance computers in a small, rugged package ideal for VXI systems.

The VXIpc-700 Series has two models – the VXIpc-740/100 and the VXIpc-745/100. Both VXIpc-700 Series computers require only one VXI C-size slot and come complete with a 3.5 in. floppy drive, Super VGA, one serial port, PC Card (PCMCIA) slot, 16 MB DRAM, and at least an 800 MB enhanced IDE hard drive. The VXIpc-745 includes integrated capability for GPIB and 10BaseT Ethernet on the motherboard with direct front panel connections to these peripherals. See Table 1 for complete VXIpc-700 Series features.

The VXIpc-700 Series includes complete VXIplug&play-compliant software, such as NI-VXI/VISA and NI-488.2 software for Windows NT/95/3.1, VxWorks and DOS. The NI-VXI/VISA bus interface software is a comprehensive software package for configuring, programming, and troubleshooting your VXI system. With NI-VXI/VISA, you can feel confident that your software development will not become obsolete or useless as your needs change and VXI technology evolves over time.

Feature	Description
Floppy drive	Integrated 3.5 in., 1.44 MB
Hard drive	EIDE, 800 MB*
Ethernet	10BaseT (RJ-45) (VXIpc-745 only)
Video	PCI, 2 MB 64-bit accelerated EDO
Memory	16 MB standard 64 MB maximum
PCMCIA	1 Type I/II, 1 Type I / II / III
GPIB	IEEE 488.2 (26-pin miniature connector) (VXIpc-745 only)
Serial ports	RS-232 (9-pin miniature connector)
Keyboard +	PS/2 connector
Mouse +	RS-232 connector

Table 1. VXIpc-700 Series Features

** Because hard drive technology changes rapidly, contact National Instruments for the latest options.*

+ Not included

Hardware

Figure 1 shows the hardware design of the VXIpc-700 Series. The hardware consists of a single-width module that fits directly in a C-size VXI mainframe. All configurations are available with a built-in floppy disk; a dual PC Card (PCMCIA)

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slot for expansion; and standard desktop PC interfaces, including PS/2-style keyboard and serial port. The VXIpc-745/100 additionally provides a state-of-the-art IEEE 488.2-compatible GPIB controller interface and 10BaseT Ethernet on the front panel. All models come with at least an 800 MB enhanced IDE hard drive and 16 MB of DRAM. The VXIpc-700 Series computers give you full Slot 0 control of the VXI mainframe; or you can optionally configure them for non-Slot 0 operation. The NI-VXI/VISA software has low and high-level tools for VXIbus programming to ease your software development task and get you up and running quickly.

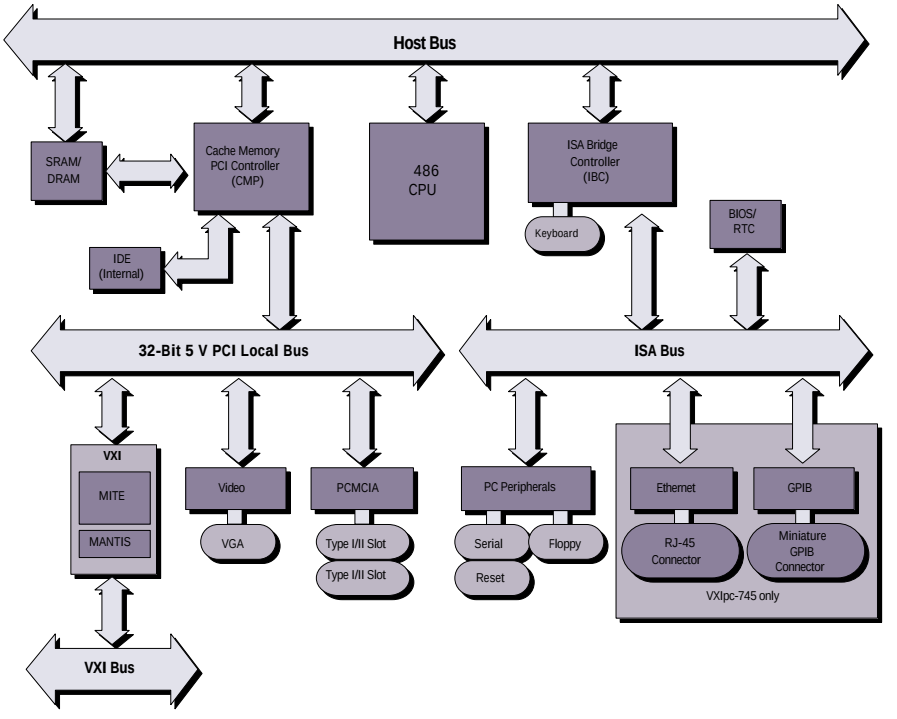

Figure 1. Block Diagram of the VXIpc-700 Series

Hardware Architecture

State-of-the-art packaging technology gives the VXIpc-700 Series computers the full functionality of a desktop PC in a single-width VXI module. A number of technological advances were required to make the VXIpc-700 Series computers possible, including the MITE and MANTIS custom ASICs for high-performance VXI control as well as the TNT4882C ASIC for GPIB control. Many of the VXIpc-700 Series peripherals interface to the microprocessor through the PCI local bus to realize the fastest performance possible. The 32-bit PCI local bus interface on the VXIpc-700 Series is clocked at 33 MHz, the fastest possible speed; therefore, all peripherals integrated on the motherboard can take advantage of the fast PCI connection to deliver high-speed performance.

You can upgrade the standard 16 MB of DRAM in your VXIpc-740 simply by adding readily available standard computer DRAM SIMMs, just as with a desktop PC. You can configure either controller with up to 64 MB of DRAM total. Using the VXIpc-745/100 Ethernet, you can quickly and easily integrate your VXI system into a LAN or WAN. Lastly, the VXIpc-700 Series come with at least an 800 MB hard drive. Because hard drive sizes change as technology advances, be sure to check with National Instruments for the latest hard drive offerings.

Processor

The VXIpc-700 Series is based on the proven 100 MHz 80486 DX4 microprocessor. To increase overall system performance, the VXIpc-700 Series computers provide 128 KB of Level 2 Write Back cache.

VXI Addressing

The VXIpc-700 Series computers feature the MITE and MANTIS custom ASICs for accessing the VXI backplane resources. To access VXI memory or VXI devices, VXIpc-700 Series uses the multiple windowing scheme of the MITE, which gives you access to all VXI address space. You can configure the VXI address windows to "look" at specific areas of VXI memory, or you can use NI-VXI/VISA to do this automatically.

The NI-VXI/VISA software driver uses three separate windows– one for VXI configuration space (A16), one for memory space (A24, A32), and one that is used internally. The remaining five windows are completely user configurable. You can use one or all five windows; you can also configure the size and location of the windows. 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

The VXIpc-700 Series 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, in the VXIpc-700 Series, CPU processing time is conserved by moving the burden of

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block data transfers to one of the DMA controllers integrated in the MITE. Instead of the computer microprocessor transferring the data and/or commands, the NI-VXI/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-700 Series computers 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 unit in another slot and use it in Non-Slot 0 mode. No matter what your configuration needs, a VXIpc-700 Series Computer can automatically detect whether it is inserted into Slot 0 and automatically enable or disable the Slot 0 onboard circuitry without switches and jumpers.

VXI Trigger Lines

The VXIpc-700 Series gives a programmer full hardware and software control of the VXI trigger lines. The VXI trigger interface is based on the advanced MANTIS ASIC developed by National Instruments. The VXIpc-700 Series can respond to all VXI-defined protocols on all P2 TTL and ECL trigger lines at the same time. The MANTIS features an internal cross-matrix switching system for routing between lines as well as to and from the front panel and onboard clocks. An internal counter gives sophisticated counting of events and interrupting on trigger edges and pulses, as well as generating pulse trains, variable length pulses, and pulse stretching.

Interrupts

The VXIpc-700 Series can function as an interrupter and an interrupt handler for any or all of the VXIbus interrupt lines in a VXI mainframe. The VXIpc-700 Series works with both Release on Acknowledge (ROAK) and Release on Register Access (RORA) devices. All interrupts are routed to the microprocessor. The VXIpc-700 Series can also detect other VXIbus conditions, including assertion of ACFAIL, SYSFAIL, and BERR.

PC Card Expansion

You can also add third-party peripheral cards to add serial ports or to add a fax/modem through one of the two PC Card (PCMCIA) slots on the front panel. The VXIpc-700 Series can accommodate two Type II PC Cards or one Type III. By using commercially available PC Cards, you can customize the VXIpc-700 Series for your application.

Optional IEEE 488.2 Interface

The VXIpc-745 uses the state-of-the-art TNT4882 ASIC to give 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-745 is fully compatible with the National Instruments industry-standard NI-488.2 driver for a variety of operating systems. Any software using NI-488.2 runs on the VXIpc-745.

Front Panel

The front panel of the VXIpc-700 Series contains up to seven connectors, six LEDs, and a reset button. In addition, it includes an integrated 3.5 in. floppy disk drive. The front panel connectors are listed below:

- *Two SMB connectors (TrigIn, TrigOut)*
- *9-pin D Sub Serial*
- *15-pin VGA controller connector*
- *PS/2 Style keyboard connector*
- *26-pin GPIB miniature connector (VXIpc-745 only)*
- *10BaseT Ethernet RJ-45 connector (VXIpc-745 only)*

Six front panel LEDs provide VXI and PC status. They are as follows: FAILED, SYSFAIL, ONLINE, TEST, DRIVE, ACCESS

Video

The VXIpc-700 Series motherboard comes standard with 2 MB of EDO DRAM and 64-bit accelerated graphics capability. The VXIpc-740 uses the Trident TGUI96xx, a PCI-integrated video chip set. See Table 2 for resolution/color density options.

Software

Resolution	Colors
1600 x 1200	16
1280 x 1024	256
1024 x 768	65 K
800 x 600	16 M
640 x 480	16 M

Table 2. Color Options

The VXIpc-700 Series comes with either Windows NT, Windows 95, or DOS/Win 3.11 installed and configured on the hard drive. To ease your programming task, NI-VXI/VISA and NI-488.2 are also installed when you order a VXIpc-700 Series VXI Development System and includes an unlimited run-time license for any software developed using these librares. The Run-Time Systems include only the operating system. The NI-VXI/VISA software comes with a VXIbus interface library that you can use with a number of popular programming environments and compilers, including Microsoft Visual C++, Borland C++, Microsoft Visual Basic, LabWindows/CVI, and LabVIEW. LabVIEW and LabWindows/CVI may also be optionally installed on the VXI Development Systems.

Application software developed using the VXIpc-700 Series and the NI-VXI/VISA bus interface software is compatible with many other VXI controller platforms. Protecting your software investment. You can easily port VXI software to other platforms as your controller requirements change or expand in the future.

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Ordering Information

Recommended hardware options with either development or run-time configurations available.

VXIpc-740/100 *(100 MHz 486) with:*
- *LabVIEW Development System*
  - *Windows NT 776870-20*
  - *Windows 95 ..... 777256-20*
  - *Windows 3.1 ..... 776710-20*
- *LabWindows/CVI Development System*
  - *Windows NT 777255-20*
  - *Windows 95 ..... 777254-20*
  - *Windows 3.1 ..... 776871-20*
- *VXI Development System*
  - *Windows NT 777330-21*
  - *Windows 95 ..... 777330-31*
  - *DOS/Windows 3.1 ..... 777330-01*
  - *VxWorks* 777330-41*

VXIpc-745/100 *(100 MHz 486) with*
- *LabVIEW Development System*
  - *Windows NT 776870-21*
  - *Windows 95 ..... 777256-21*
  - *Windows 3.1 ..... 776710-21*
- *LabWindows/CVI Development System*
  - *Windows NT 777255-21*
  - *Windows 95 ..... 777254-21*
  - *Windows 3.1 ..... 776871-21*
- *VXI Development System*
  - *Windows NT 777331-21*
  - *Windows 95 ..... 777331-31*
  - *Windows 3.1 ..... 777331-01*
  - *VxWorks* 777331-41*

Cables and Accessories
- *GPIB Cable (2 m) 183285-02*
- *PCMCIA Cable Strain Relief Kit 777391-01*

VXIpc-700 Series with PCMCIA Strain-Relief Kit

** The VXIpc-700 Series VXI Development and Run-Time Systems do not include VxWorks installed on the hard drive. Please contact Wind River Systems at (800) 545-Wind.*

Specifications

Performance
- *Address access A32, A24, A16*
- *Transfer width (master) ..... D64, D32, D16, D08 (EO)*
- *Transfer width (slave) ..... D64, D32, D16, D08 (EO)*
- *Maximum master D32 read throughput (sustained) ..... 11 Mbytes/s*
- *Maximum master D32 write throughput (sustained) ..... 10 Mbytes/s*
- *Read, modify, write cycles ..... Yes*
- *VME block cycles ..... Yes*
- *Automatic Slot 0 detection ..... Yes*

Physical
- *RAM ..... Up to 64 MB*
- *Size ..... C-size, C-1*
- *Number of VXI slots 1*
- *Dimensions ..... 23.3 by 43.0 cm (9.2 by 13.4 in.)*
- *Weight ..... 1.7 kg (3.7 lb)*

Peripherals
- *SuperVGA ..... 2 MB EDO 64-bit*
- *Serial ports (1) 16550 RS-232*
- *PC Cards (PCMCIA) ..... 2 Type II or 1 Type III*
- *Ethernet (VXIpc-745 only) 10BaseT*
- *GPIB port (VXIpc-745 only) ..... IEEE 488.2*

Power Requirements	Minimum	Maximum
+5 VDC	3.85 A	7A
-2 VDC	78.1 mA	2 A
-5.2 VDC	331.4 mA	2 A
+12 VDC	3.92 mA	2 A
-12 VDC	2.98 mA	2 A

Operating Environment
- *Temperature ..... 0 to 50 °C ambient maximum*
- *Relative humidity ..... 10% to 90% noncondensing*
- *Functional shock ..... MIL-T-28800E Class 3*
- *Random vibration ..... MIL-T-28800 MIL-T-810E Category 1*

Storage Environment
- *Temperature ..... -20 to 70 °C ambient maximum*
- *Relative humidity ..... 5% to 95% noncondensing*

Noise and Emissions
- *FCC Class A*
- *EC EN 55011*
- *EC En 50082*

Cooling VXIpc-745
- *Average power ..... 21 W*
- *Airflow ..... 1.7 liters/s*
- *Back Pressure ..... 0.11 mm H_2O*