

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

KPXI System Controller

User's Manual

KPXI-CON-900-01 Rev. A / January 2007

ECA 42912

WARRANTY

Keithley Instruments, Inc. warrants this product to be free from defects in material and workmanship for a period of 1 year from date of shipment.

Keithley Instruments, Inc. warrants the following items for 90 days from the date of shipment: probes, cables, rechargeable batteries, diskettes, and documentation.

During the warranty period, we will, at our option, either repair or replace any product that proves to be defective.

To exercise this warranty, write or call your local Keithley Instruments representative, or contact Keithley Instruments headquarters in Cleveland, Ohio. You will be given prompt assistance and return instructions. Send the product, transportation prepaid, to the indicated service facility. Repairs will be made and the product returned, transportation prepaid. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days.

LIMITATION OF WARRANTY

This warranty does not apply to defects resulting from product modification without Keithley Instruments' express written consent, or misuse of any product or part. This warranty also does not apply to fuses, software, non-rechargeable batteries, damage from battery leakage, or problems arising from normal wear or failure to follow instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES.

NEITHER KEITHLEY INSTRUMENTS, INC. NOR ANY OF ITS EMPLOYEES SHALL BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF ITS INSTRUMENTS AND SOFTWARE EVEN IF KEITHLEY INSTRUMENTS, INC., HAS BEEN ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGES. SUCH EXCLUDED DAMAGES SHALL INCLUDE, BUT ARE NOT LIMITED TO: COSTS OF REMOVAL AND INSTALLATION, LOSSES SUSTAINED AS THE RESULT OF INJURY TO ANY PERSON, OR DAMAGE TO PROPERTY.

KEITHLEY

A GREATER MEASURE OF CONFIDENCE

Keithley Instruments, Inc.

Corporate Headquarters • 28775 Aurora Road • Cleveland, Ohio 44139
440-248-0400 • Fax: 440-248-6168 • 1-888-KEITHLEY (534-8453) • www.keithley.com

12/06

KPXI
System Controller
User's Manual

©2007, Keithley Instruments, Inc.
All rights reserved.
Cleveland, Ohio, U.S.A.
Document Number: KPXI-CON-900-01 Rev. A / January 2007

Manual Print History

The print history shown below lists the printing dates of all Revisions and Addenda created for this manual. The Revision Level letter increases alphabetically as the manual undergoes subsequent updates. Addenda, which are released between Revisions, contain important change information that the user should incorporate immediately into the manual. Addenda are numbered sequentially. When a new Revision is created, all Addenda associated with the previous Revision of the manual are incorporated into the new Revision of the manual. Each new Revision includes a revised copy of this print history page.

Revision A (Document Number KPXI-CON-900-01)..... January 2007

All Keithley Instruments product names are trademarks or registered trademarks of Keithley Instruments, Inc.
Other brand names are trademarks or registered trademarks of their respective holders.

KEITHLEY

Safety Precautions

The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with non-hazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the manual for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product may be impaired.

The types of product users are:

Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

Maintenance personnel perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the manual. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

Service personnel are trained to work on live circuits, and perform safe installations and repairs of products. Only properly trained service personnel may perform installation and service procedures.

Keithley Instruments products are designed for use with electrical signals that are rated Measurement Category I and Measurement Category II, as described in the International Electrotechnical Commission (IEC) Standard IEC 60664. Most measurement, control, and data I/O signals are Measurement Category I and must not be directly connected to mains voltage or to voltage sources with high transient over-voltages. Measurement Category II connections require protection for high transient over-voltages often associated with local AC mains connections. Assume all measurement, control, and data I/O connections are for connection to Category I sources unless otherwise marked or described in the Manual.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30V RMS, 42.4V peak, or 60VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 volts, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, make sure the line cord is connected to a properly grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided, in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

The instrument and accessories must be used in accordance with its specifications and operating instructions or the safety of the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

When fuses are used in a product, replace with same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as safety earth ground connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

If a  screw is present, connect it to safety earth ground using the wire recommended in the user documentation.

The  symbol on an instrument indicates that the user should refer to the operating instructions located in the manual.

The  symbol on an instrument shows that it can source or measure 1000 volts or more, including the combined effect of normal and common mode voltages. Use standard safety precautions to avoid personal contact with these voltages.

The  symbol on an instrument shows that the surface may be hot. Avoid personal contact to prevent burns.

The  symbol indicates a connection terminal to the equipment frame.

The **WARNING** heading in a manual explains dangers that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **CAUTION** heading in a manual explains hazards that could damage the instrument. Such damage may invalidate the warranty.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits, including the power transformer, test leads, and input jacks, must be purchased from Keithley Instruments. Standard fuses, with applicable national safety approvals, may be used if the rating and type are the same. Other components that are not safety related may be purchased from other suppliers as long as they are equivalent to the original component. (Note that selected parts should be purchased only through Keithley Instruments to maintain accuracy and functionality of the product.) If you are unsure about the applicability of a replacement component, call a Keithley Instruments office for information.

To clean an instrument, use a damp cloth or mild, water based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing.

Table of Contents

NOTE *In this manual, Sections 1-5, Appendix A, and Appendix B apply to embedded controller Models: KPXI-CON-CM-1.3G, KPXI-CON-PM-1.8G, KPXI-CON-PM-1.8G-PLUS. Appendix C applies to the remote control extension Models KPXI-CON-PCIREM and KPXI-CON-PXIREM.*

Section	Topic	Page
1	**Introduction**	1-1
	Introduction	1-2
	Safety symbols and terms	1-3
	Features	1-3
	Model KPXI-CON controller features	1-3
	Functional block diagram	1-4
	PXI bus interface	1-4
	CPU support	1-5
	Memory support	1-5
	Ethernet interfaces	1-6
	Display interfaces	1-6
	Universal Serial Bus (USB)	1-6
	Hot-swappable CF interface	1-6
	Serial I/O	1-6
	IEEE-1284 parallel port/printer interface	1-6
	PXI trigger I/O port	1-6
	AC ’97 multimedia audio output	1-7
	Hardware monitor function	1-7
	Watchdog Timer	1-8
	LED Setting	1-8
	Specifications	1-8
	PXI/CompactPCI compliancy	1-8
	Form factor	1-8
	CPU/Cache	1-8
	Chipset	1-9
	Host memory	1-9
	BIOS	1-9
	CompactPCI bus controller	1-9
	Graphics	1-9
	Gigabit ethernet	1-9
	Onboard peripherals	1-9
	Front panel LED indicators and reset button	1-10
	Real-time clock and nonvolatile memory	1-10
	Environment	1-10
	Safety Certificate and Test	1-10
	Unpacking and inspection	1-10
	Shipment contents	1-11
	Inspection for damage	1-11
	Instruction manual	1-12
	Repacking for shipment	1-12
	Optional accessories	1-12
2	**I/O Connectors and Pin Assignment**	2-1
	Introduction	2-2
	Peripheral connectivity	2-2
	Model KPXI-CON controller I/O connectors	2-3
	Model KPXI-CON controller front panel I/O connectors	2-3
	Model KPXI-CON controller connector pin assignments	2-3
	PXI trigger connector	2-3
	VGA connector	2-4
	USB port 1, 2 connector	2-4

Section	Topic	Page

2 I/O Connectors and Pin Assignment (continued)

Ethernet (RJ-45) connector 2-5
COM1, 2 serial port connector DB-9 2-5
LPT printer port connector DB-25 2-6
General purpose LED definitions 2-7
CompactFlash type I/II connector 2-7
PS/2 keyboard/mouse combo connector (mini DIN-6) 2-8
J1 connector pin assignment 2-8
J2 connector pin assignment 2-9

3 Getting Started 3-1
Introduction 3-2
Installing the Model KPXI-CON controller 3-2
How to remove the controller from the PXI chassis 3-2
CompactFlash card installation 3-2
BIOS configuration overview 3-2
Operating system installation 3-3

4 Driver Installation 4-1
Introduction 4-2
Chipset driver installation 4-2
Installing hardware configuration file 4-3
VGA driver installation 4-3
Troubleshooting VGA driver installation 4-3
LAN driver installation 4-3
Audio codec driver installation 4-4
PXI trigger driver installation 4-4

5 Utilities 5-1
Introduction 5-2
Watchdog timer overview 5-2
Intel® 6300ESB ICH watchdog timer 5-2
Configuration registers 5-3
GPIO control registers 5-4
WDT programming procedure 5-4
W83627HF (Super IO) watchdog timer 5-4

Appendix	Topic	Page

A KPXI Trigger Function Description A-1
Introduction A-2
Data Types A-2
Function Reference A-2
KPXITRIG_Close A-2
KPXITRIG_GetGPIOBase A-3
KPXITRIG_Init A-3
KPXITRIG_SetSoftTrg A-4
KPXITRIG_Trigger_Clear A-4
KPXITRIG_Trigger_Route A-4

B Award BIOS Setup Utility B-1
Introduction B-3
Standard CMOS feature B-4
Date B-4
Time B-4
IDE Channel 0 Master/Slave, IDE Channel 1 Master/Slave B-5
Device A / Device B B-6
Video B-6
Halt on B-6

Appendix	Topic	Page

B Award BIOS Setup Utility (continued)

Base memory B-6
Extended memory B-6
Total Memory B-6
Advanced BIOS features B-7
CPU Feature B-7
Virus Warning B-7
CPU L1 & L2 Cache B-8
CPU L3 Cache B-8
Quick Power On Self Test B-8
First, Second, Third, and Other Boot Devices B-8
Swap Floppy Drive B-8
Boot Up Floppy Seek B-8
Boot Up NumLock Status B-8
Gate A20 Option B-8
Typematic Rate Setting B-8
Typematic Rate (Chars/Sec) B-9
Typematic Delay (Msec) B-9
Security Option B-9
MPS Version Control for OS B-9
OS Select for DRAM > 64MB B-9
Summer Screen Show B-9
Advanced Chipset Features B-9
DRAM Data Integrity Mode B-10
MGM Core Frequency B-10
System BIOS Cacheable B-10
Video BIOS Cacheable B-10
Init Display First B-11
BIOS Write Protection B-11
ENUM# signal redirect to B-11
On-Chip VGA B-11
On-Chip Frame Buffer Size B-11
Boot Display B-11
Integrated Peripherals B-11
OnChip IDE Device B-12
Onboard device B-13
SuperIO Device B-14
Onboard LAN Boot ROM B-15
Power Management Setup B-15
Power Management B-16
Video Off Method B-16
Video Off In Suspend B-16
Suspend Type B-16
Suspend Mode B-16
HDD Power Down B-16
Reload Global Timer Events B-16
PnP/PCI Configurations B-17
Reset Configuration Data B-17
Resources Controlled By B-17
IRQ Resources B-17
PCI/VGA Palette Snoop B-17
PC Health Status B-18
Current CPU Temperature/Current System Temperature B-18
CPU Vcore B-18
+3.3V, +5V, +12V, VBAT(V), 5VSB(V) B-18
Frequency/Voltage Control B-19
Spread Spectrum B-19
Load Fail-Safe Defaults B-19
Load Optimized Defaults B-20
Set Supervisor Password B-20

Appendix	Topic	Page

B **Award BIOS Setup Utility (continued)**

Set User Password B-21
Save & Exit Setup B-22
Exit Without Saving B-23

C **PCI-to-PXI, PXI-to-PXI Extension User's Guide** C-1
Introduction C-2
- Features C-2
- Applications C-2
- Specifications C-3

Installation C-4
- Contents of package C-4
- Unpacking C-4
- Getting started C-4
- Software installation C-5
- Hardware installation C-5

Hardware overview C-11
- Basic architecture of PCI extension module C-11
- Bus architecture C-12

Service Form

List of Figures

Section	Figure	Title	Page
1	Figure 1-1	Functional block diagram	1-4
	Figure 1-2	PXI Trigger I/O block diagram	1-7
2	Figure 2-1	Model KPXI-CON controller front panel I/O connectors	2-3
3	Figure 3-1	Model KPXI-CON System Controller installation in PXI Chassis	3-3
5	Figure 5-1	Intel® 6300ESB Watchdog Timer architecture	5-2
	Figure 5-2	W83267HF Watchdog Timer architecture	5-5

Appendix	Figure	Title	Page
B	Figure B-1	Main menu screen	B-3
	Figure B-2	Standard CMOS features	B-4
	Figure B-3	Master and slave channels	B-5
	Figure B-4	Advanced BIOS Features	B-7
	Figure B-5	Advanced chipset features	B-10
	Figure B-6	Integrated peripherals	B-11
	Figure B-7	OnChip IDE device	B-12
	Figure B-8	Onboard device	B-13
	Figure B-9	SuperIO device	B-14
	Figure B-10	Power Management Setup	B-15
	Figure B-11	PnP/PCI configurations	B-17
	Figure B-12	PC health status	B-18
	Figure B-13	Frequency/voltage control	B-19
	Figure B-14	Load fail-safe defaults	B-20
	Figure B-15	Load fail-safe defaults	B-20
	Figure B-16	Set supervisor password	B-21
	Figure B-17	Set user password	B-22
	Figure B-18	Save & exit setup	B-22
	Figure B-19	Exit without saving	B-23
C	Figure C-1	PCI/PXI control of PXI chassis	C-8
	Figure C-2	Basic PCI extension configuration – extend two PCI segments	C-9
	Figure C-3	Star configuration	C-10
	Figure C-4	Daisy-Chain configuration	C-11
	Figure C-5	Block diagram	C-12
	Figure C-6	Bus architecture of the basic configuration	C-13

This page left blank intentionally.

List of Tables

Section	Table	Title	Page
1	Table 1-1	W83627HF hardware monitor inputs	1-7
2	Table 2-1	Peripheral connectivity table	2-2
	Table 2-2	PXI trigger connector pin assignment	2-3
	Table 2-3	VGA connector pin assignment	2-4
	Table 2-4	USB connector pin assignment	2-4
	Table 2-5	Ethernet connector pin assignment	2-5
	Table 2-6	Ethernet LED status definitions	2-5
	Table 2-7	COM connector pin assignment	2-5
	Table 2-8	LPT printer port connector DB-25	2-6
	Table 2-9	General purpose LED definitions	2-7
	Table 2-10	CompactFlash connector pin assignment	2-7
	Table 2-11	PS/2 connector pin assignment	2-8
	Table 2-12	J1 connector pin assignment	2-8
	Table 2-13	J2 connector pin assignment	2-9
4	Table 4-1	Windows drivers file locations	4-2

Appendix	Table	Title	Page
A	Table A-1	Data Types	A-2
C	Table C-1	Spread spectrum jumper settings	C-6
	Table C-2	M66EN jumper settings	C-6

This page left blank intentionally.

Section 1
Introduction

In this section:

Topic	Page
Introduction	1-2
Safety symbols and terms	1-3
Features	1-3
Model KPXI-CON controller features	1-3
Functional block diagram	1-4
PXI bus interface	1-4
CPU support	1-5
Memory support	1-5
Ethernet interfaces	1-6
Display interfaces	1-6
Universal Serial Bus (USB)	1-6
Hot-swappable CF interface	1-6
Serial I/O	1-6
IEEE-1284 parallel port/printer interface	1-6
PXI trigger I/O port	1-6
AC ’97 multimedia audio output	1-7
Hardware monitor function	1-7
Watchdog Timer	1-8
LED Setting	1-8
Specifications	1-8
PXI/CompactPCI compliancy	1-8
Form factor	1-8
CPU/Cache	1-8
Chipset	1-9
Host memory	1-9
BIOS	1-9
CompactPCI bus controller	1-9
Graphics	1-9
Gigabit ethernet	1-9
Onboard peripherals	1-9
Front panel LED indicators and reset button	1-10
Real-time clock and nonvolatile memory	1-10
Environment	1-10
Safety Certificate and Test	1-10
Unpacking and inspection	1-10
Shipment contents	1-11
Inspection for damage	1-11
Instruction manual	1-12
Repacking for shipment	1-12
Optional accessories	1-12

Introduction

The Keithley Instruments KPXI-CON controller is an advanced test system controller based on 32-bit PCI architecture. High performance designs and the state-of-the-art technology make this product an ideal solution as the controller in a complex, hybrid production test system.

This manual is designed to help you use/understand the Model KPXI-CON controller and describes the versatile functions and the operation of the Model KPXI-CON controller.

The Model KPXI-CON System Controller is Keithley Instruments' first PXI form factor Intel® Pentium® M compatible solution. Three configurations are available:

- 3U PXI system controller with Pentium M 1.8GHz CPU, 512MB RAM, 40GB HDD
- 3U Pentium M CPU module with Pentium M 1.8GHz CPU, 2GB memory, 80G HDD
- 3U PXI system controller with Celeron M 1.3GHz CPU, 512MB RAM, 40GB HDD

NOTE *In this manual, Sections 1-5, Appendix A, and Appendix B apply to embedded controller Models: KPXI-CON-CM-1.3G, KPXI-CON-PM-1.8G, KPXI-CON-PM-1.8G-PLUS. Appendix C applies to the remote control extension Models KPXI-CON-PCIREM and KPXI-CON-PXIREM.*

This product is designed to meet the highest performance requirements for embedded computing. It is based on the Intel® Pentium® M processor, 855GME and 6300ESB chipset that provides both long life and excellent driver support to meet the majority of industrial applications. The Model KPXI-CON System Controller complies with PXI specification Rev. 2.2 and features many practical interfaces, such as hot swappable CompactFlash card, USB 2.0 ports, and Gigabit Ethernet. The Model KPXI-CON controller can support a CPU frequency of up to 1.8GHz and a memory size up to 2GB RAM via two 200-pin DDR SO-DIMM sockets. With an embedded PXI trigger pin, the Model KPXI-CON controller provides synchronous trigger ability to meet the high-performance requirements of instrumentation. In addition, the Model KPXI-CON controller's compact and rugged mechanism makes it ideal for test and measurement applications in harsh environments.

This section gives an overview of the Model KPXI-CON System Controller, and covers the following topics:

- Features
- Functional block diagram and overview
- Specifications
- Unpacking checklist

Safety symbols and terms

The following symbols and terms may be found on the Model KPXI-CON System Controller or used in this manual.

The  symbol indicates that the user should refer to the operating instructions located in the manual.

The  symbol shows that high voltage may be present on the terminal(s). Use standard safety precautions to avoid personal contact with these voltages.

The  symbol on an instrument shows that the surface may be hot. Avoid personal contact to prevent burns.

The **WARNING** heading used in this manual explains dangers that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **CAUTION** heading used in this manual explains hazards that could damage the unit. Such damage may invalidate the warranty.

Features

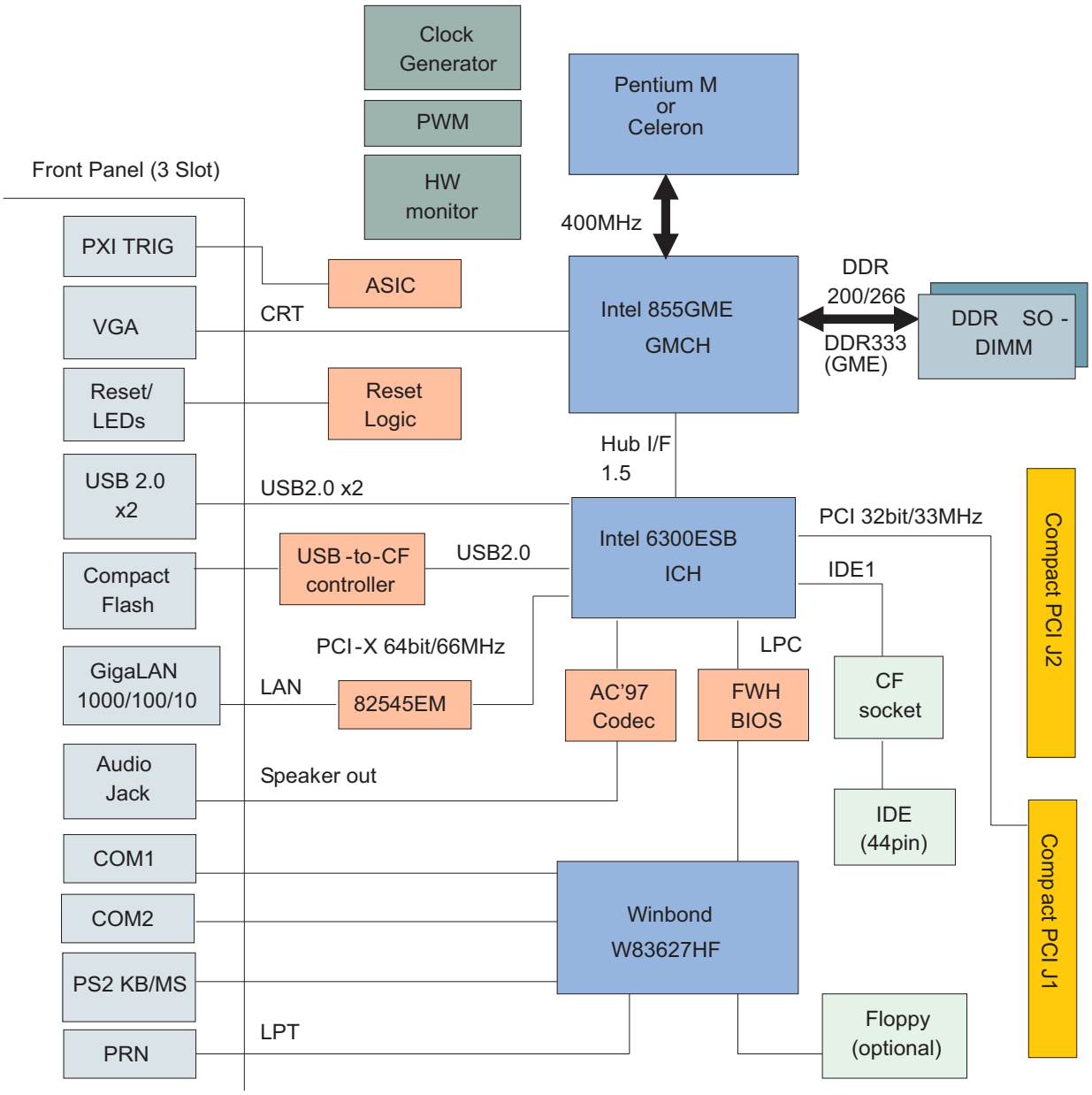
Model KPXI-CON controller features

- Standard 3U PXI form factor
- PICMG 2.0 CompactPCI Specification R3.0 compliant
- PICMG 2.8 PXI Specification Rev. 2.2 compliant
- Designed for Pentium® M processor, FSB 400MHz, CPU frequency up to 1.8GHz
- Two 200-pin DDR SO-DIMM sockets supporting up to 2GB RAM
- One 44-pin EIDE (primary IDE) with built-in 2.5" low profile HDD (40 GB, standard)
- Two CompactFlash interfaces for HDD and FDD replacement; CF Type II supports hot-swappable CF card functionality
- Two USB 2.0 ports, two serial ports (RS-232) and one parallel port provided on the front panel
- One AC '97 stereo audio output
- One TRIG I/O on the front panel for advanced PXI trigger function
- VGA output on the front panel supporting up to 2048 x 1536 resolution at 75Hz
- Intel® 82545EM controller providing one 10/100/1000 Mb Ethernet port
- Supports 7 bus-master PCI devices on PXI/CompactPCI bus
- Programmable watchdog timer

Functional block diagram

The following sections give an overview the Model KPXI-CON controller's main features as outlined in the functional block diagram Figure 1-1.

Figure 1-1
Functional block diagram



PXI bus interface

The Model KPXI-CON controller is built on the PICMG 2.8 Instrumentation Extensions to CompactPCI Specification. PXI specifications dedicate the slot furthest to the left of the PXI chassis to the System Controller. PXI is electrically compatible with the PCI local bus standard, and provides enhanced instrumentation signals for synchronization or communication between peripherals. Based on the mechanical design of CompactPCI systems, PXI systems provide the

high levels of environmental performance required by the vibration, shock, temperature, and humidity extremes of industrial environments.

The Model KPXI-CON controller utilizes a 32-bit/33MHz PCI bus and can be used in the Keithley Instruments PXI chassis listed below:

- KPXI-SYS-6-250, 6-slot 3U PXI Instrument chassis
- KPXI-SYS-8-400, 8-slot 3U PXI Instrument chassis
- KPXI-SYS-14-500, 14-slot 3U PXI instrument chassis
- KPXI-SYS-18-460X2, 18-slot 3U PXI Instrument chassis

As PXI compliant controllers they can be used with any PXI compliant chassis from any manufacturer.

CPU support

The KPXI-CON controller supports a single Intel® Pentium® M Processor with 1MB L2 cache in 478-pin Micro-FCPGA or 479-ball Micro-FCBGA package. The standard Model KPXI-CON controller comes with a CPU socket which can be installed with a Micro-FC-PGA package CPU, including Pentium M 1.1GHz, 1.6GHz and 1.8GHz. The Pentium M processor runs at a core speed up to 1.8GHz, with a Front Side Bus (FSB) speed of 400MHz.

The Intel Pentium M processor is a high performance, low power mobile processor with several micro-architectural enhancements over existing Intel mobile processors. The key features of the processor are listed as follows:

- Support Intel Architecture with Dynamic Execution
- On-die, primary 32-KB instruction cache and 32-KB write-back data cache
- On-die, 1-MB second level cache with Advanced Transfer Cache Architecture
- Advanced Branch Prediction and Data Prefetch Logic
- Streaming SIMD Extensions 2 (SSE2)
- 400-MHz, Source-Synchronous processor system bus
- Advanced Power Management features including Enhanced Intel SpeedStep® technology

The Pentium M processor runs at a core speed up to 1.8GHz, with a Front Side Bus (FSB) speed of 400MHz.

Memory support

The Model KPXI-CON controller is based on Intel 855GME chipset, which consists of 855GME Graphics Memory Controller Hub (GMCH) and the 6300ESB I/O Controller Hub (ICH). The GMCH system memory interface supports the following features:

- Single channel of x72, unbuffered, ECC DDR SDRAM (SO-DIMM)
- 200, 266MHz and 333MHz DDR device
- 64-bit data interface(72-bit with ECC)
- Up to two double-sided SO-DIMMs (four rows populated) with unbuffered PC2100/PC2700 DDR-SDRAM (with or without ECC)
- Up to 16 simultaneous open pages
- 64MB, 128MB, 256MB, and 512MB technologies for x8 and x16 width devices
- System memory supports up to 2GB
- SDRAM speed, type and size can be determined by the BIOS reading the SO-DIMM presence detect bits on the System Management Bus (SMBus)
- SDRAM timing register, which provides the DRAM speed control for the entire array, is programmed to use the timings of the slowest DRAMs installed.

Ethernet interfaces

The Model KPXI-CON controller supports an Intel 82545EM Gigabit Ethernet controller. It integrates MAC and PHY functions into a single chip to provide a standard IEEE 802.3 Ethernet interface for 10/100/1000BASE-T applications. The controller provides a 64-bit wide interface compliant with PCI 2.3 and PCI-X 1.0a specifications. The Ethernet interface is routed to an RJ45 port with activity/speed LEDs.

Display interfaces

The Intel® 855GME GMCH chip has dual independent display pipes which can support concurrent or simultaneous display on each display device. The 350MHz integrated 24bit RAMDAC supports analog display pixel resolution up to 1600x1200 at 85Hz and 2048x1536 at 75Hz.

Universal Serial Bus (USB)

The Model KPXI-CON controller supports three USB 2.0 serial ports. Ports 1 and 2 are on the front panel, port 3 is used as a USB-to-CF or USB-to-IDE adaptor to support a Compact Flash Type II socket on the front panel or a 2.5" IDE HDD. Additional ports can be added through the use of an external USB hub. USB allows for the easy addition of peripherals such as mouse, keyboard, speakers, etc. Transfer rates of up to 480Mb/s are supported. High-speed connections require shielded cables. The Model KPXI-CON controller provides each USB port 0.5A at 5V to power peripherals and each USB port is protected by a power distribution switch (0.5A rating allows for inrush currents).

Hot-swappable CF interface

An external CompactFlash socket is available on the Model KPXI-CON controller front panel. The external CompactFlash interface provides Plug and Play features and is also hot swappable. Therefore, a CompactFlash card can be used as a replacement for floppy disks and can also provide very large storage capability (up to 1GB). It is also possible to set this CF interface as a boot device by selecting boot from USB in the BIOS menu. For information on changing BIOS settings see Appendix B. Note that drivers are needed for the external CompactFlash interface.

Serial I/O

The Model KPXI-CON controller provides support for two 16C550 UART compatible COM ports. COM1 and COM2 are accessible from the front faceplate through DB-9 connectors.

IEEE-1284 parallel port/printer interface

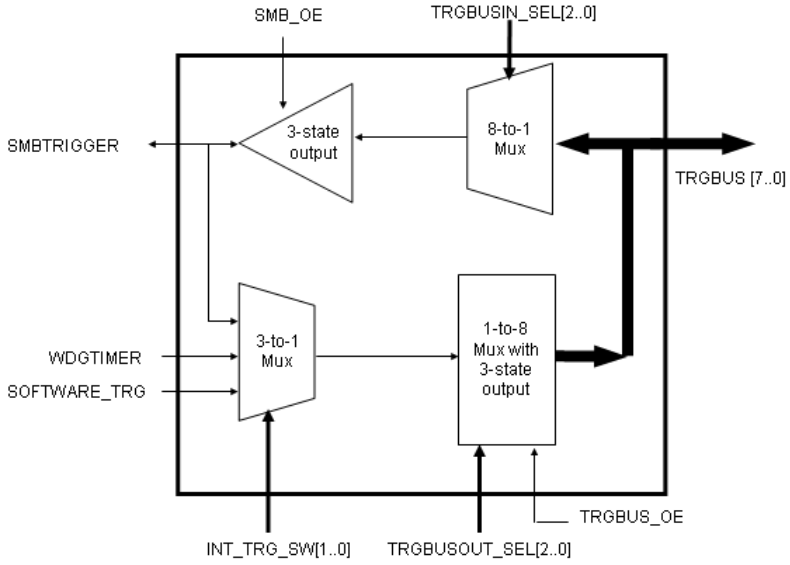
The parallel I/O interface signals are routed to the DB-25 connector on the front faceplate. This port supports the full IEEE-1284 specification and provides a basic printer interface. The BIOS will initialize the parallel port as LPT1 with an ISA I/O base address of 378h. This default configuration also assigns the parallel port to IRQ7. The printer interface mode (Normal, Extended, EPP, or ECP) is selectable through the BIOS menu. For information on changing BIOS settings see Appendix B.

PXI trigger I/O port

The Model KPXI-CON System Controller provides one PXI trigger I/O port on the front panel for advanced PXI trigger functionality. The TRIG I/O is the software-controlled trigger connection for routing PXI triggers to or from the backplane trigger bus. All trigger lines are compatibility with TTL

voltage levels and are edge sensitive. Please refer to Figure 1-2 for the detailed block diagram of PXI Trigger I/O.

Figure 1-2
PXI Trigger I/O block diagram



AC '97 multimedia audio output

The Model KPXI-CON System Controller supports an AC '97 2.2 compliant audio stereo output with amplifier. Supports multiple sample rates up to 48 kHz.

Hardware monitor function

Two devices provide all the hardware monitor functions of a Model KPXI-CON controller system. The ADM1032 provides a CPU temperature monitor with programmable over/under temperature limits and over temperature alarm. The Winbond W83627HF provides system temperature and DC voltage monitoring.

Table 1-1
W83627HF hardware monitor inputs

83627HF Pin Name	Voltage/ Temperature	Function/Comments
-12VIN	-12V	+/- 5%
+12VIN	+12V	+/- 5%
+3.3VIN	+3.3V	+/- 5%
VSB	+5VSB	+/- 5%
VCOREB	+1.05V	+/- 5%
VCOREA	CPU_VCORE	Processor core voltage
VTIN1		System Temperature
VTIN2		External Temperature Sensor Input
OVT#		CPU over temperature shutdown output
BEEP		Beep function for hardware monitor

Watchdog Timer

The Model KPXI-CON controller system implements two watchdog timers. The Intel® 6300ESB provides one 2-stage programmable watchdog timer (WDT) and the W83627HF provides one 1-stage programmable watchdog timer.

6300ESB Watchdog Timer

- Supports selectable prescaler – approximately 1MHz (1μs to 1s) and approximately 1KHz (1ms to 10min).
- The 2-stage WDT mode operates as follows: When the first programmed time expires before the counter is reloaded, the WDT generates an IRQ, SMI, or SCI interrupt and loads the second programmed value. If the host still fails to reload the WDT before the second timeout, the WDT drives WDT_TOUT# low and resets Model KPXI-CON controller system.

W83627HF Watchdog Timer

- Watchdog timer is programmable from 1 to 255 seconds.
- Time out will generate interrupt to NMI or RESET, BIOS selectable.

LED Setting

The Model KPXI-CON System Controller provides four LEDs on the front panel to display the following information:

- **System Active LED:** This Green LED will turn on after POST; turn off when system is powered off.
- **IDE LED:** This amber LED flashes when the IDE port is accessed.
- **WDT LED:** This Red LED should be off in normal situations. The LED flashes after the WDT is enabled by software. The LED turns on steady when the WDT times out.
- **General Purpose LED:** This Blue LED is a general purpose LED. Customers can define this LED through software.

Specifications

Refer to the product data sheet for updated Model KPXI-CON System Controller specifications. Check the Keithley Instruments website at www.keithley.com for the latest updates to the specifications. See below for general specifications.

PXI/CompactPCI compliancy

- PXI Specification Rev 2.2
- PICMG 2.0 CompactPCI Rev. 3.0

Form factor

- Standard PXI 3U form factor (board size: 100mm x 160mm)
- 3-slot (12 HP) width

CPU/Cache

- Supports Intel® Pentium® M processor, CPU frequency up to 1.8GHz
- Front Side Bus (FSB) frequency: 400MHz
- Cache size: 1MB on-die cache

Chipset

- Intel® 855GME Graphic Memory Controller Hub (GMCH)
- Intel® 6300ESB I/O Controller Hub

Host memory

- Two 200-pin SO-DIMM sockets for DDR SDRAM, up to 2GB with or w/o ECC

BIOS

- Award PnP BIOS with 4Mb LPC compatible Flash ROM
- BIOS write protection provides anti-virus capability
- DMI BIOS Support: Desktop Management Interface (DMI) allows users to download system hardware-level information such as CPU type, CPU speed, internal/external frequencies, and memory size
- For information on changing BIOS settings see Appendix B

CompactPCI bus controller

- PLXtech PCI-6540 Universal PCI-X to PCI-X bridge, supports transparent and non-transparent mode
- PCI-X Rev 1.0 compliant
- Supports 64-bit/66MHz, 64-bit/33MHz, 32-bit/33MHz

Graphics

- Integrated into 855GME GMCH
- 350MHz integrated 24bit RAMDAC supports analog display pixel resolution up to 1600x1200 at 85Hz and 2048x1536 at 75Hz
- Up to 64MB of dynamic video memory allocation
- Dual independent display pipes support concurrent or simultaneous display on each display device
- Front panel analog VGA DB-15 connector is available

Gigabit ethernet

- Intel® 82545EM Gigabit Ethernet controller provides one 10/100/1000 Mbps Gigabit Ethernet port via a RJ-45 connector on the front panel.
- Standard IEEE 802.3 Ethernet interface
- 64-bit wide interface compliant with PCI 2.3 and PCI-X 1.0a Specifications

Onboard peripherals

- Integrated into Intel® 6300ESB southbridge
- One EIDE connector supports a 2.5" HDD with Ultra ATA 66/100 support
- Four USB 2.0 ports
  - USB 1 and 2 are on the front panel
  - USB 3 is used for USB-to-CF to support CompactFlash Type II socket on front panel
- Two CompactFlash Type I/II sockets
  - Supports one CompactFlash Type II interface through IDE interface

  - Supports one CompactFlash Type II drive using USB to CF adaptor
- Supports up to three 16C550 UART compatible COM ports
  - COM1 and COM2 are on front faceplate
- One PXI trigger input/output on front panel
- One AC '97 2.2 compliant audio stereo output with amplifier on the front panel. Supports multiple sample rates up to 48KHz.
- One high-speed bi-directional SPP/EPP/ECP parallel port
- PS2 keyboard/mouse combo port on front panel

Front panel LED indicators and reset button

- Four LEDs on the front panel including System Active LED (Green), IDE LED (Amber), Watchdog timer LED (Red), and General Purpose LED (Blue).
- Flush tact switch for system reset

Real-time clock and nonvolatile memory

The Model KPXI-CON controller system provides a century calendar as well as a time of day function. In addition, 256 bytes of battery backed-up RAM are available for use by the BIOS. A separate 3V coin cell battery provides battery backup.

Environment

- Operating temperature: 0°C to 50°C
- Storage temperature: -20°C to 80°C
- Humidity: 5% to 95% RH non-condensing
- Shock: 15G peak-to-peak, 11ms duration, non-operation
- Vibration:
  - Non-operation: 1.88Grms, 5-500Hz, each axis
  - Operation: 0.5Grms, 5-500Hz, each axis, with 2.5" HDD

Safety Certificate and Test

- CE
- All plastic material, PCB and Battery used are all UL-94V0 certified

Unpacking and inspection

The Model KPXI-CON was carefully inspected electrically and mechanically before shipment. After unpacking all items from the shipping carton, check for any obvious signs of physical damage that may have occurred during transit. Report any damage to the shipping agent immediately. Save the original packing carton for possible future shipment.

Shipment contents

The following items are included with every Model KPXI-CON series order:

- One of the following models of System Controllers (equipped with CPU, RAM and HDD):
  - KPXI-CON-PM-1.8G: 3U PXI system controller with Pentium M 1.8GHz CPU, 512MB RAM, 40GB HDD
  - KPXI-CON-PM-1.8G-PLUS: 3U Pentium M CPU module with Pentium M 1.8GHz CPU, 2GB memory, 80G HDD
  - KPXI-CON-CM-1.3G: 3U PXI system controller with Celeron M 1.3GHz CPU, 512MB RAM, 40GB HDD
- CD containing required software and manuals
- Windows XP CD
- Y-Cable for PS/2 Keyboard and Mouse

CAUTION: 	This board must be protected from static discharge and physical shock. Never touch any of the socketed parts except at a static-free workstation. Use the anti-static bag shipped with the product to handle the board. Wear a grounded wrist strap when touching components.

Inspection for damage

CAUTION: 	Your Model KPXI-CON controller contains electro-static sensitive components that can be easily be damaged by static electricity. Therefore, handle the controller on a grounded anti-static mat. The operator should be wearing an anti-static wristband, grounded at the same point as the anti-static mat.

The Model KPXI-CON controller was carefully inspected electrically and mechanically before shipment.

Inspect the controller carton for obvious damages. Shipping and handling may damage the module. Make sure there are no shipping and handling damages on the controller's carton before continuing.

After opening the card module carton, extract the system module and place it only on a grounded anti-static surface with component side up. Save the original packing carton for possible future shipment.

Again, inspect the module for damages. Report any damage to the shipping agent immediately.

Instruction manual

A CD-ROM containing this User's Manual and required software is included with each Model KPXI-CON controller order. If a hardcopy of the Model KPXI-CON Series User's Manual is required, you can order the Manual Package (Keithley Instruments Part Number KPXI-CON-900-01). The Manual Package includes an instruction manual and any pertinent addenda.

Always check the Keithley Instruments' website at www.keithley.com for the latest revision of the manual. The latest manual can be downloaded (in PDF format) from the website.

Repacking for shipment

Should it become necessary to return the Model KPXI-CON controller for repair, carefully pack the unit in its original packing carton or the equivalent, and follow these instructions:

- Call Keithley Instruments' repair department at 1-888-KEITHLEY (1-888-534-8453) for a Return Material Authorization (RMA) number.
- Let the repair department know the warranty status of the Model KPXI-CON controller.
- Write ATTENTION REPAIR DEPARTMENT and the RMA number on the shipping label.
- Complete and include the Service Form located at the back of this manual.

Optional accessories

NOTE *Check the Keithley Instruments website (www.keithley.com) for additional accessories that may have been added to the Keithley Instruments product line for the Model KPXI-CON System Controller.*

- **Model 4200-FPD-RM**: 1U 17" TFT display with keyboard and pointing device
- **Model EM-23B**: Keyboard with integrated trackball mouse
- **Model KPXI-DIG-CAB-1**: 1m (3.3 ft) SMB to SMB cable
- **Model KPXI-DIG-CAB-2**: 1m (3.3 ft) SMB to BNC converter cable
- **Model KPXI-USB-CD**: External USB CD drive for controllers

Section 2
I/O Connectors and Pin Assignment

In this section:

Topic	Page
Introduction	2-2
Peripheral connectivity	2-2
Model KPXI-CON controller I/O connectors	2-3
Model KPXI-CON controller front panel I/O connectors	2-3
Model KPXI-CON controller connector pin assignments	2-3
PXI trigger connector	2-3
VGA connector	2-4
USB port 1, 2 connector	2-4
Ethernet (RJ-45) connector	2-5
COM1, 2 serial port connector DB-9	2-5
LPT printer port connector DB-25	2-6
General purpose LED definitions	2-7
CompactFlash type I/II connector	2-7
PS/2 keyboard/mouse combo connector (mini DIN-6)	2-8
J1 connector pin assignment	2-8
J2 connector pin assignment	2-9

Introduction

This section provides information about the board outline and connector definitions to allow users to become familiar with the Model KPXI-CON controller before use. Included are the following topics:

- Model KPXI-CON controller peripheral connectivity
- Model KPXI-CON controller I/O connectors
- Model KPXI-CON controller connector pin assignments

Peripheral connectivity

Table 2-1 lists the peripherals and their corresponding Model KPXI-CON controller connectors.

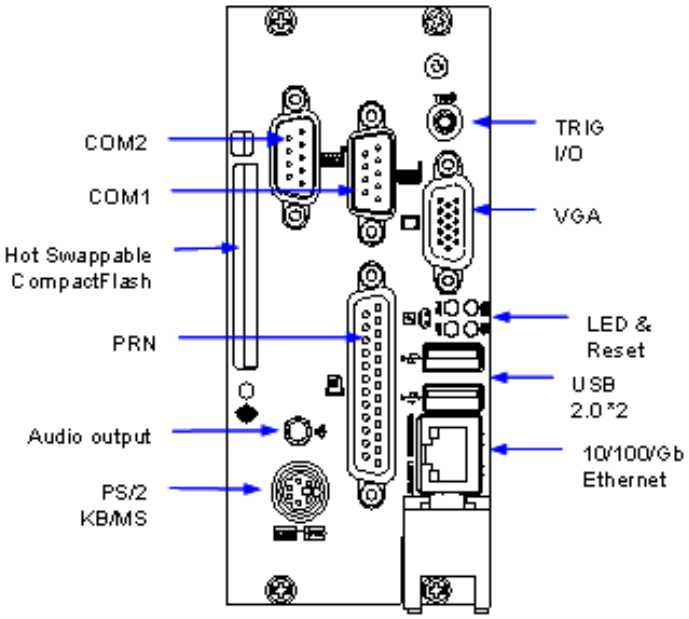
Table 2-1
Peripheral connectivity table

Peripheral	External Connector
Video	VGA (DB-15)
Serial Port	COM1 (DB-9)
Serial Port	COM2 (DB-9)
Parallel Port	PRN (DB-25)
PXI trigger	TRIG (SMB)
Keyboard/Mouse	PS/2 (Mini DIN-6)
CompactFlash	CF2 Socket (Supported by USB-to-CF adaptor)
USB 2.0 Port	USB 1,2 (USB 4-pin series)
Gigabit Ethernet	LAN (RJ-45)
Audio speaker out-put	Y
LEDs	Y
Reset button	Y

Model KPXI-CON controller I/O connectors

Model KPXI-CON controller front panel I/O connectors

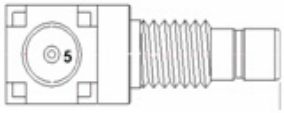
Figure 2-1
Model KPXI-CON controller front panel I/O connectors



Model KPXI-CON controller connector pin assignments

PXI trigger connector

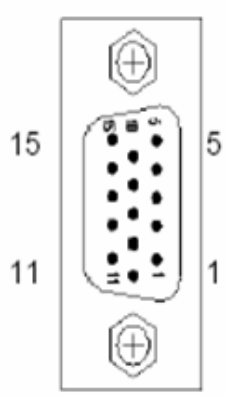
Table 2-2
PXI trigger connector pin assignment



Pin	Signal	Function
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	PXI_TRG	PXI trigger signal

VGA connector

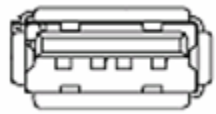
Table 2-3
VGA connector pin assignment



Pin	Signal	Function
1	RED	Analog RED
2	GREEN	Analog GREEN
3	BLUE	Analog BLUE
4	NC	No Connect
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	+5V	Power In
10	GND	Ground
11	NC	No Connect
12	DDCDAT	DDC Data for CRT
13	HSYNC	Horizontal sync for Monitor
14	VSYNC	Vertical sync for Monitor
15	DDCCLK	DDC CLK for CRT

USB port 1, 2 connector

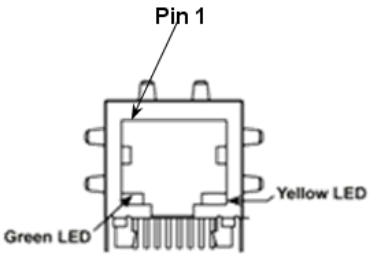
Table 2-4
USB connector pin assignment



Pin	Signal	Function
1	USBVCC	Power
2	USB-	Data (-)
3	USB+	Data (+)
4	USBGND	Ground

Ethernet (RJ-45) connector

Table 2-5
Ethernet connector pin assignment



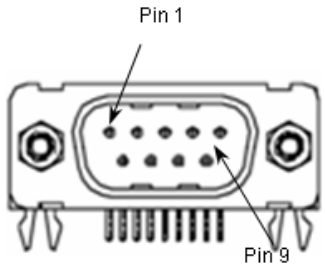
Pin	Signal	Function
1	TDP	Transmit Data (+)
2	TDN	Transmit Data (-)
3	RDP	Receive Data (+)
4	LANCT1	Termination
5	LANCT2	Termination
6	RDN	Receive Data (-)
7	NC	No Connect
8	GND	Ground
9	TDP	Transmit Data (+)

Table 2-6
Ethernet LED status definitions

Status		Yellow LED	Green LED
Network link is not established		OFF	OFF
10 Mbps(10 BaseT)	Link	ON	OFF
	Active	Flash	OFF
100 Mbps (100 BaseT)	Link	ON	OFF
	Active	Flash	OFF
1000 Mbps (1000 BaseT)	Link	ON	ON
	Active	Flash	ON

COM1, 2 serial port connector DB-9

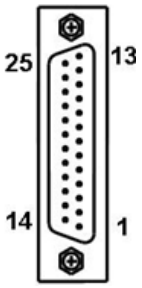
Table 2-7
COM connector pin assignment



Pin	Signal	Function
1	DCD#	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR#	Data Terminal Ready
5	GND	Ground
6	DSR#	Data Set Ready
7	RTS#	Request to Send
8	CTS#	Clear to Send
9	RI#	Ring Indicate

LPT printer port connector DB-25

Table 2-8
LPT printer port connector DB-25



Signal Name	Pin	Pin	Signal Name
Line printer strobe	1	14	AutoFeed
PD0, parallel data 0	2	15	Error
PD1, parallel data 1	3	16	Initialize
PD2, parallel data 2	4	17	Select In
PD3, parallel data 3	5	18	Ground
PD4, parallel data 4	6	19	Ground
PD5, parallel data 5	7	20	Ground
PD6, parallel data 6	8	21	Ground
PD7, parallel data 7	**9**	**22**	**Ground**
ACK, acknowledge	10	23	Ground
Busy	11	24	Ground
Paper empty	12	25	Ground
Select	13		

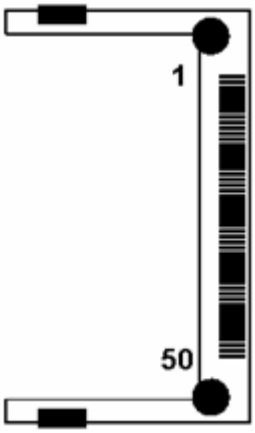
General purpose LED definitions

Table 2-9
General purpose LED definitions

LED	Color	Status	Description
System Active (PW)	Green	OFF	System power not on or power failure
		ON	Power ON
IDE (HD)	Yellow	OFF	IDE idle
		Flash	IDE access
WDT (WD)	Red	OFF	WDT not enabled
		Flash	WDT enabled
		ON	WDT timeout occur
General Purpose (GP)	Blue	OFF	Controller installed and active
		ON	Controller installed but not active

CompactFlash type I/II connector

Table 2-10
CompactFlash connector pin assignment



Signal Name	Pin	Pin	Signal Name
GND	1	26	GND
SDD3	2	27	SDD11
SDD4	3	28	SDD12
SDD5	4	29	SDD13
SDD6	5	30	SDD14
SDD7	6	31	SDD15
SDCS#1	7	32	SDCS#3
GND	8	33	GND
GND	9	34	SDIOR#
GND	10	35	SDIOW#
GND	11	36	+5V
GND	12	37	IDEIRQ14
+5V	13	38	+5V
GND	14	39	PCSEL
GND	15	40	NC
GND	16	41	SIDERST#
GND	17	42	SIORDY
SDA2	18	43	NC
SDA1	19	44	SDDACK#
SDA0	20	45	IDEACT#
SDD0	21	46	S66DECT
SDD1	22	47	SDD8
SDD2	23	48	SDD9
IOIS16#	24	49	SDD10
GND	25	50	GND

PS/2 keyboard/mouse combo connector (mini DIN-6)

Table 2-11
PS/2 connector pin assignment



Pin	Signal	Function
1	KBDATA	Keyboard Data
2	MSDATA	Mouse Data
3	GND	Ground
4	VCC	Power
5	KBCLK	Keyboard Clock
6	MSCLK	Mouse Clock

J1 connector pin assignment

Table 2-12
J1 connector pin assignment

Pin	Z	A	B	C	D	E	F
J1-25	GND	+5V	REQ64#	ENUM#	+3.3V	+5V	GND
J1-24	GND	AD[1]	+5V	V(I/O)	AD[0]	ACK64#	GND
J1-23	GND	+3.3V	AD[4]	AD[3]	+5V	AD[2]	GND
J1-22	GND	AD[7]	GND	+3.3V	AD[6]	AD[5]	GND
J1-21	GND	+3.3V	AD[9]	AD[8]	M66EN	C/BE[0]#	GND
J1-20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
J1-19	GND	+3.3V	AD[15]	AD[14]	GND	AD[13]	GND
J1-18	GND	SERR#	GND	+3.3V	PAR	C/BE[1]#	GND
J1-17	GND	+3.3V	NC	NC	GND	PERR#	GND
J1-16	GND	DEVSEL#	GND	V(I/O)	STOP#	LOCK#	GND
J1-15	GND	+3.3V	FRAME#	IRDY#	GND	TRDY#	GND
J1-12~14	Keying Area						
J1-11	GND	AD[18]	AD[17]	AD[16]	GND	C/BE[2]#	GND
J1-10	GND	AD[21]	GND	+3.3V	AD[20]	AD[19]	GND
J1-9	GND	C/BE[3]#	GND	AD[23]	GND	AD[22]	GND
J1-8	GND	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
J1-7	GND	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
J1-6	GND	REQ0#	GND	+3.3V	CLK0	AD[31]	GND
J1-5	GND	NC	NC	RST#	GND	GNT0#	GND
J1-4	GND	NC	HEALTHY#	V(I/O)	INTP	INTS	GND
J1-3	GND	INTA#	INTB#	INTC#	+5V	INTD#	GND
J1-2	GND	TCK	+5V	TMS	TDO	TDI	GND
J1-1	GND	+5V	-12V	TRST#	+12V	+5V	GND
Pin	Z	A	B	C	D	E	F

J2 connector pin assignment

Table 2-13
J2 connector pin assignment

Pin	Z	A	B	C	D	E	F
J2-22	GND	NC	NC	NC	NC	NC	GND
J2-21	GND	CLK6	GND	NC	RSV	RSV#	GND
J2-20	GND	CLK5	GND	RSV	GND	RSV	GND
J2-19	GND	GND	GND	SMB_SDA	SMB_SCL	SMB_ALERT#	GND
J2-18	GND	PXI_TRIG3	PXI_TRIG4	PXI_TRIG5	GND	PXI_TRIG6	GND
J2-17	GND	PXI_TRIG2	GND	REST#	REQ6#	GNT6#	GND
J2-16	GND	PXI_TRIG1	PXI_TRIG0	DEG#	GND	PXI_TRIG7	GND
J2-15	GND	NC	GND	FAL#	REQ5#	GNT5#	GND
J2-14	GND	AD[35]	AD[34]	AD[33]	GND	AD[32]	GND
J2-13	GND	AD[38]	GND	V(I/O)	AD[37]	AD[36]	GND
J2-12	GND	AD[42]	AD[41]	AD[40]	GND	AD[39]	GND
J2-11	GND	AD[45]	GND	V(I/O)	AD[44]	AD[43]	GND
J2-10	GND	AD[49]	AD[48]	AD[47]	GND	AD[46]	GND
J2-9	GND	AD[52]	GND	V(I/O)	AD[51]	AD[50]	GND
J2-8	GND	AD[56]	AD[55]	AD[54]	GND	AD[53]	GND
J2-7	GND	AD[59]	GND	V(I/O)	AD[58]	AD[57]	GND
J2-6	GND	AD[63]	AD[62]	AD[61]	GND	AD[60]	GND
J2-5	GND	C/BE[5]	GND	V(I/O)	C/BE[4]#	PAR64	GND
J2-4	GND	V(I/O)	NC	C/BE[7]#	GND	C/BE[6]#	GND
J2-3	GND	CLK4	GND	GNT3#	REQ4#	GNT4#	GND
J2-2	GND	CLK2	CLK3	SYSEN#	GNT2#	REQ3#	GND
J2-1	GND	CLK1	GND	REQ1#	GNT1#	REQ2#	GND
Pin	Z	A	B	C	D	E	F

This page left blank intentionally.

Section 3
Getting Started

In this section:

Topic	Page
Introduction	3-2
Installing the Model KPXI-CON controller	3-2
How to remove the controller from the PXI chassis	3-2
BIOS configuration overview	3-2
BIOS configuration overview	3-2
Operating system installation	3-3

Introduction

This section gives a summary of what is required to set up an operating system using the Model KPXI-CON controller. Hardware installation and BIOS setup are also discussed. Note that the Model KPXI-CON controller is shipped with CPU, RAM, HDD, and Windows XP® operating system preinstalled.

Installing the Model KPXI-CON controller

Use the following procedure to install the Model KPXI-CON controller into a PXI chassis. Consult your PXI chassis user guide for specific instructions and warnings.

Step 1: Plug in your chassis before installing the Model KPXI-CON controller. Make sure the system power is turned off.

Step 2: Remove the blank face panel from the system slot.

Step 3: Align the top and bottom edges of the board with the card guides on the chassis, then slide the board into the chassis until resistance is felt.

Step 4: Move the locking handle in an inward direction until it is fully latched. Please note that slight resistance will be felt while inserting the board. If this resistance is more than under normal conditions, check to ensure that there are no bent pins on the backplane and that the board's connector pins are aligned properly with the connectors on the backplane.

Step 5: Verify that the board is seated properly. Secure the four screws at the top and bottom of the front panel; connect the appropriate cables to the board. The system can now be powered on.

Figure 3-1 shows a Model KPXI-CON controller being installed in the system slot of a typical Keithley Instruments chassis.

How to remove the controller from the PXI chassis

Step 1: Power off the chassis.

Step 2: Loosen the four screws in the front panel.

Step 3: Press down on the red locking tab on the ejector handle then press down on the ejector handle itself which will eject the controller from its seated position.

Step 4: Slide the controller out of the chassis.

CompactFlash card installation

The CompactFlash Card (or CF storage card) is widely used in digital consumer devices like PDAs, digital cameras, and MP3 players. The CF format features anti-shock and anti-vibration properties, improved environmental tolerance, low power consumption, a small form factor, and higher reliability. Plus, it has been widely accepted in the industrial and embedded application field.

The Model KPXI-CON controller has an external CompactFlash socket. The external CF interface is hot swappable so users can install or remove via the front panel while the system is running.

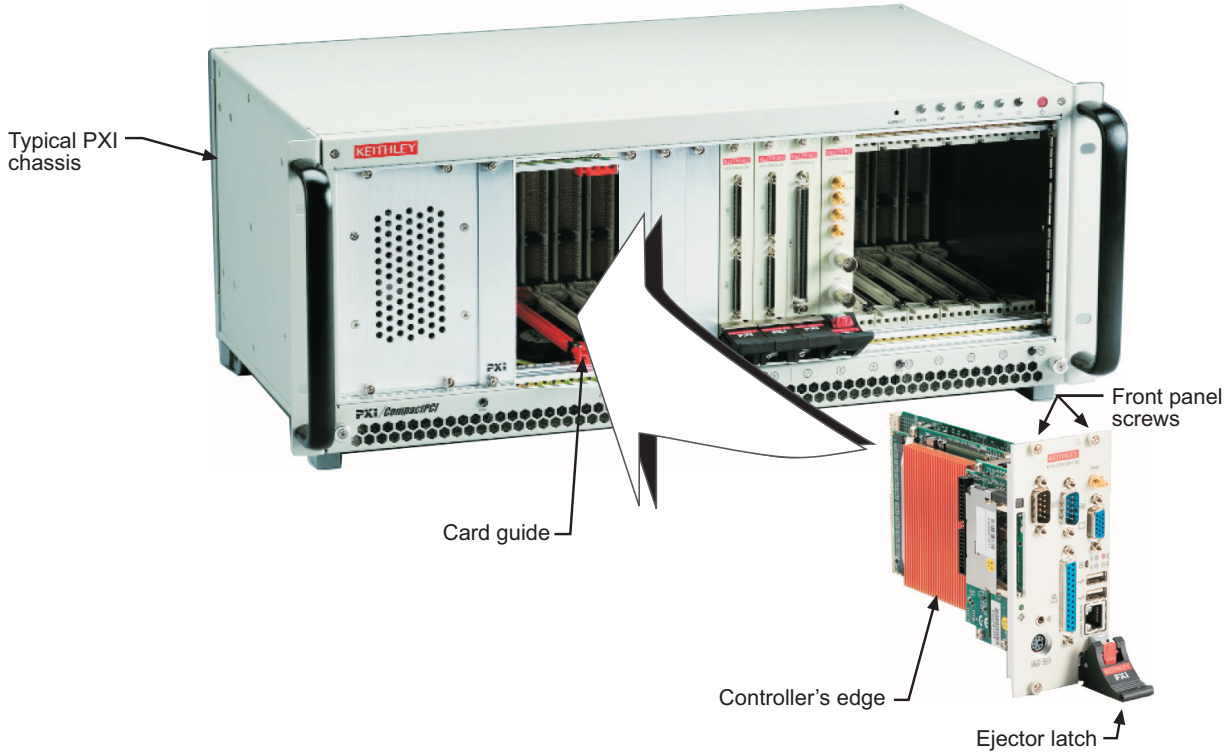
BIOS configuration overview

The Basic Input/Output System (BIOS) is a program that provides the basic level of communication between the processor and peripherals. In addition, the BIOS also contain code for various advanced features found in the system board. The BIOS setup program includes menus

for configuring settings and enabling Model KPXI-CON controller controller features. Most users do not need to use the BIOS setup program, as the Model KPXI-CON controller controller ships with default settings that work well for most configurations. Please refer to the BIOS Manual (see Appendix B) for detailed information about the BIOS and other utilities.

CAUTION: Changing BIOS settings may lead to incorrect controller behavior and possibly an unbootable controller. In general, do not change a BIOS setting unless you are absolutely certain of what it does.

Figure 3-1
Model KPXI-CON System Controller installation in PXI Chassis



Operating system installation

Keithley PXI System Controllers come pre-installed with a Windows XP Operating System. In some cases reinstallation of Windows XP may be necessary or desirable. For this purpose the original Windows XP CD is shipped with each controller. You may wish to install an operating system not supported by Keithley Instruments. In that case, refer to the documentation provided by the operating system vendor.

Read the release notes and installation documentation provided by the operating system vendor. Be sure to read all the README files or documents provided on the distribution disks, as these typically note documentation discrepancies or compatibility problems.

To reinstall the operating system use the KPXI-USBCD external USB CDROM drive. The BIOS is by default set to boot from the USB CDROM when connected with bootable media. For information on changing the boot sequence see Appendix B.

This page left blank intentionally.

Section 4
Driver Installation

In this section:

Topic	Page
Introduction	4-2
Chipset driver installation	4-2
Installing hardware configuration file	4-3
VGA driver installation	4-3
Troubleshooting VGA driver installation	4-3
LAN driver installation	4-3
Audio codec driver installation	4-4
PXI trigger driver installation	4-4

Introduction

The controller comes preloaded with all KPXI series drivers as well as the Windows XP® drivers for all the internal hardware components. This section includes instructions for re-installing the device drivers if Windows had to be reinstalled or device drivers were lost for some other reason. The driver installation instructions for Windows® XP/2000 are described below.

To install Windows drivers:

Step 1: Fully install Windows properly before installing any drivers. Most of the standard I/O device drivers have been included in Windows.

Step 2: Install the chipset driver.

Step 3: Install the VGA driver.

Step 4: Install the LAN driver.

Step 5: Install the Audio driver.

Step 6: Install the PXI Trigger driver.

To ensure compatibility, it is recommended that the chipset, VGA, LAN, Audio, and PXI Trigger drivers provided in the Keithley Instruments CD are used.

To install the Windows drivers for the Model KPXI-CON system controller, refer to the installation information in this section. The Windows drivers are located in the following directories of the Keithley Instruments CD (Table 4-1):

Table 4-1
Windows drivers file locations

Chipset driver	\Driver Installation\PXI controller\chipset\Win2KXP
VGA driver	\Driver Installation\PXI controller\VGA\
LAN driver	\Driver Installation\PXI controller\LAN\
Audio driver	\Driver Installation\PXI controller\Audio\
PXI Trigger driver	\Driver Installation\PXI controller\PXI_Trigger\

The Bus-mastering IDE drivers are automatically installed by Windows.

For using USB 2.0, please update to the newest Windows Service Pack.

Chipset driver installation

This section describes the system requirements of Intel® 855GME chipset device drivers. The drivers are designed for and tested with Windows XP/2000. The system must contain a supported Intel processor and chipset configuration. Ensure that a mouse is connected to the system. One of the following versions of Windows XP/2000 must be installed on the system prior to running the utility program.

- Windows XP Version 2002 (Original release)
- Windows 2000 5.00.2195 (Original release)

Installing hardware configuration file

Follow the instructions below to install the hardware configuration file on a Windows XP/2000 system.

NOTE *Record the location of the Windows XP/2000 directory before installing the drivers.*

Step 1: Check the System Requirements. Windows XP/2000 must be fully installed and running on the system prior to running this software.

Step 2: Close any running applications.

Step 3: The files are stored in an integrated Windows XP/2000 application setup program.

Step 4: Insert the Keithley Instruments CD, run the infinst_enu.exe file at X:\Driver Installation\PXI controller\chipset\Win2kXP\ (where X is the CD-ROM drive).

Step 5: Click **Next** on the Welcome Screen to read and agree to the license agreement. Click **Yes** if you agree to continue. NOTE: If you click No, the program will terminate.

Step 6: Click **Next** on the Readme Information screen to install INF files.

Step 7: Click **Finish** to restart the system when prompted.

Step 8: Follow the screen instructions and use default settings to complete setup when Windows XP/2000 restarts. Upon restart, Windows may display a dialog box announcing new hardware has been found and installs drivers for them. If a New Hardware Found dialog box is displayed requesting the location of the drivers, click on the scrollbar and select the Windows directory.

Step 9: Select **Yes**, when prompted to restart Windows.

VGA driver installation

This section describes the VGA driver installation for the onboard VGA controller Intel® 855E GMCH2. The relative drivers are located in X:\Driver Installation\PXI Platform\\PXI controller\VGA\ of the Keithley Instruments CD, where X: is the drive letter of the CD-ROM drive.

Windows 2000 and Windows XP may try to install the standard VGA driver. To ensure compatibility, manually install the latest driver, which is included in the Keithley Instruments CD. To update to the new driver, follow the steps below:

Step 1: Boot Windows and execute the win2k_xp149.exe file under this directory: X:\Driver Installation\PXI controller\VGA\Win2kXP

Step 2: Follow the prompts. The VGA driver will automatically be installed onto the system.

Step 3: Restart the system.

Troubleshooting VGA driver installation

After installing the VGA/AGP drivers in Windows, it is possible to find the drivers not working correctly. This may be caused by failing to install the Windows service pack beforehand. Ensure that the Windows service pack is installed to enable AGP capability.

LAN driver installation

This section describes the LAN driver installation for the onboard Intel® 82545EM Gigabit Ethernet controller. The drivers included in the Keithley Instruments CD support Windows XP/2000.

Windows XP/2000 will attempt to install a LAN driver automatically. To ensure compatibility, manually install the latest LAN driver, which is stored on the Keithley Instruments CD. After installing Windows XP/2000, update to the new driver by following these procedures:

Step 1: Boot Windows and execute the **pro2kxp.exe** file under the directory:
X:\Driver Installation\PXI controller\LAN\Win2kXP

Step 2: Following prompt instructions, The LAN driver will automatically be installed on the system.

Step 3: Restart the system.

Audio codec driver installation

This section outlines the Audio Codec driver installation for the onboard AC97' Codec. The drivers included on the Keithley Instruments CD support Windows XP/2000. Follow the instructions below to install the Audio driver for Windows XP/2000.

Step 1: Execute the wdm_a365.exe file in the following path location:
X:\Driver Installation\PXI controller\Audio\Win2kXP

Step 2: Click **Next** on the Welcome audio setup screen to install driver.

Step 3: Finally, click **Finish** to restart.

PXI trigger driver installation

This section outlines the PXI Trigger driver installation. The driver included on the Keithley Instruments CD supports Windows XP/2000. To install the driver for PXI Trigger, follow the instructions below:

Step 1: Execute the setup.exe file in the following path location:
X:\Driver Installation\PXI controller\PXI_Trigger\Win2k

Step 2: Click **Next** on the Welcome PXI Trigger setup screen to install the driver.

Step 3: Finally, click **Finish** to restart.

Section 5
Utilities

In this section:

Topic	Page
Introduction	5-2
Watchdog timer overview	5-2
Intel® 6300ESB ICH watchdog timer	5-2
Configuration registers	5-3
GPIO control registers	5-4
WDT programming procedure	5-4
W83627HF (Super IO) watchdog timer	5-4

Introduction

This section explains extended function of the Model KPXI-CON controller (watchdog timer WDT).

Watchdog timer overview

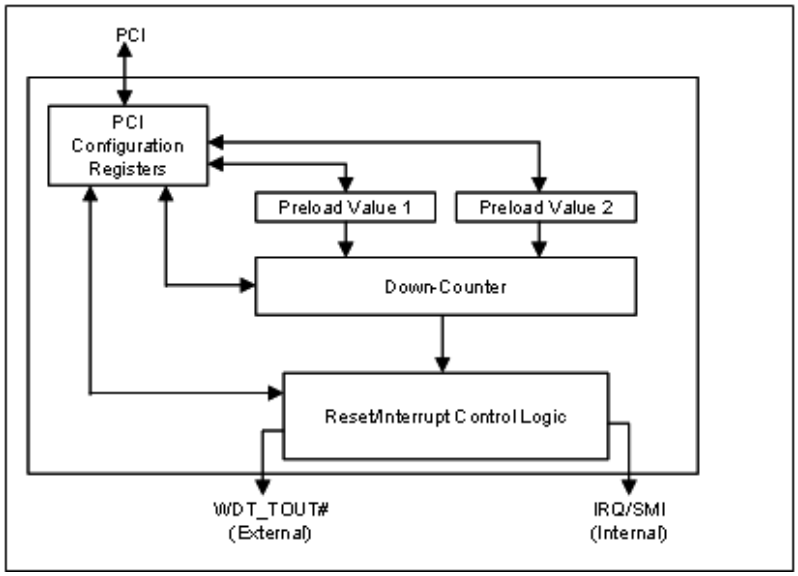
The Model KPXI-CON controller has two different type watchdog timers (WDT), one is integrated into the south bridge 6300ESB and another is integrated into the super I/O W83627HF. The primary function of the WDT is to monitor the Model KPXI-CON controller operation and to generate IRQs and send a signal to PXI Trigger or reset the system if the software fails to function as programmed. The major features of the watchdog timer are:

1. Enabled and disabled through software control
2. Armed and strobed through software control

Intel® 6300ESB ICH watchdog timer

The Intel® 6300ESB ICH includes a two-stage Watchdog Timer (WDT) that provides a resolution ranging from one micro second to ten minutes. The timer uses a 35-bit Down-Counter. The counter is loaded with the value from the first Preload register. The timer is then enabled and starts counting down. The time at which the WDT first starts counting down is called the first state. If the host fails to reload the WDT before the 35-bit down counter reaches zero the WDT generates an internal interrupt. After the interrupt is generated, the WDT loads the value from the second Preload register into the WDT's 35-bit Down-Counter and starts counting down. The WDT is now in the second stage. If the host still fails to reload the WDT before the second timeout, the WDT drives the WDT_TOUT# pin low. The WDT_TOUT# pin is held low until the system is reset. Users can choose to reset the system or send a PXI Trigger signal through BIOS WDT setting.

Figure 5-1
Intel® 6300ESB Watchdog Timer architecture



Configuration registers

The Intel® 6300ESB WDT appears to BIOS as PCI Bus -0, Device 29, Function 4, and has the standard set of PCI configuration registers. The configuration registers are described below.

Offset 10H: Base Address Register (BAR)

This register determines the memory base for WDT down-counter setting. It will be used to set Preload value 1 register, Preload value 2 register, General Interrupt Status register and Reload register.

Preload Value 1 and 2 registers

These two registers are used to hold the preload value for the WDT timer. Its value will be automatically transferred into the down-counter every time the WDT enters the first stage and second stage. Preload Value 1 register locates at Base + 00H and Preload Value 2 register locates at Base + 04H. Only bit [19:0] can be set.

The register unlocking sequence is necessary when writing to the Preload registers. The procedure of writing a value into preload value 1 and 2 register is as follows:

1. Write 80H to offset BAR + 0CH.
2. Write 86H to offset BAR + 0CH.
3. Write desired value to preload register. (BAR + 00H or BAR + 04H)

General Interrupt Status Register

This register is at Base + 08H. Bit 0 is set when the first stage of down-counter reaches zero.

Bit 0 = 0 – No Interrupt

Bit 1 = 1 – Interrupt Active

Reload Register

This register is at Base + 0CH. Write 1 to bit 8 will reload the down-counter's value. Instructions on preventing a timeout is as follows:

1. Write 80H to offset BAR + 0CH.
2. Write 86H to offset BAR + 0CH.
3. Write a '1' to RELOAD[8] of the reload register.

Offset 60 – 61H: WDT Configuration Register

Bit 5 indicates whether or not the WDT will toggle the WDT_TOUT# pin when WDT times out. (0=Enabled, 1=Disabled)

Bit 2 provides two options for prescaling the main down-counter. (0=1ms – 10min, 1=1us—1sec)

Bit [1:0] allows the user to choose the type of interrupt when the WDT reaches the end of the first stage without being reset. (00 = IRQ, 01 = reserved, 10 = SMI, 11 = Disabled)

NOTE *At present, the WDT does not support SMI. IRQ uses APIC 1, INT 10 and it is active low, level triggered.*

Offset 68H: WDT Lock Register

Bit 1 enables or disables the WDT. (0 = Disabled, 1 = Enabled)

Bit 0 will lock the values of this register until a hard reset occurs or power is cycled. (0 = unlocked, 1 = locked) The default is Unlocked.

GPIO control registers

There are three GPIOs on the Model KPXI-CON controller related to the watchdog timer. They are listed as follows. The GPIO control base port is 480H.

WDT_TOUT# pin selection

The WDT_TOUT# signal is multiplexed with GPIO32. When using WDT, this signal must be switched to WDT_TOUT# function. It uses bit 0 of GPIOBASE + 30H to set WDT_TOUT function. (0 = WDT_TOUT#, 1 = GPIO32)

RESET hardware circuit selection

GPO24 of the 6300ESB is designed to control the reset circuit. When GPO24 is low, the system will reset according to the level of the WDT_TOUT# signal. When GPO24 is high, the system will not be reset by WDT_TOUT#. Set bit 24 of GPIOBASE + 04H to 0 for output use. Bit 24 of GPIOBASE + 0CH determines the level of GPO24 (0 = Low, 1 = High). A setting already exists in the BIOS setup menu. The user can set this item before programming WDT. For information on changing BIOS settings see Appendix B.

WDT LED Control

GPO25 of the 6300ESB is designed to control WDT LED. Two features of the WDT LED are supported on Model KPXI-CON controller. WDT LED lights or blinks.

WDT LED lights: Set bit 25 of GPIOBASE + 04H to 0. Bit 24 of GPIOBASE + 0CH determines the state of WDT LED. (0 = light, 1= dark)

WDT LED blinks: Set bit 25 of GPIOBASE + 04H to 0. Bit 25 of GPIOBASE + 18H enables WDT LED blinking function. (0 = function normally, 1 = enable blinking) The high and low times have approximately 0.5 seconds each.

WDT programming procedure

Step 1: Set BIOS Setting in Integrated Peripherals\Onboard Device Page Watch Dog Timer Item to **Enabled**.

Step 2: Make sure WDT_TOUT# signal is functional (not GPIO32 function).

Step 3: Set WDT output enable, presecaler and interrupt type into WDT configuration register.

Step 4: Obtain control base from Base Address register.

Step 5: Program Preload register's value according to unlocking sequence.

Step 6: Set WDT timer mode into WDT Lock Register.

Step 7: Enable WDT from WDT Lock register and program the functionality of WDT LED.

Step 8: To prevent the timer from causing an interrupt or driving WDT_TOUT#, the timer must be reloaded periodically. The frequency of reloads required is dependent on the value of the preload values. To reload the down-counter, the register unlocking sequence must be performed.

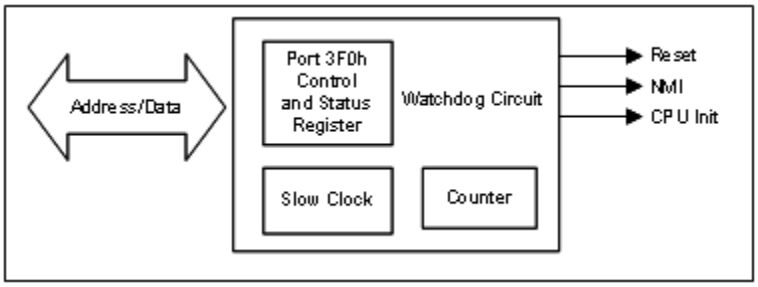
Step 9: If the user wishes to disable WDT, set bit 1 of WDT lock Register to 0.

W83627HF (Super IO) watchdog timer

The W83627HF watchdog timer circuit is implemented in a programmable logic device. The watchdog timer contains a "Control and Status Register." The register allows the BIOS or user application to determine if a watchdog time out was the source of a particular reset. The timeout

period is 1-255 seconds. The watchdog is normally strobed by reading the Watchdog Register (3F0h). IF the host fails to reload the WDT before the timeout, the WDT drives the WDT_TOUT# pin low. Users can choose to reset the system or send a PXI Trigger signal through BIOS WDT setting.

Figure 5-2
W83267HF Watchdog Timer architecture



This page left blank intentionally.

Appendix A
KPXI Trigger Function Description

In this appendix:

Topic	Page
Introduction	A-2
Data Types	A-2
Function Reference	A-2
KPXITRIG_Close	A-2
KPXITRIG_GetGPIOBase	A-3
KPXITRIG_Init	A-3
KPXITRIG_SetSoftTrg	A-4
KPXITRIG_Trigger_Clear	A-4
KPXITRIG_Trigger_Route	A-4

Introduction

This appendix provides a description of PXI Trigger functions, including data types and function reference.

Data Types

We have defined some data types in the Model KPXI-CON controller header file. This header file can be found in **KPXITRIG.H** under the directory **X:\KEITHLEY\KPXITRIG\Include** after running the setup.exe file (where **X** is the drive from which you installed the driver). These data types are used by the Model KPXI-CON controller Library. It is recommended that you use these data types in your application programs. The following table lists the data type names, their ranges, and the corresponding data types in C/C++, and Visual Basic.

Table A-1
Data Types

Type Name	Description	Range	Type	
			C/C++ (for 32-bit compiler)	Visual Basic
U8	8-bit ASCII character	0 to 255	Unsigned char	Byte
I16	16-bit signed integer	-32768 to 32767	Short	Integer
U16	16-bit unsigned integer	0 to 65535	Unsigned short	Not supported by BASIC, use the signed integer (I16) instead
I32	32-bit signed integer	-2147483648 to 2147483647	Long	Long
U32	32-bit unsigned integer	0 to 4294967295	Unsigned long	Not supported by BASIC, use the signed long integer (I32) instead
F32	32-bit single-precision floating-point	-3.402823E38 to 3.402823E38	Float	Single
F64	64-bit double-precision floating-point	-1.797683134862315E308 to 1.797683134862315E309	Double	Double

Function Reference

KPXITRIG_Close

Description This function is used to tell the Model KPXI-CON controller library that a registered card is not currently used and can be released, making room for the new card to register. At the end of a program, use this function to release all cards that were registered.

Cards Supported: KPXI Series

Syntax **Microsoft C/C++ and Borland C++**

```
I16 KPXITRIG_Close (U16 CardNumber)
```

Visual Basic

```
KPXITRIG_Close (ByVal CardNumber As Integer) As Integer
```

Parameters **CardNumber:** The card ID of the card that want to be released.

Return Value NoError

KPXITRIG_GetGPIOBase

Description Get the GPIO base address of the Model KPXI-CON controller.

Cards Supported: KPXI Series

Syntax **Microsoft C/C++ and Borland C++**

```
I16 KPXITRIG_GetGPIOBase(U16 wCardNumber, U32 *BaseAddr)
```

Visual Basic

```
KPXITRIG_GetGPIOBase (ByVal CardNumber As Integer, BaseAddr
As Long) As Integer
```

Parameters **CardNumber:** The card ID of the card to retrieve the DPIO address.

Base Addr: Returns the GPIO base address.

Return Value NoError

KPXITRIG_Init

Description Initializes the hardware and software states of a Model KPXI-CON controller device, and returns a numeric card ID that corresponds to the card initialized. KPXITRIG_Init must be called before any other Model KPXI-CON controller library functions can be called for that card. The function initializes the card and variables internal to the Model KPXI-CON controller library.

Cards Supported: KPXI Series

Syntax **Microsoft C/C++ and Borland C++**

```
I16 KPXITRIG_Init (U16 card_num)
```

Visual Basic

```
KPXITRIG_Init (ByVal card_num As Integer) As Integer
```

Parameters **card_num:** The sequence number of the device. This must be zero.

Return Value This function returns a numeric card ID for the card initialized. A negative error code would be returned in the even of an error. Possible error codes:

```
ERR_InvalidBoardNumber

ERR_BoardNoInit

ErrorOpenDriverFailed

ERR_OpenDriverFail

ERR_GetGPIOAddress

ERR_BoardBusy
```

KPXITRIG_SetSoftTrg

Description Generates a software trigger signal.

Cards Supported: KPXI Series

Syntax **Microsoft C/C++ and Borland C++**

```
I16 KPXITRIG_SetSoftTrg (U16 wCardNumber, U8 status)
```

Visual Basic

```
KPXITRIG_SetSoftTrg (ByVal CardNumber As Integer,
  ByVal status As Byte) As Integer
```

Parameters **CardNumber:** The card ID of the card to perform this operation.

status: The trigger status. Possible statuses:

1: High
0: Low

Return Value NoError, ERR_SoftTrg_Out

KPXITRIG_Trigger_Clear

Description Resets all trigger routing configuration to the default settings.

Cards Supported: KPXI Series

Syntax **Microsoft C/C++ and Borland C++**

```
I16 KPXITRIG_Trigger_Clear (U16 wCardNumber)
```

Syntax **Visual Basic**

```
KPXITRIG_Trigger_Clear (ByVal CardNumber As Integer) As
Integer
```

Parameters **CardNumber:** The card ID of the card to perform this operation.

Return Value NoError, ERR_Trigger_Clr

KPXITRIG_Trigger_Route

Description Configures the source, destination, and halfway of the trigger path.

Cards Supported: KPXI Series

Syntax **Microsoft C/C++ and Borland C++**

```
I16 KPXITRIG_Trigger_Route(U16 wCardNumber, U32 source,
  U32 dest, U32 halfway)
```

Visual Basic

```
KPXITRIG_Trigger_Route (ByVal CardNumber As Integer,
  ByVal source As Long, ByVal dest As Long,
  ByVal halfway As Long) As Integer
```

Parameters **CardNumber:** The card ID of the card to perform this operation.

Source: The trigger signal source or the starting point of the trigger path. Possible values of source:

KPXITRIG_VAL_WDT, KPXITRIG_VAL_SMB, KPXITRIG_VAL_SOFT, KPXITRIG_VAL_TTL0, KPXITRIG_VAL_TTL1, KPXITRIG_VAL_TTL2, KPXITRIG_VAL_TTL3, KPXITRIG_VAL_TTL4, KPXITRIG_VAL_TTL5, KPXITRIG_VAL_TTL6, KPXITRIG_VAL_TTL7

dest: The endpoint of the trigger path. Possible values of destination:

KPXITRIG_VAL_SMB, KPXITRIG_VAL_TTL0, KPXITRIG_VAL_TTL1, KPXITRIG_VAL_TTL2, KPXITRIG_VAL_TTL3, KPXITRIG_VAL_TTL4, KPXITRIG_VAL_TTL5, KPXITRIG_VAL_TTL6, KPXITRIG_VAL_TTL7

halfway: Halfway of the trigger path. Possible values of halfway:

KPXITRIG_VAL_NONE, KPXITRIG_VAL_TTL0, KPXITRIG_VAL_TTL1, KPXITRIG_VAL_TTL2, KPXITRIG_VAL_TTL3, KPXITRIG_VAL_TTL4, KPXITRIG_VAL_TTL5, KPXITRIG_VAL_TTL6, KPXITRIG_VAL_TTL7

Return Value NoError, ERR_Set_Path

This page left blank intentionally.

Appendix B
Award BIOS Setup Utility

In this appendix:

Topic	Page
Introduction	B-3
Standard CMOS feature	B-4
Date	B-4
Time	B-4
IDE Channel 0 Master/Slave, IDE Channel 1 Master/Slave	B-5
Device A / Device B	B-6
Video	B-6
Halt on	B-6
Base memory	B-6
Extended memory	B-6
Total Memory	B-6
Advanced BIOS features	B-7
CPU Feature	B-7
Virus Warning	B-7
CPU L1 & L2 Cache	B-8
CPU L3 Cache	B-8
Quick Power On Self Test	B-8
First, Second, Third, and Other Boot Devices	B-8
Swap Floppy Drive	B-8
Boot Up Floppy Seek	B-8
Boot Up NumLock Status	B-8
Gate A20 Option	B-8
Typematic Rate Setting	B-8
Typematic Rate (Chars/Sec)	B-9
Typematic Delay (Msec)	B-9
Security Option	B-9
MPS Version Control for OS	B-9
OS Select for DRAM > 64MB	B-9
Summer Screen Show	B-9
Advanced Chipset Features	B-9
DRAM Data Integrity Mode	B-10
MGM Core Frequency	B-10
System BIOS Cacheable	B-10
Video BIOS Cacheable	B-10
Init Display First	B-11
BIOS Write Protection	B-11
ENUM# signal redirect to	B-11
On-Chip VGA	B-11
On-Chip Frame Buffer Size	B-11
Boot Display	B-11

Topic (continued) **Page**

Integrated Peripherals B-11
OnChip IDE Device B-12
Onboard device B-13
SuperIO Device B-14
Onboard LAN Boot ROM B-15

Power Management Setup B-15
Power Management B-16
Video Off Method B-16
Video Off In Suspend B-16
Suspend Type B-16
Suspend Mode B-16
HDD Power Down B-16
Reload Global Timer Events B-16

PnP/PCI Configurations B-17
Reset Configuration Data B-17
Resources Controlled By B-17
IRQ Resources B-17
PCI/VGA Palette Snoop B-17

PC Health Status B-18
Current CPU Temperature/Current System Temperature B-18
CPU Vcore B-18
+3.3V, +5V, +12V, VBAT(V), 5VSB(V) B-18

Frequency/Voltage Control B-19
Spread Spectrum B-19

Load Fail-Safe Defaults B-19

Load Optimized Defaults B-20

Set Supervisor Password B-20

Set User Password B-21

Save & Exit Setup B-22

Exit Without Saving B-23

Introduction

The Basic Input/Output System (BIOS) is a program that takes care of the basic level of communication between the processor and peripherals. In addition, the BIOS also contains codes for various advanced features found in this system board. This chapter explains the Setup Utility for the Award BIOS.

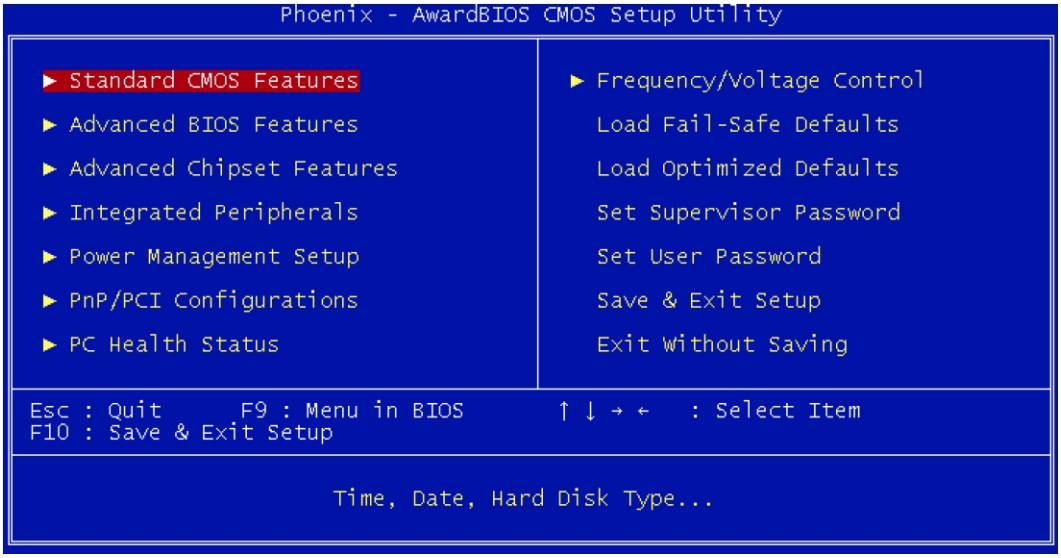
After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the following message will appear on the screen:

```
Press DEL to enter setup
```

If the message disappears before you respond, restart the system or press the Reset button. You may also restart the system by pressing the <Ctrl> <Alt> and <Del> keys simultaneously.

When you press <Del>, the main menu screen will appear.

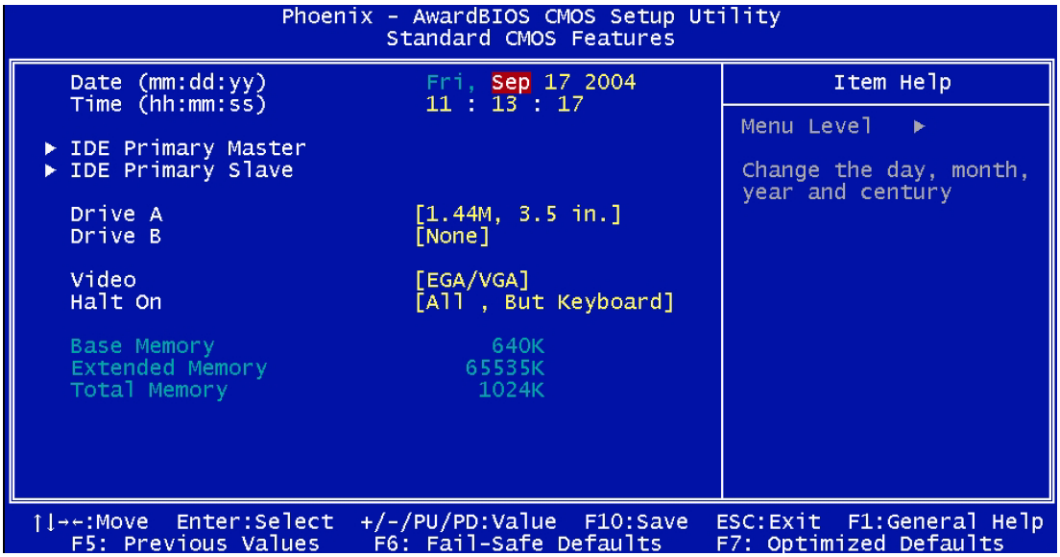
Figure B-1
Main menu screen



Standard CMOS feature

Use the arrow keys to highlight Standard CMOS Features and press <Enter>. A screen similar to the one on the next page will appear.

Figure B-2
Standard CMOS features



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

Date

The date format is <day>, <month>, <date>, <year>. Day displays a day, from Sunday to Saturday. Month displays the month, from January to December. Date displays the date, from 1 to 31.Year displays the year, from 1990 to 2098.

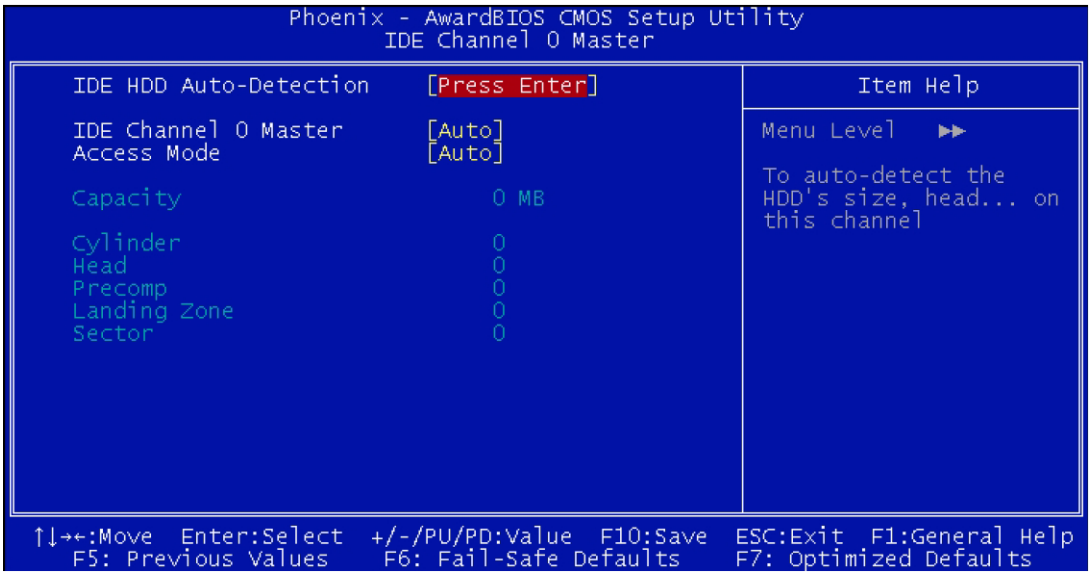
Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

IDE Channel 0 Master/Slave, IDE Channel 1 Master/Slave

Move the cursor to the IDE Channel 0 Master, IDE Channel 0 Slave, IDE Channel 1 Master, or IDE Channel 1 Slave field, then press <Enter>.

Figure B-3
Master and slave channels



IDE HDD auto-detection

Detects the parameters of the drive. The parameters will automatically be shown on the screen.

IDE Channel 0 Master/Slave and IDE Channel 1 Master/Slave

The drive type information should be included in the documentation from your hard disk vendor. If you select Auto, the BIOS will auto-detect the HDD & CD-ROM drive at the POST stage and show the IDE for the HDD & CD-ROM drive. If a hard disk has not been installed, select None.

Access Mode

For hard drives larger than 528MB, you would typically select the LBA type. Certain operating systems require that you select CHS or Large. Please check your operating system's manual or Help desk on which one to select.

Capacity

Displays the approximate capacity of the disk drive. Usually the size is slightly greater than the size of a formatted disk given by a disk checking program.

Cylinder

This field displays the number of cylinders.

Head

This field displays the number of read/write heads.

Precomp

This field displays the number of cylinders at which to change the write timing.

Landing Zone

This field displays the number of cylinders specified as the landing zone for the read/write heads.

Sector

This field displays the number sectors per track.

Device A / Device B

Choose the Floppy Drive A or B icon to specify the floppy drive type. The settings are: Not Installed, 360 KB 5 inch, 1.2 MB 5 inch, 720 KB 3 inch, 1.44 MB 3 inch or 2.88 MB 3 inch.

Video

This category selects the type of video adapter used for the primary system monitor. Although secondary monitors are supported, you do not have to select the type in Setup. The default setting is EGA/VGA.

- **EGA/VGA:** Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SVGA and PGA monitor adapters.
- **CGA 40:** Color Graphics Adapter. Power up in 40-column mode.
- **CGA 80:** Color Graphics Adapter. Power up in 80-column mode.
- **Mono:** Monochrome adapter. Includes high resolution monochrome adapters.

Halt on

This category determines whether the computer will stop if an error is detected during power up.

- **All errors:** When the BIOS detects a non-fatal error the system will be stopped and you will be prompted
- **No errors:** The system boot will not be stopped for any error that may be detected
- **All, But Keyboard:** The system boot will not stop for a keyboard error, it will stop for all other errors

Base memory

Displays the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 512K for systems with 512K memory installed on the motherboard or 640K for systems with 640K or more memory installed on the motherboard.

Extended memory

Displays the amount of extended memory detected during bootup.

Total Memory

Displays the total memory available in the system.

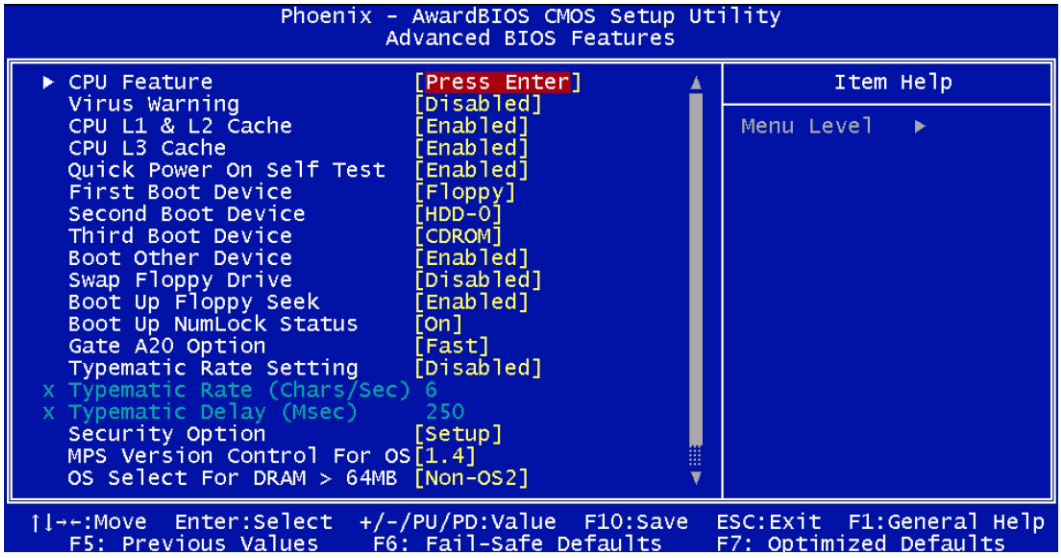
NOTE *The fields in this section will vary in accordance to the settings in the On-Chip Serial ATA field (Intel OnChip IDE Device section) of the Integrated Peripherals submenu.*

The settings on the screen are for reference only. Your version may not be identical to this one.

Advanced BIOS features

The Advanced BIOS Features allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.

Figure B-4
Advanced BIOS Features



NOTE *The screen above lists all the fields available in the Advanced BIOS Features submenu, for ease of reference in this manual. In the actual CMOS setup, you have to use the scroll bar to view the fields. The settings on the screen are for reference only. Your version may not be identical to this one.*

CPU Feature

- **Delay Prior to Thermal:** Set the time for the system to decrease performance to avoid reaching maximum thermal temp. Ex. If you set it to 16 minutes the system will start decreasing the performance 16 minutes before reaching max thermal temp

Virus Warning

This category flashes on the screen. During and after the system boots up, any attempt to write to the boot sector or partition table of the hard disk drive will halt the system and the following error message will appear, in the mean time, you can run an anti-virus program to locate the problem. Default value is Disabled.

- **Disabled:** No warning message to appear when anything attempts to access the boot sector or hard disk partition table.
- **Enabled:** Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.

CPU L1 & L2 Cache

These fields speed up the memory access. The default value is enabled. Enable the external cache for better performance.

CPU L3 Cache

Set this option to "Enabled" to activate the function of the CPU L3 cache.

Quick Power On Self Test

This field speeds up Power On Self Test (POST) whenever the system is powered on. The BIOS will shorten or skip some check items during POST. To attain the shortest POST time, select Fast.

First, Second, Third, and Other Boot Devices

Select the drive to boot first, second and third in the First Boot Device Second Boot Device and Third Boot Device fields respectively. The BIOS will boot the operating system according to the sequence of the drive selected. Set **Boot Other Device** to Enabled if you wish to boot from another device.

Swap Floppy Drive

This field is effective only in systems with two floppy drives. Selecting enabled assigns physical drive B to logical drive A.

Boot Up Floppy Seek

This feature controls whether the BIOS checks for a floppy drive during system boot.

Boot Up NumLock Status

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on wherein the function of the numeric keypad is the number keys. When set to Off, the function of the numeric keypad is the arrow keys.

Gate A20 Option

- **Normal:** The A20 signal is controlled by keyboard controller or chipset hardware.
- **Fast:** The A20 signal is controlled by Port 92 or chipset specific method.

Typematic Rate Setting

- **Disabled:** Continually holding down a key on your keyboard will cause the BIOS to report that the key is down.
- **Enabled:** The BIOS will not only report that the key is down, but will first wait for a moment, and, if the key is still down, it will begin to report that the key has been depressed repeatedly. For example, you would use such a feature to accelerate cursor movements with the arrow keys. You can then select the typematic rate and typematic delay in the Typematic Rate (Chars/Sec) and Typematic Delay (Msec) fields below.

Typematic Rate (Chars/Sec)

This field allows you to select the rate at which the keys are accelerated.

Typematic Delay (Msec)

This field allows you to select the delay between when the key was first depressed and when the acceleration begins.

Security Option

This field determines when the system will prompt for the password every time the system boots or only when you enter the BIOS setup. Set the password in the Set Supervisor/User Password submenu.

- **System:** The system will not boot and access to Setup will be denied unless the correct password is entered at the prompt.
- **Setup:** The system will boot, but access to Setup will be denied unless the correct password is entered at the prompt.

MPS Version Control for OS

This field is used to select the MPS version that the system board is using.

OS Select for DRAM > 64MB

This field allows you to access the memory that is over 64MB in OS/2.

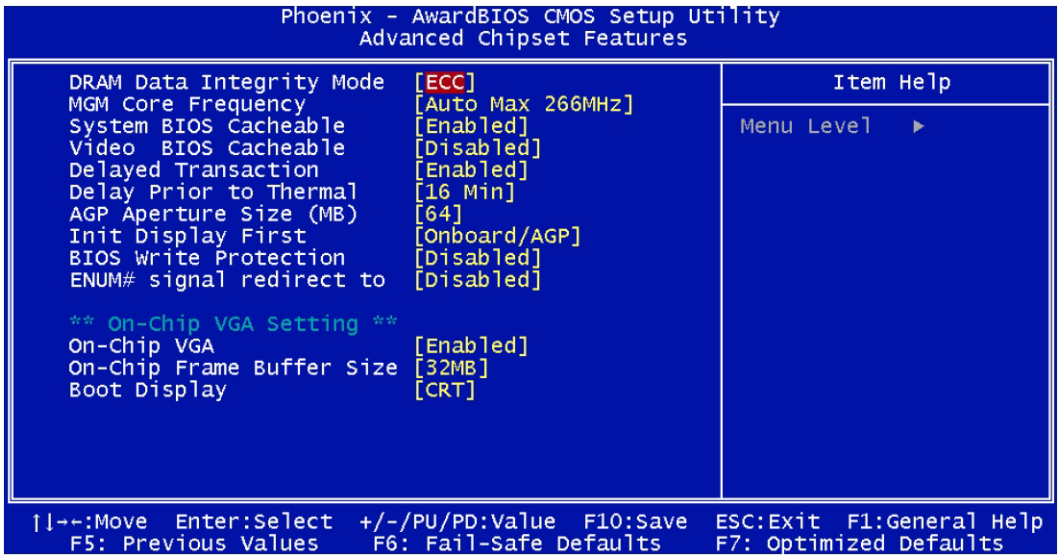
Summer Screen Show

When system boots, it will display a list table that show the system information such as the frequency of CPU, the size of memory, onboard device, and PCI devices. This option allows user to decide if they want to show the summary screen.

Advanced Chipset Features

This section gives you functions to configure the system based on the specific features of the chipset. The chipset manages bus speeds and access to system memory resources. These items should not be altered unless necessary. The default settings have been chosen because they provide the best operating conditions for your system. The only time you might consider making any changes would be if you discovered some incompatibility or that data was being lost while using your system.

Figure B-5
Advanced chipset features



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

DRAM Data Integrity Mode

This item will be show-only when user plugs non-ECC DRAM on memory slot. When user uses DRAM with ECC, the data integrity mode can be selected as following description:

- **ECC:** DRAM with 72bit wide.
- **Non-ECC:** DRAM with 64bit wide.

MGM Core Frequency

This field is used to select the memory clock speed of the DIMM. The system board supports DDR266, DDR333 or DDR400 when using 800MHz FSB CPU. DDR333 will run at 320MHz memory frequency when used with 800MHz FSB CPU. Under such circumstance, make sure this field is set to Auto or DDR320. Refer to chapter 1 (System Memory section) for detailed specification of the memory supported by the system board.

System BIOS Cacheable

When this field is enabled, accesses to the system BIOS ROM addressed at F0000HFFFFFH are cached, provided that the cache controller is enabled. The larger the range of the Cache RAM, the higher the efficiency of the system.

Video BIOS Cacheable

As with caching the system BIOS, enabling the Video BIOS cache will allow access to video BIOS address at C0000H to C7FFFH to be cached, if the cache controller is also enabled. The larger the range of the Cache RAM, the faster the video performance.

Init Display First

This item allows you to decide to active whether PCI Slot or on-chip VGA first.

BIOS Write Protection

- **Enabled:** This option will protect the system from unnecessary updating or flashing of the BIOS. When enabled, it secures the BIOS therefore any updates to the BIOS will not take effect.
- **Disabled:** Disables the BIOS flash lock function, allowing you to update or flash the BIOS any time needed.

ENUM# signal redirect to

This item set ENUM# signal redirect to IRQ 3/4/5/7/11/12.

On-Chip VGA

This item will enable/disable On-Chip VGA. Once disabling, you must use another VGA card to display the POST messages. The default is Enabled.

On-Chip Frame Buffer Size

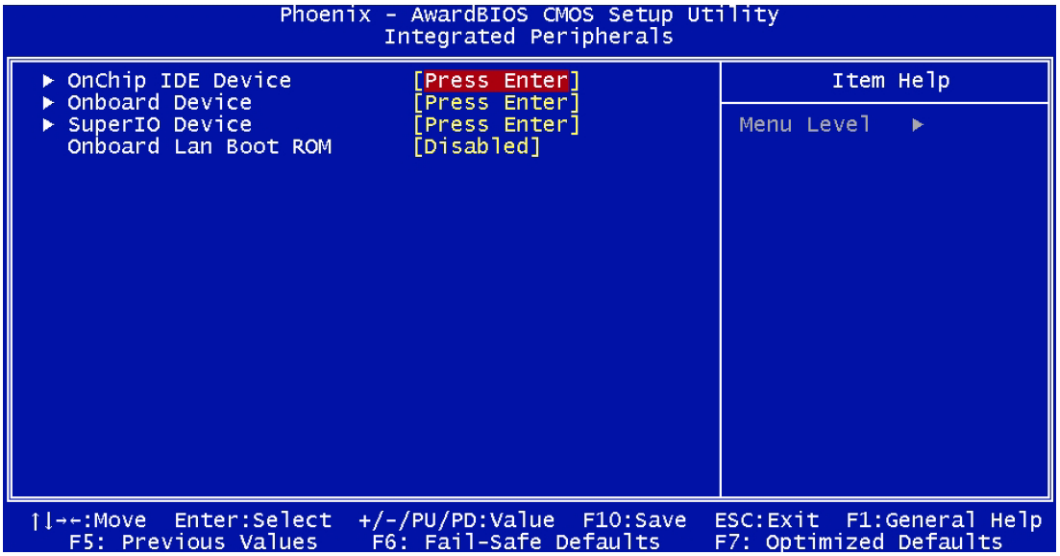
This item set On-Chip VGA memory cache windows size.

Boot Display

You can use this item to CRT or CRT+DVI display.

Integrated Peripherals

Figure B-6
Integrated peripherals

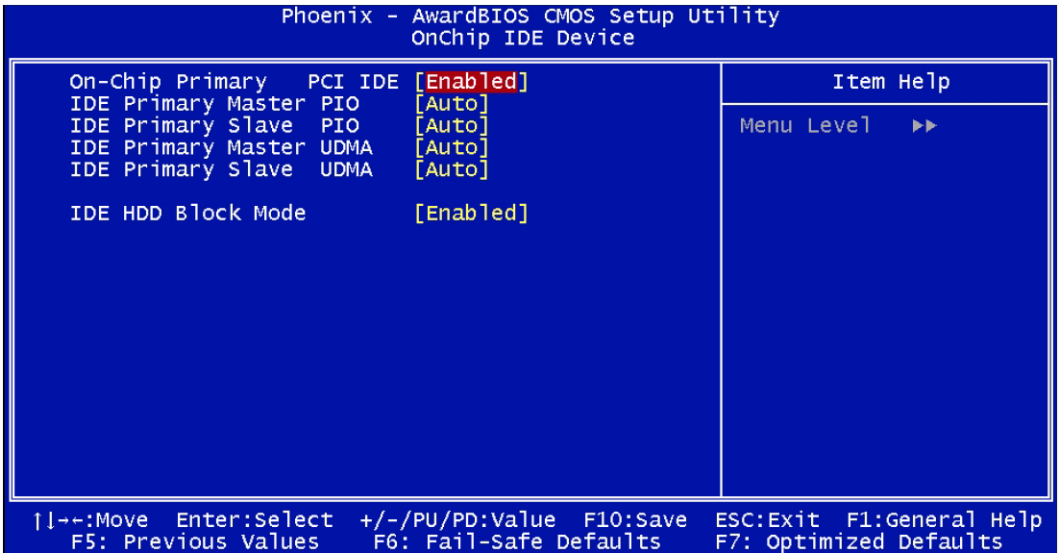


NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

OnChip IDE Device

Move the cursor to this field and press <Enter>. The following screen will appear.

Figure B-7
OnChip IDE device



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

On-Chip Primary PCI IDE and On-Chip Secondary PCI IDE

These fields allow you to enable or disable the primary and secondary IDE controller. Select Disabled if you want to add a different hard drive controller.

IDE Primary and Secondary Master/Slave PIO

PIO means Programmed Input/Output. Rather than have the BIOS issue a series of commands to affect a transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the complete task by them. Your system supports five modes, 0 (default) to 4, which primarily differ in timing. When Auto is selected, the BIOS will select the best available mode after checking your drive.

- **Auto:** The BIOS will automatically set the system according to your hard disk drive's timing.
- **Mode 0-4:** You can select a mode that matches your hard disk drive's timing.

CAUTION **Do not use the wrong setting or you will have drive errors.**

IDE Primary and Secondary Master/Slave UDMA

These fields allow you to set the Ultra DMA in use. When Auto is selected, the BIOS will select the best available option after checking your hard drive or CD-ROM.

- **Auto:** The BIOS will automatically detect the settings for you.
- **Disabled:** The BIOS will not detect these categories.

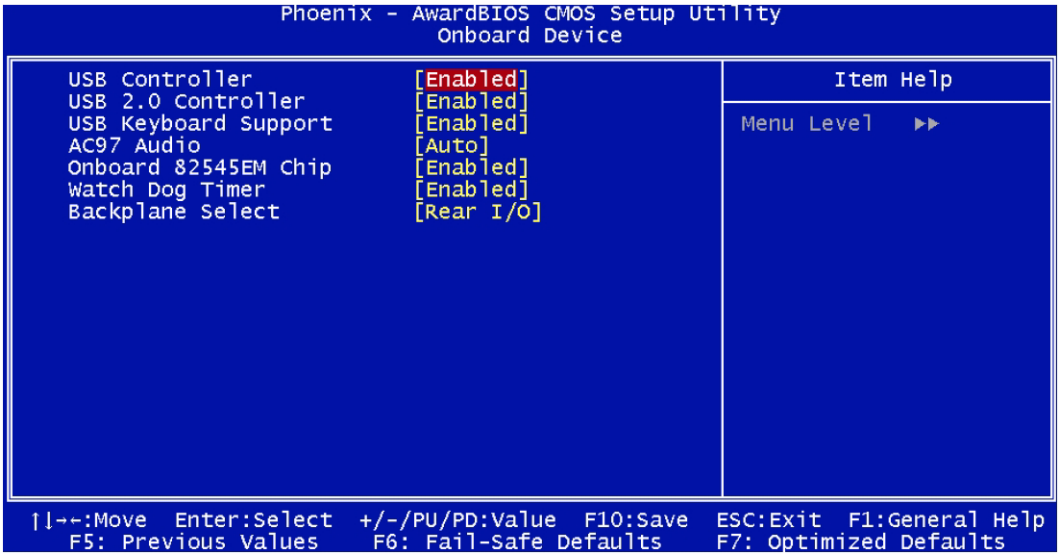
IDE HDD Block Mode

- **Enabled:** The IDE HDD uses the block mode. The system BIOS will check the hard disk drive for the maximum block size the system can transfer. The block size will depend on the type of hard disk drive.
- **Disabled:** The IDE HDD uses the standard mode.

Onboard device

Move the cursor to this field and press <Enter>. The following screen will appear.

Figure B-8
Onboard device



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

USB Controller

- **Enabled**: Enables the onboard USB. You can further configure the USB in the USB 2.0 Controller and USB Keyboard Support fields
- **Disabled:** Disables the onboard USB. USB 2.0 Controller and USB Keyboard Support fields are not Configurable.

USB 2.0 Controller

If you are using a USB 2.0 device, this field must be set to Enabled.

USB Keyboard Support

By default, this field is Disabled. However, if you are using a USB keyboard under DOS, make sure to enable this function.

AC97 Audio

- **Auto**: Select this option when using the onboard AC97 codec.
- **Disabled:** Select this option when using a PCI sound card.

Onboard 82545EM Chip

This field is used to enable or disable the onboard 82545EM LAN Chip.

Watch Dog Timer

The controller has a function that can enable/disable the Watch Dog Timer Function. The default is Disabled.

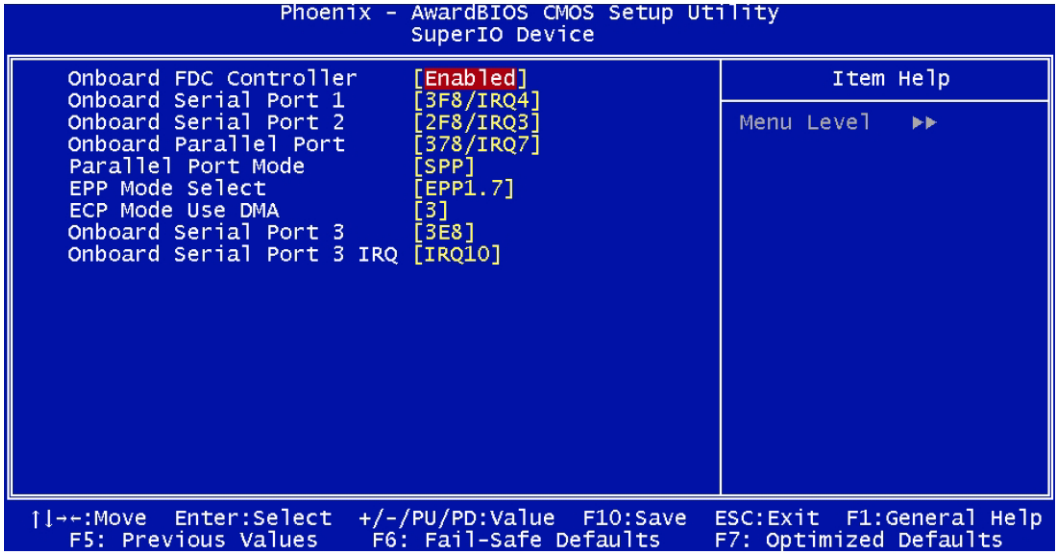
Backplane Select

Select a 64-Bit Backplane or Rear I/O supported backplane.

SuperIO Device

Move the cursor to this field and press <Enter>. The following screen will appear.

Figure B-9
SuperIO device



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

Onboard FDC Controller

Select Enabled if your system has a floppy disk controller (FDC) installed on the system board and you wish to use it. If you install an add-in FDC or the system has no floppy drive, select Disabled in this field.

Onboard Serial Port 1/ Onboard Serial Port 2

- **Disabled**: Disables the onboard Serial Port 1 / onboard Serial Port 2
- **3F8/IRQ4, 2F8/IRQ3, 3E8/IRQ4, 2E8/IRQ3**: Allows you to manually select an I/O address for the onboard serial port 1/ onboard serial port 2

Onboard Parallel Port

Select a logical LPT port address and corresponding interrupt for the physical parallel port.

Parallel Port Mode

Select an operating mode for the onboard parallel port. Select Normal unless you are certain that both your hardware and software support one of the other available modes.

EPP Mode Select

The settings are EPP1.7 or EPP1.9. The Optimal and Fail-Safe default settings are N/A.

ECP Mode Use DMA

This option is only available if the setting of the parallel port mode option is ECP. The settings are None, 0 (DMA channel 0), 1 (DMA channel 1), or 3 (DMA channel 3).

Onboard Serial Port 3

Allows you to manually select an I/O address for the onboard serial port 3

Onboard Serial Port 3 IRQ

These options specify the bus that the specified IRQ line is used on.

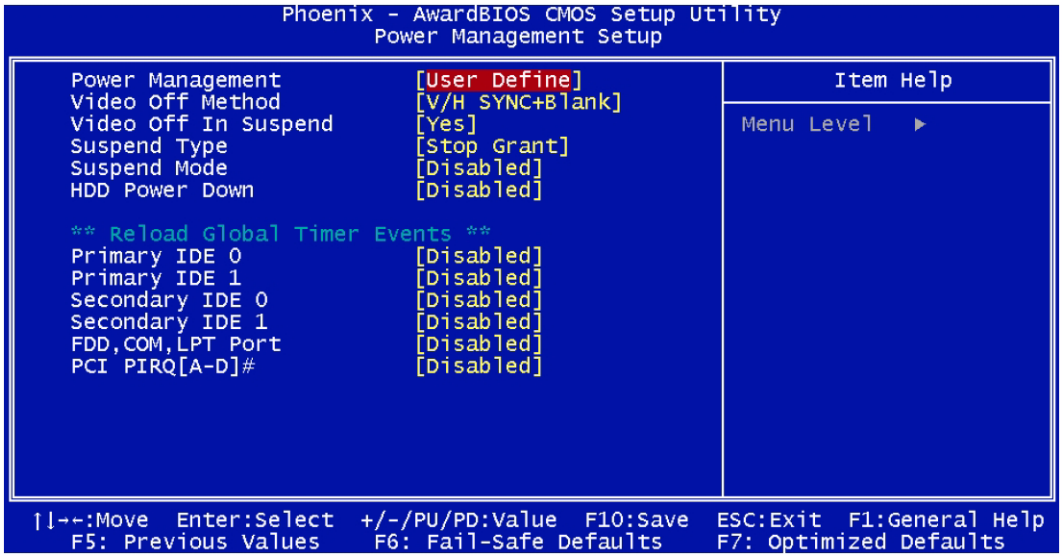
Onboard LAN Boot ROM

Enable this field if you wish to use the boot ROM (instead of a disk drive) to boot-up the system and access the local area network directly.

Power Management Setup

The Power Management Setup allows you to configure your system to most effectively save energy.

Figure B-10
Power Management Setup



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

Power Management

This field allows you to select the type (or degree) of power saving by changing the length of idle time that elapses before the Suspend mode and HDD Power Down fields are activated.

- **Min Saving:** Minimum power saving time for the Suspend Mode (1 hour) and HDD Power Down (15 min.)
- **Max Saving:** Maximum power saving time for the. Suspend Mode and HDD Power Down = 1 min.
- **User Define:** Allows you to set the power saving time in the Suspend Mode and HDD Power Down fields.

Video Off Method

This determines the manner in which the monitor is blanked.

- **V/H SYNC + Blank:** This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer.
- **Blank Screen:** This option only writes blanks to the video buffer.
- **DPMS:** Initializes display power management signaling. Use this option if your video board supports it.

Video Off In Suspend

This field is used to activate the video off feature when the system enters the Suspend mode. The options are Yes and No.

Suspend Type

The default setting for the Suspend Type field is Stop Grant.

- **Stop Grant:** The system can wake up through external events.
- **PwrOn Suspend:** The system can only wake up through the Power-Button.

Suspend Mode

This is selectable only when the Power Management field is set to User Define. When the system enters the Suspend mode according to the power saving time selected, the CPU and onboard peripherals will be shut off.

HDD Power Down

This is selectable only when the Power Management field is set to User Define. When the system enters the HDD Power Down mode according to the power saving time selected, the hard disk drive will be powered down while all other devices remain active.

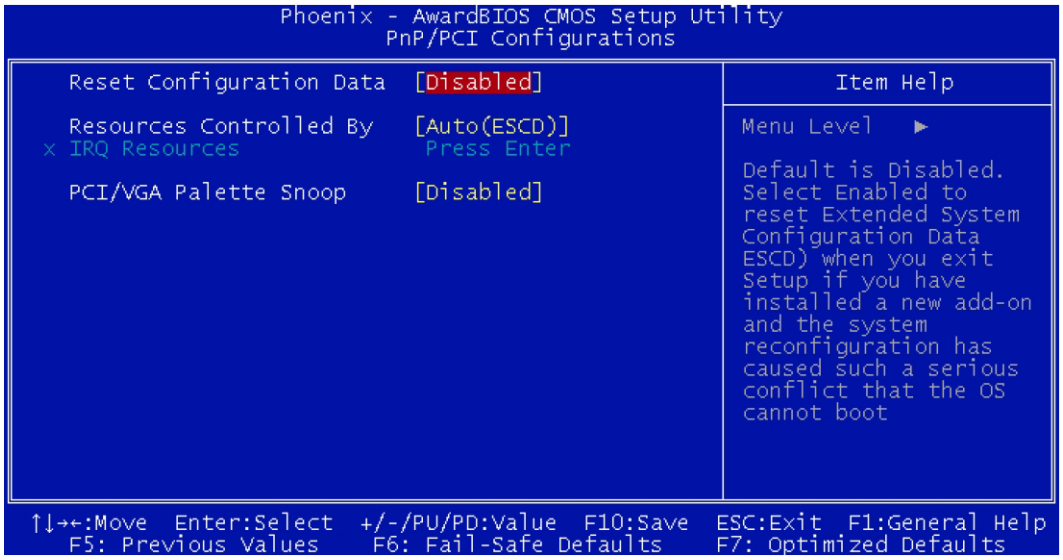
Reload Global Timer Events

The events are I/O events whose occurrence can prevent the system from entering a power saving mode or can awaken the system from such a mode. In effect, the system remains alert for anything, which occurs to a device, which is configured as Enabled, even when the system is in a power down mode.

PnP/PCI Configurations

This section describes configuring the PCI bus system. It covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.

Figure B-11
PnP/PCI configurations



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

Reset Configuration Data

- **Enabled**: The BIOS will reset the Extended System Configuration Data (ESCD) once automatically. It will then recreate a new set of configuration data.
- **Disabled:** The BIOS will not reset the configuration data.

Resources Controlled By

The Award Plug and Play BIOS has the capability to automatically configure all of the boot and Plug and Play compatible devices.

- **Auto:** The system will automatically detect the settings for you.
- **Manual:** Choose the specific IRQ in the IRQ Resources field respectively.

IRQ Resources

Move the cursor to this field and press <Enter>. This field is used to set each system interrupt to either Reserved or PCI Device.

PCI/VGA Palette Snoop

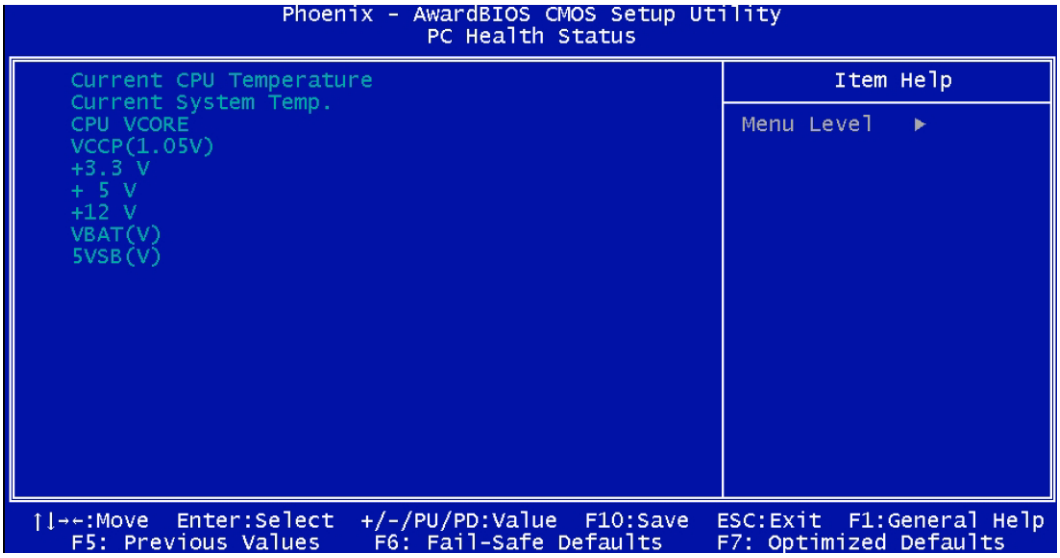
This field determines whether the MPEG ISA/VESA VGA cards can work with PCI/VGA or not. The default value is Disabled.

- **Enabled:** MPEG ISA/VESA VGA cards work with PCI/VGA.

- **Disabled:** MPEG ISA/VESA VGA cards do not work with PCI/VGA.

PC Health Status

Figure B-12
PC health status



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

Current CPU Temperature/Current System Temperature

These fields show the internal temperature of the system, current temperature of the CPU.

CPU Vcore

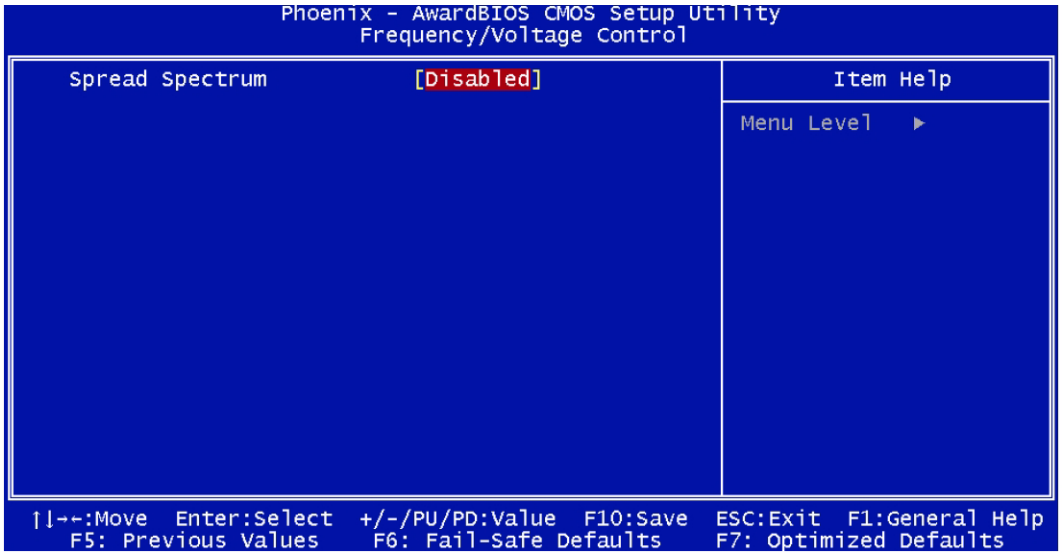
These fields show the voltage of the processor.

+3.3V, +5V, +12V, VBAT(V), 5VSB(V)

These fields show the output voltage of the power supply.

Frequency/Voltage Control

Figure B-13
Frequency/voltage control



NOTE *The settings on the screen are for reference only. Your version may not be identical to this one.*

Spread Spectrum

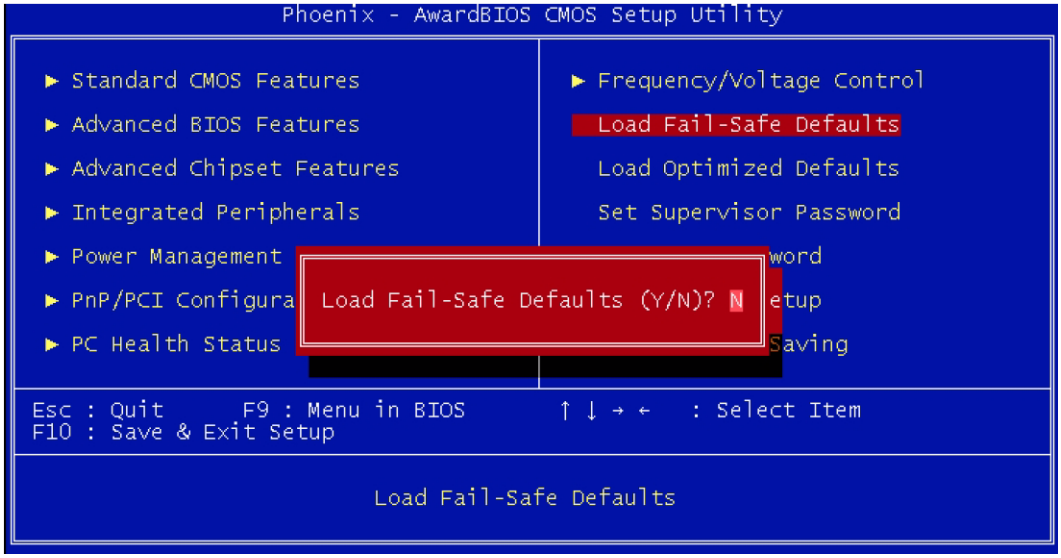
Leave this field in its default setting. Do not alter this setting unless advised by an engineer or technician.

Load Fail-Safe Defaults

The Load Fail-Safe Defaults option loads the troubleshooting default values permanently stored in the ROM chips. These settings are not optimal and turn off all high performance features. You should use these values only if you have hardware problems. Highlight this option in the main menu and press <Enter>.

If you want to proceed, type <Y> and press <Enter>. The default settings will be loaded.

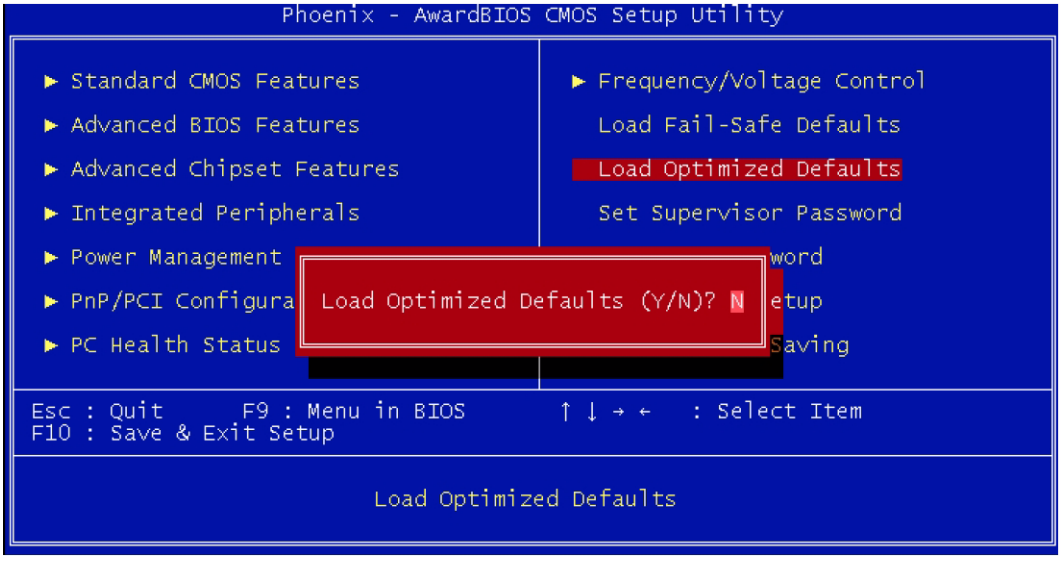
Figure B-14
Load fail-safe defaults



Load Optimized Defaults

The Load Optimized Defaults option loads optimized settings from the BIOS ROM. Use the default values as standard values for your system. Highlight this option in the main menu and press <Enter>. Type <Y> and press <Enter> to load the Setup default values.

Figure B-15
Load fail-safe defaults



Set Supervisor Password

If you want to protect your system and setup from unauthorized entry, set a supervisor's password with the System option selected in the Advanced BIOS Features. If you want to protect access to setup only, but not your system, set a supervisor's password with the Setup option selected in the Advanced BIOS Features. You will not be prompted for a password when you cold boot the

system. Use the arrow keys to highlight Set Supervisor Password and press <Enter>. Type in the password. You are limited to eight characters. When done, the message below will appear:

```
Confirm Password:
```

You are asked to verify the password. Type in exactly the same password. If you type in a wrong password, you will be prompted to enter the correct password again. To delete or disable the password function, highlight Set Supervisor Password and press <Enter>, instead of typing in a new password. Press the <Esc> key to return to the main menu.

Figure B-16
Set supervisor password



Set User Password

If you want another user to have access only to your system but not to setup, set a user's password with the System option selected in the Advanced BIOS Features. If you want a user to enter a password when trying to access setup, set a user's password with the Setup option selected in the Advanced BIOS Features. Using users password to enter Setup allows a user to access only Set User Password that appears in the main menu screen. Access to all other options is denied. Use the arrow keys to highlight Set User Password and press <Enter>. Type in the password. You are limited to eight characters. When done, the message below will appear:

```
Confirm Password:
```

You are asked to verify the password. Type in exactly the same password. If you type in a wrong password, you will be prompted to enter the correct password again. To delete or disable the password function, highlight Set User Password and press <Enter>, instead of typing in a new password. Press the <Esc> key to return to the main menu.

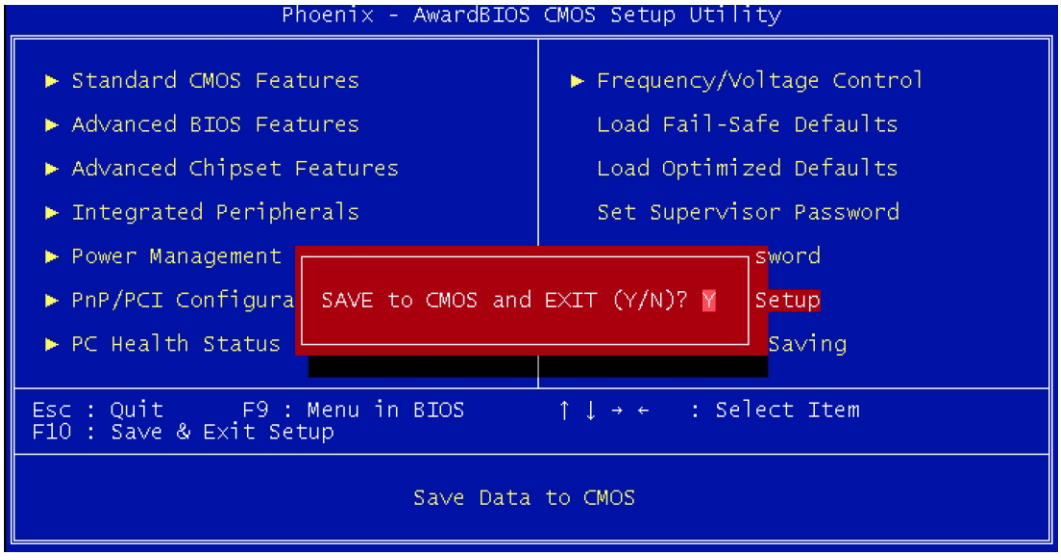
Figure B-17
Set user password



Save & Exit Setup

When all the changes have been made, highlight Save & Exit Setup and press <Enter>. Type Y and press <Enter>. The modifications you have made will be written into the CMOS memory, and the system will reboot. You will once again see the initial diagnostics on the screen. If you wish to make additional changes to the setup, press <Ctrl> <Alt> <Esc> simultaneously or <Del> after memory testing is done.

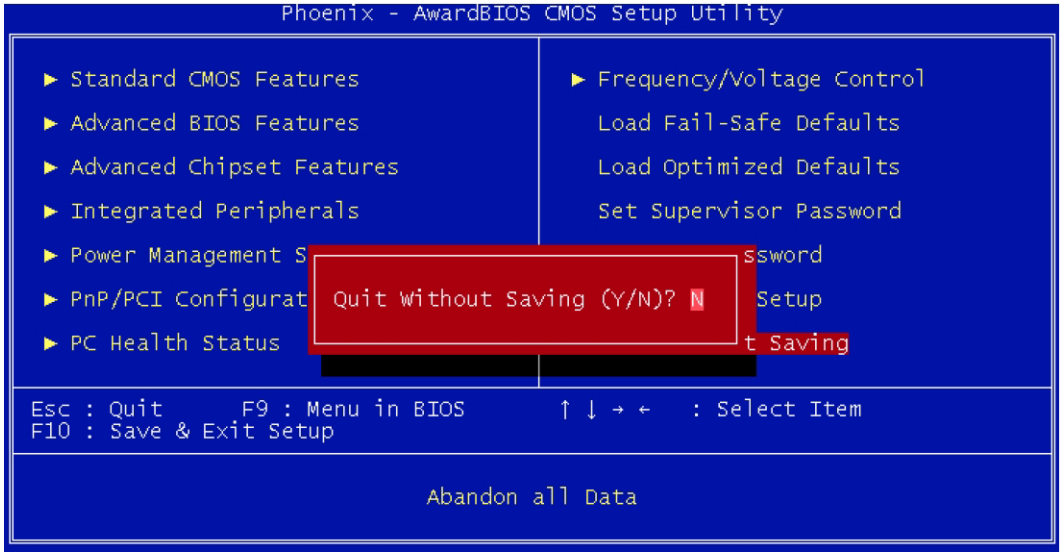
Figure B-18
Save & exit setup



Exit Without Saving

When you do not want to save the changes you have made, highlight Exit Without Saving and press <Enter>. Type Y and press <Enter>. The system will reboot and you will once again see the initial diagnostics on the screen. If you wish to make any changes to the setup, press <Ctrl> <Alt> <Esc> simultaneously or <Del> after memory testing is done.

Figure B-19
Exit without saving



This page left blank intentionally.

Appendix C

PCI-to-PXI, PXI-to-PXI Extension User's Guide

In this appendix:

Topic	Page
Introduction	C-2
Features	C-2
Applications	C-2
Specifications	C-3
Installation	C-4
Contents of package	C-4
Unpacking	C-4
Getting started	C-4
Software installation	C-5
Hardware installation	C-5
Hardware overview	C-11
Basic architecture of PCI extension module	C-11
Bus architecture	C-12

Introduction

The Keithley Instruments PCI to PXI or PXI to PXI extension modules function as a transparent PCI-PCI bridge register set. With coupling master and slave extension modules, users will have direct control of PXI/CompactPCI chassis from another PC or multi-chassis PXI/CompactPCI systems. All devices on this system appear as local devices in a single PCI system. One master extension card (KPXI-CON-PXIREM or KPXI-CON-PCIREM) can expand up to 2 slave extension modules (KPXI-CON-PXIREM) at the same time.

Keithley Instruments extension modules employ the StarFabric architecture, a well-known physical layer technology, with a serial interconnection at 622Mbps low voltage differential signaling (LVDS). Four transmit and receive differential pairs are used to provide 2.5Gbps full duplex link bandwidth. Using shielding twisted pair copper cable can extend the transmission distance to 10m. The PCI interface supports 64-bit or 32-bit PCI buses operating at 66MHz or 33MHz. A bundled link can support the full bandwidth of 64-bit/66MHz PCI bus.

All interrupts asserted by add-in cards in the extension system are passed through the extension set to the host system. These Keithley Instruments extension modules are built in a transparent architecture, and function independently of the operating system. A PCI-to-PCI bridge function in the system extension set provides 100% capability with PCI drivers, application software, BIOS, operating systems, configuration codes, etc. Users can combine PCI, CompactPCI, and PXI devices in the same system, increase the available number of PXI/CompactPCI slots for high density I/O applications, and could separate the control system from the harsh environment with the extension chassis.

Features

Keithley Instruments extension cards have the following advanced features:

- Direct PC control of PXI/CompactPCI systems
- Multi-chassis configurations for PXI/CompactPCI
- Up to 2 PCI segments from signal KPXI-CON-PCIREM
- PCI local bus specifications Rev. 2.2 compliant
- PCI to PCI bridge architecture specifications Rev. 1.1 compliant
- PXI specifications Rev. 2.0 compliant
- Up to 64-bit, 66MHz PCI bus extension
- StarFabric link performance
- 528Mbytes/s peak (64-bit, 66MHz PCI)
- 132Mbytes/s peak (32-bit, 33MHz PCI)
- Shielded copper cabling
- 10m maximum distance
- Completely hardware and software transparent
- Independent of operating systems
- Seamless PCI interrupt extension

Applications

- High Density I/O System
- Test System in Harsh Environment
- Electronic Manufacturing Test System
- Automation System with Existed PC

Specifications

Architecture

- Functions as a PCI-to-PCI bridge
- PCI-to-PCI bridge architecture specifications Rev. 1.1 compliant
- PCI local bus specifications Rev. 2.2
- PXI specifications Rev. 2.0 compliant
- 64-bit, 66MHz PCI bus extension
- Maximum data throughput
- 132Mbytes/s (32-bit, 33MHz PCI)
- 528Mbytes/s (64-bit, 66MHz PCI)
- Certificates
  EMC/EMI: CE

General specifications

- I/O Connector: RJ-45 connector x 4
- Maximum cable length: 10m
- Operating temperature: 0°C to 50ºC
- Storage temperature: -20°C to 80ºC
- Relative humidity: 5% to 95%, non-condensing

Power requirements

Device	+5V	+3.3V
KPXI-CON-PCIREM	190mA	250mA
KPXI-CON-PXIREM	–	540mA

Dimensions (not including connectors)

Device	Dimension
KPXI-CON-PCIREM	175mm x 107mm
KPXI-CON-PXIREM	160mm x 100mm

Installation

This outlines the contents of package, describes unpacking information, and describes how to install the software and hardware.

Contents of package

The package includes the following items:

- KPXI-CON-PXIREM or KPXI-CON-PCIREM extension module
- Keithley Instruments CD

If any of these items are missing or damaged, contact your local Keithley Instruments representative. Save the shipping materials and carton in to ship or store the product in the future.

Unpacking

The extension module contains electro-static sensitive components that can be easily be damaged by static electricity.

Therefore, the module should be handled on a grounded anti-static mat. The operator should be wearing an anti-static wristband, grounded at the same point as the anti-static mat.

Inspect the module for obvious damage. Shipping and handling may cause damage to the module. Be sure there is no shipping and handling damage on the module before continuing.

You are now ready to install the extension module.

WARNING ***Do not apply power to the card if it has been damaged.***

Getting started

To set up and use the PCI bus extension module, you need the following:

- A KPXI-CON-PCIREM module and a KPXI-CON-PXIREM module or two KPXI-CON-PXIREM modules
- Two RJ-45 Copper cables (Keithley Instruments provides three different lengths of shielded copper cable to eliminate the EMI issues: KPXI-REM-CAB-2, KPXI-REM-CAB-5, and KPXI-REM-CAB-10). These cables have color coded ends for this application. During hardware installation **both BLACK connectors should be connected to the transmit (Tx) ports** on the card pair while **both RED connectors should be connected to the receive (Rx) ports**. Please contact your local Keithley Instruments representative for more information.

NOTE *Connection of the two RJ-45 Copper cables may be counter intuitive. Both BLACK connectors go on the transmit lines because BLACK is not wired to BLACK.*

- Primary bus – A computer with a PCI backplane, or a PXI controller embedded in a PXI/CompactPCI chassis
- Secondary bus – A PXI/CompactPCI chassis

Software installation

Once Windows XP/2000 has started, the Plug and Play function of the Windows system will find the new KPXI-CON-PXIREM / KPXI-CON-PCIREM. If this is the first time installing the KPXI-CON-PXIREM / KPXI-CON-PCIREM in your Windows system, you will be informed to input the device information source. Please follow these steps to install KPXI-CON-PXIREM / KPXI-CON-PCIREM.

For Windows XP/2000 users:

Step 1: Insert the Keithley Instruments CD.

Step 2: Execute **kpxireminstall.exe** to start the setup. The path is:
X:\PXI Extension\Wnt2kxp\kpxireminstall.exe
Where **X** is the drive letter of your CDROM)

Step 3: This setup program will copy the necessary files to your hard drive automatically. When the hardware installation process is complete, reboot the computer for the changes to take effect.

Hardware installation

Jumper setting (only for KPXI-CON-PXIREM)

Spread spectrum jumper setting

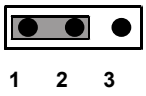
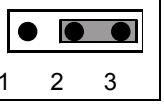
When KPXI-CON-PXIREM plugged into the system slot, it provides a discrete clock signal to each of the peripheral slot defined as a PCI clock (CLK0, CLK1, CLK2, CLK3, CLK4, CLK5, and CLK6).

An important feature of the KPXI-CON-PCIREM/KPXI-CON-PXIREM extension modules is that they support 33MHz/66MHz clock operating environment. As system clock increase, electromagnetic interference (EMI) becomes a challenge for the system designers. KPXI-CON-PXIREM adopts a spread-spectrum clock generator to help user to deal with this difficult task.

Spread spectrum clocking speeds up and slows down the clock within a few percent of its fundamental frequency. By reducing the peak amplitudes, the system will more likely meet EMI emission compliance standards. In other words, spread spectrum clocking distributes the energy that was originally concentrated on one frequency over a wider band. This method dramatically reduces the amount of EMI.

You can follow Table C-1 to turn on the spread spectrum clock generator.

Table C-1
Spread spectrum jumper settings

Spread Spectrum Control	JP1
OFF (default)	
ON	

M66EN Jumper Setting

KPXI-CON-PXIREM supports 64-bit or 32-bit PCI buses operating at 66MHz or 33MHz. A bundled link can support the full bandwidth of 64-bit/66MHz PCI bus. You can utilize the following configuration to set the operation frequency of your system.

Table C-2
M66EN jumper settings

JP2	Setting
 (default)	66 MHz PCI enable. If the backplane or any devices in the system do not support 66MHz PCI bus operations, extension modules will detect the configuration and operate at 33 MHz automatically.
	66MHz PCI disable. PCI bus is forced to operate at 33 MHz.

KPXI-CON-PCIREM/KPXI-CON-PXIREM supports the following primary and secondary bus frequency combinations:

1. 66MHz primary bus, 66MHz secondary bus
2. 66MHz primary bus, 33MHz secondary bus
3. 33MHz primary bus, 33MHz secondary bus

KPXI-CON-PCIREM/KPXI-CON-PXIREM does not support 33MHz primary/66MHz secondary bus operation.

Installing KPXI-CON-PCIREM

Follow these steps to install KPXI-CON-PCIREM:

Step 1: Turn off your computer, leave it plugged in while installing KPXI-CON-PCIREM. The power code grounds the chassis and protects it from electrical damage while you install this module.

Step 2: Remove the top cover and the access port to the PCI bus.

Step 3: Select any available PCI slot and remove the bracket-retaining screw.

Step 4: Plug in the KPXI-CON-PCIREM and reinstall the bracket-retaining screw.

Step 5: Replace the computer cover.

Installing KPXI-CON-PXIREM

Follow these steps to install KPXI-CON-PXIREM in your PXI or CompactPCI chassis.

Step 1: Turn off your PXI/CompactPCI system, leave it plugged in while installing KPXI-CON-PXIREM. The power code grounds the chassis and protects it from electrical damage while you install this module.

Step 2: Select a slot for KPXI-CON-PXIREM:

Step 3: For use in secondary PXI bus – Must choose the system slot (slot 1) of your chassis.

Step 4: For use in primary PXI bus – Choose any unused PXI peripheral slot except slot 1 (Slot 1 is reserved for the system controller.)

Step 5: Remove any covers blocking access to the slot in which you intend to install KPXI-CON-PXIREM.

Step 6: Make sure the injector/ejector handle is in its downward position.

Step 7: Hold the handle as you slide the module into the chassis until the handle catches on the injector/ejector rail.

Step 8: Raise the injector/ejector handle until the module firmly seats into the backplane receptacle connectors. The front panel of KPXI-CON-PXIREM should be even with the front panel of chassis.

Step 9: Tighten the bracket-retaining screws.

Configuration and cabling

Because KPXI-CON-PCIREM/KPXI-CON-PXIREM extension modules function as a standard PCI-to-PCI bridge, it can take advantage of a variety of extension configurations. Figure C-1 and Figure C-2 show the most basic PCI extension configuration. Each primary extension module can connect to two secondary extension modules at most in order to extend two PCI segments. Figure C-3 and Figure C-4 show the Star and Daisy-chain configurations to extend more than two PXI chassis.

Each extension module (KPXI-CON-PCIREM or KPXI-CON-PXIREM) has two link ports (Link 0 and Link 1), and each link is divided into transmit (Tx) and receive (Rx). Please follow these steps to link the primary and secondary extension modules:

Connect the cables to both primary and secondary extension modules. Two cables are needed while linking the primary and secondary modules. One cable is used for connecting transmit (Tx – black if Keithley Instruments cables are used) of primary module with receive (Rx) of secondary module. The other is used for connecting receive (Rx – red if Keithley Instruments cables are used) of primary module with transmit (Tx) of secondary module. Please refer to Figure C-1 and Figure C-2 for the connection. Turn on the system with the secondary extension module first.

When configuration and cabling is complete, turn on the system with the primary extension module.

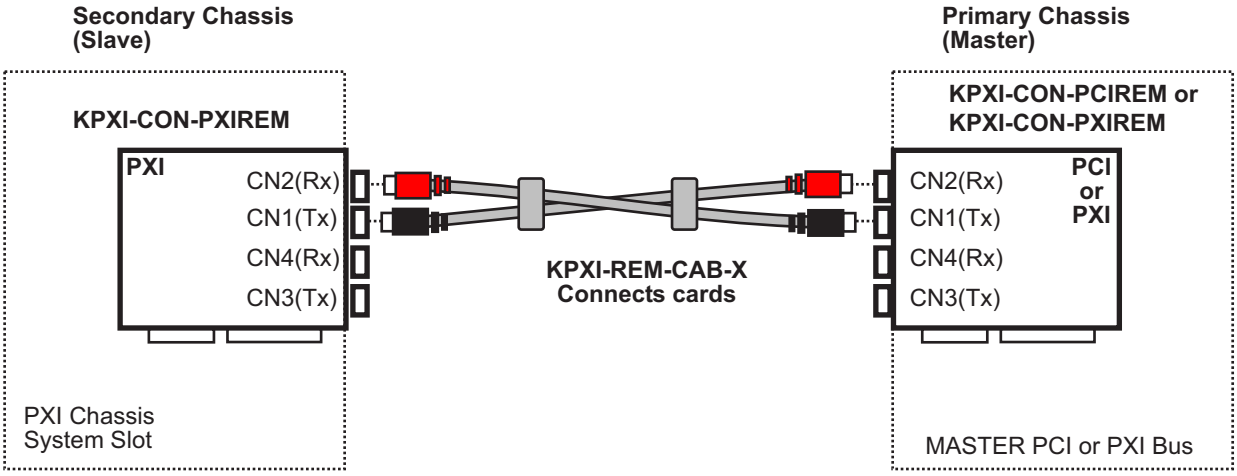
NOTE *If your operation is correct, the indicated LED of primary extension module is dark and the LED of secondary extension module is bright.*

If you turn on the system with primary extension module first and then secondary extension module, the indicated LED of both modules will keep twinkling.

If the communication between primary and secondary extension modules is broken, the indicated LED of the primary module is bright and the LED of the secondary module is dark.

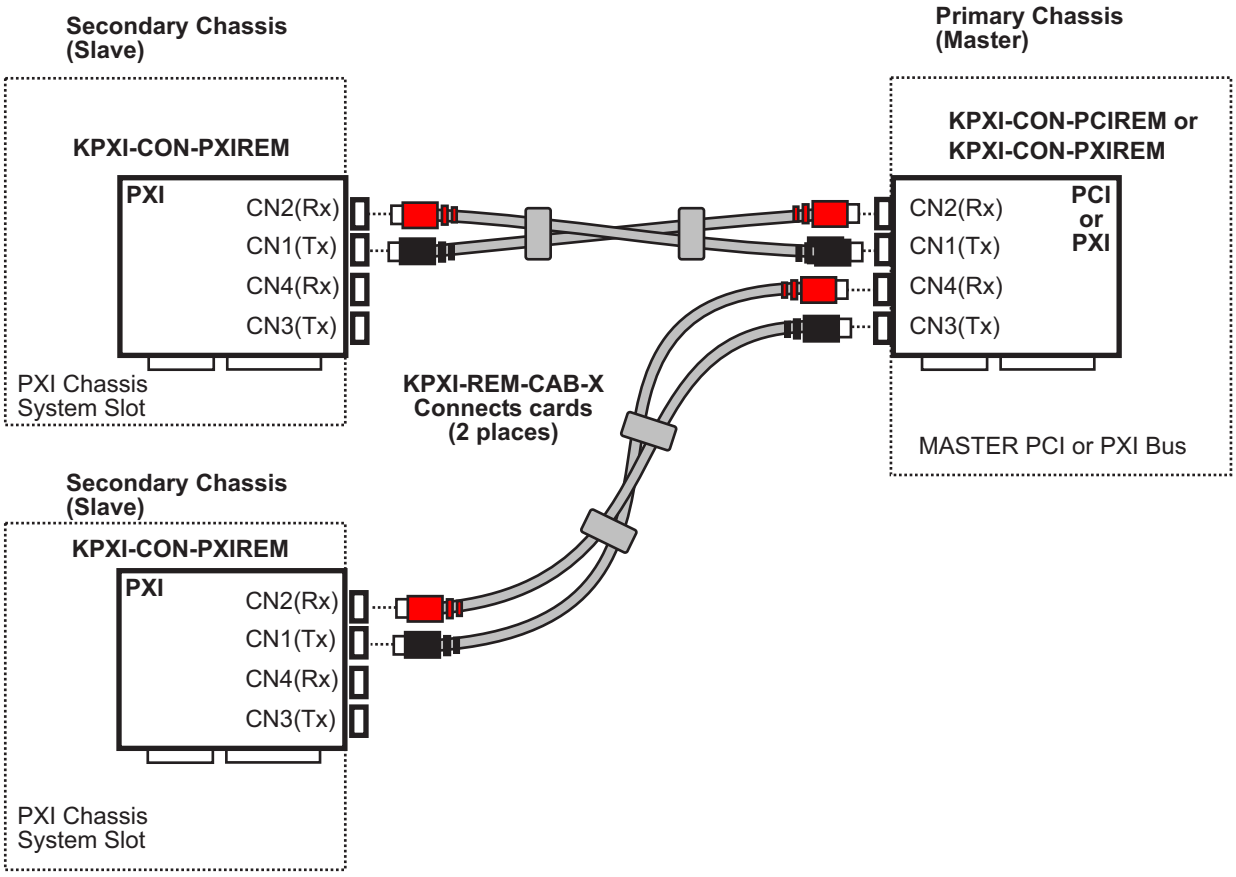
If Star or Daisy-chain configurations are implemented, please always turn on the secondary system first.

Figure C-1
PCI/PXI control of PXI chassis



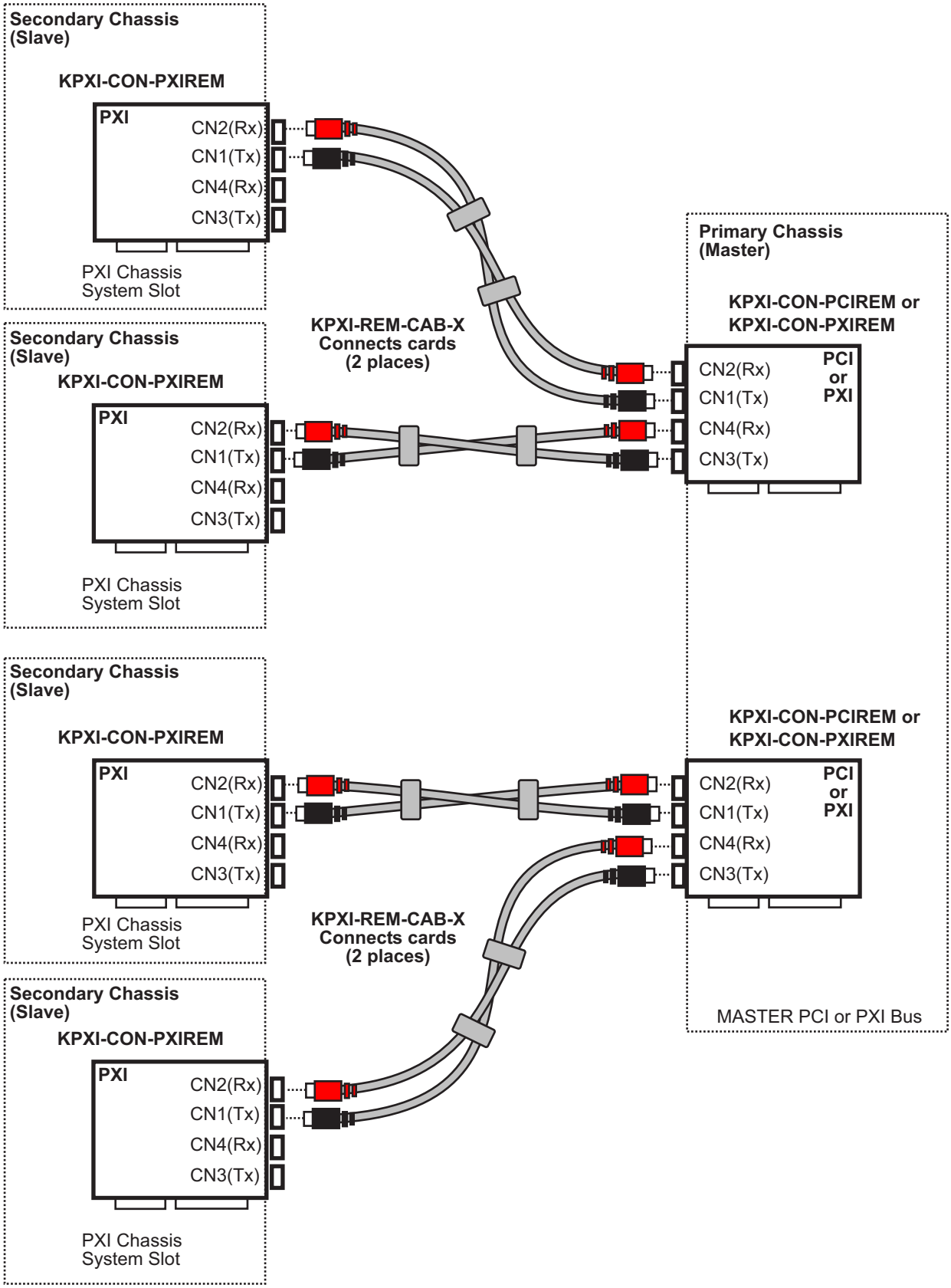
NOTE *Connection of the KPXI-REM-CAB-X cables may be counter intuitive. Both BLACK connectors go on the transmit lines because BLACK is not wired to BLACK.*

Figure C-2
Basic PCI extension configuration – extend two PCI segments



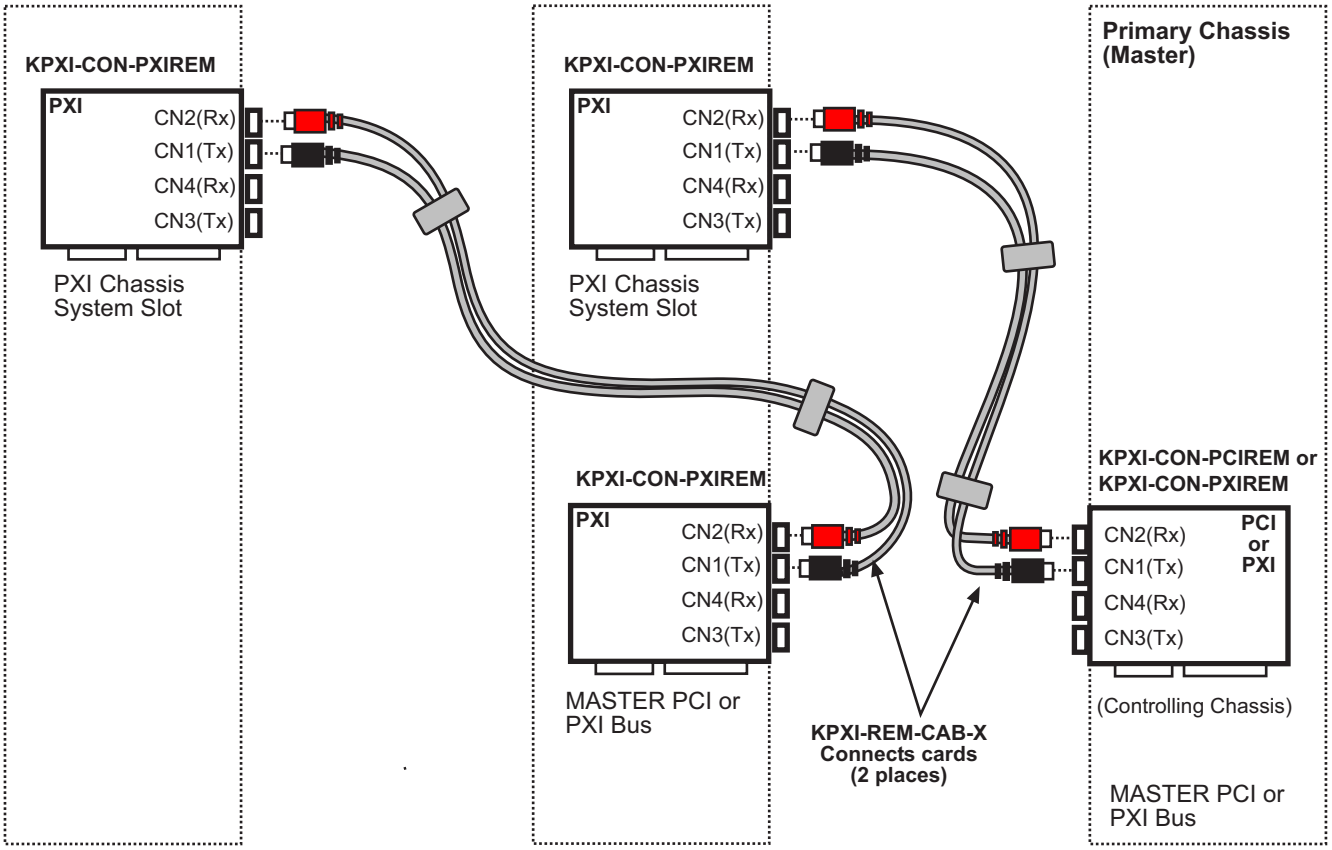
NOTE *Connection of the KPXI-REM-CAB-X cables may be counter intuitive. Both BLACK connectors go on the transmit lines because BLACK is not wired to BLACK.*

Figure C-3
Star configuration



NOTE *Connection of the KPXI-REM-CAB-X cables may be counter intuitive. Both BLACK connectors go on the transmit lines because BLACK is not wired to BLACK.*

Figure C-4
Daisy-Chain configuration



Hardware overview

This describes the basic architecture of the PCI extension module and its bus architecture.

Basic architecture of PCI extension module

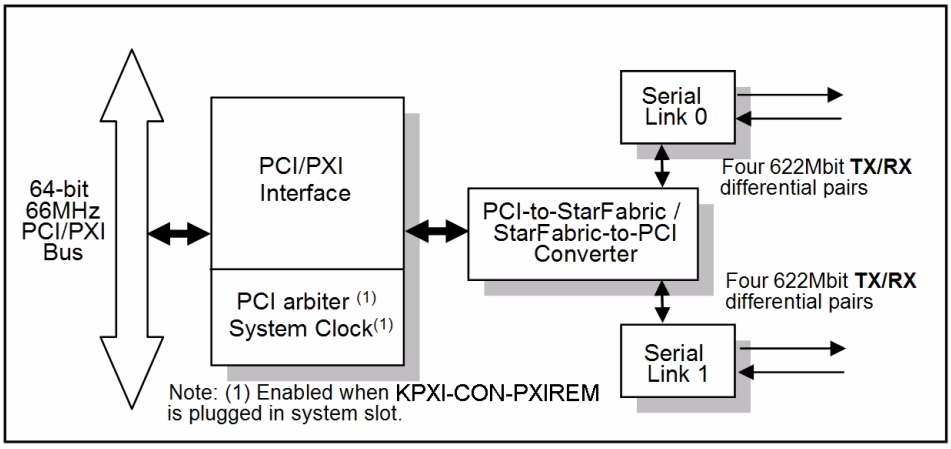
The KPXI-CON-PCIREM/KPXI-CON-PXIREM extension modules are basically a PCI-to-PCI bridge. The PCI-to-PCI bridge function in the KPXI-CON-PCIREM/KPXI-CON-PXIREM supports legacy address routed traffic, which provides 100% capability with PCI drivers, application software, BIOS, O/Ss, etc. These functions allow users to transfer their designs without extra effort. The functional block diagram of KPXI-CON-PCIREM/KPXI-CON-PXIREM is shown in Figure C-5.

The Model KPXI-CON-PCIREM/KPXI-CON-PXIREM employs a serial interconnect technology, 622Mbps low voltage differential signaling (LVDS). Each extension module has two link ports, named as Link 0 and Link 1. Each link is divided into transmit (TX) and receive (RX). Four TX and RX differential pairs in each link are used to provide 2.5Gbps full duplex link bandwidth or 5Gbps of total bandwidth. Incorporated with the high speed serial LVDS, it is easy to extend the transmission up to 10 meters through shielded twisted pair copper cables.

Inside the PCI-to-PCI bridge, a PCI-to-StarFabric/StarFabric-to-PCI converter is used to translate PCI transactions into StarFabric frames and StarFabric frames into PCI transactions. The PCI

interface is capable of 64-bit/66MHz. Thus the maximum data throughput can up to 528Mbytes/s. The PCI interface acts like the primary side of a PCI-to-PCI bridge if KPXI-CON-PCIREM/ KPXI-CON-PXIREM is plugged into the peripheral slot. The PCI interface in KPXI-CON-PXIREM acts like the secondary side of a PCI-to-PCI bridge if KPXI-CON-PXIREM is plugged into the system slot. The secondary side PCI interface of PCI-to-PCI bridge is responsible to the central resources and system clocks generation.

Figure C-5
Block diagram



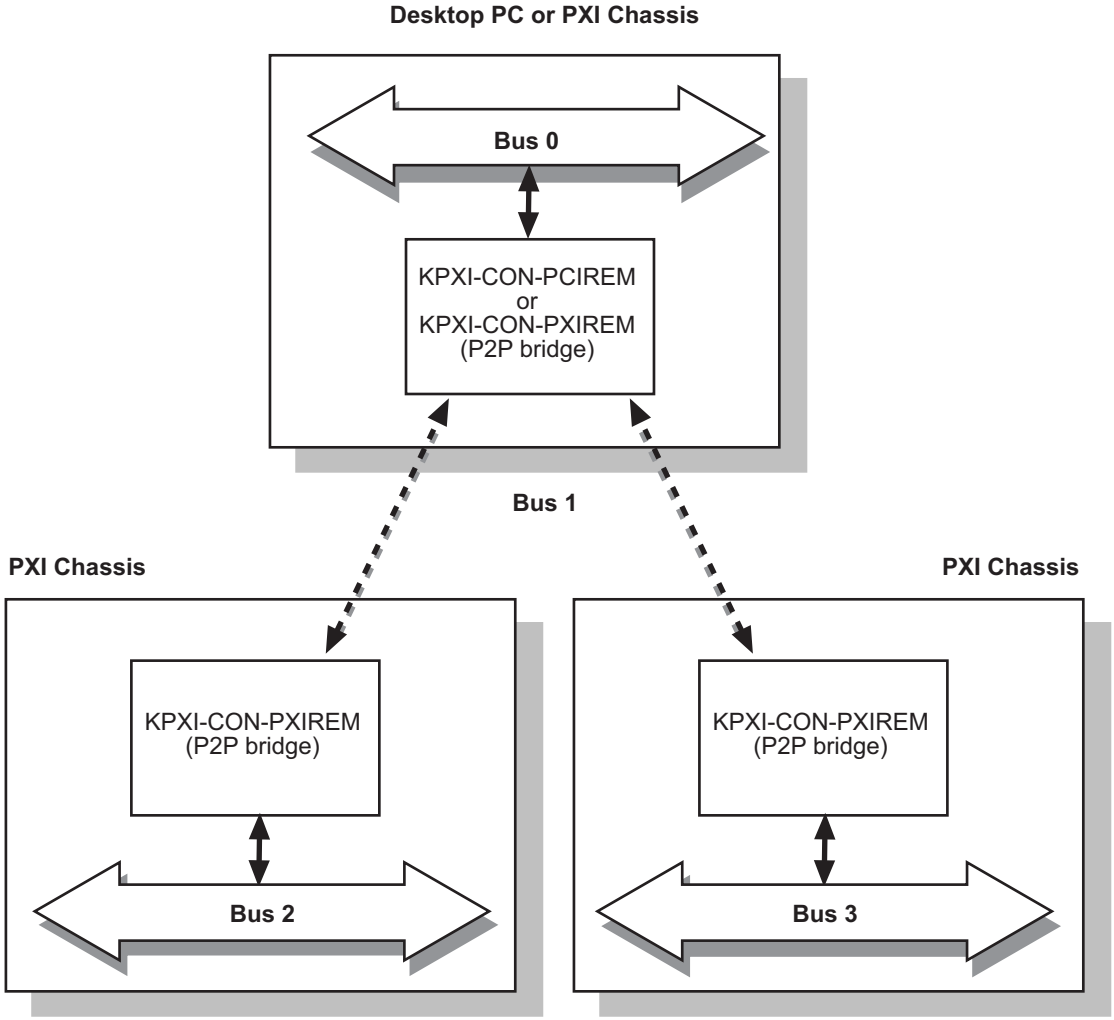
Bus architecture

Each extension module has two link ports. Users can use one of them to extend PCI bus to a PXI chassis or both of them to extend PCI bus to two PXI chassis.

The following figure represents an example of the PCI extension architecture. The desktop PC or PXI system extends the PCI bus to two PXI chassis via KPXI-CON-PCIREM/KPXI-CON-PXIREM modules. From the system view, the three modules act as three PCI-to-PCI bridges. Thus the serial interconnection between these bridges is also a bus, i.e. bus 1 in this example, although it's not PCI architecture.

NOTE *Basic configuration is shown in Figure C-2.*

Figure C-6
Bus architecture of the basic configuration



This page left blank intentionally.

KEITHLEY

Service Form

Model No. _____ **Serial No.** _____ **Date** _____

Name and Telephone No. _____

Company _____

List all control settings, describe problem and check boxes that apply to problem. _____

_____

_____

❒ Intermittent ❒ Analog output follows display ❒ Particular range or function bad; specify

_____

❒ IEEE failure ❒ Obvious problem on power-up ❒ Batteries and fuses are OK

❒ Front panel operational ❒ All ranges or functions are bad ❒ Checked all cables

Display or output (check one)

❒ Drifts ❒ Unable to zero ❒ Unstable

❒ Overload ❒ Will not read applied input

❒ Calibration only ❒ Certificate of calibration required ❒ Data required

(attach any additional sheets as necessary)

Show a block diagram of your measurement including all instruments connected (whether power is turned on or not). Also, describe signal source.

Where is the measurement being performed? (factory, controlled laboratory, out-of-doors, etc.) _____

_____

What power line voltage is used? _____ Ambient temperature? _____ °F

Relative humidity? _____ Other? _____

Any additional information. (If special modifications have been made by the user, please describe.)

_____

_____

Be sure to include your name and telephone number on this service form.

Specifications are subject to change without notice.
All Keithley trademarks and trade names are the property of Keithley Instruments, Inc.
All other trademarks and trade names are the property of their respective companies.

KEITHLEY

A GREATER MEASURE OF CONFIDENCE

Keithley Instruments, Inc.

Corporate Headquarters • 28775 Aurora Road • Cleveland, Ohio 44139 • 440-248-0400 • Fax: 440-248-6168 • 1-888-KEITHLEY • www.keithley.com

12/06

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP