M-946

MicroATX Industrial Motherboard

User's Manual

Manual Rev. 2.00

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Recycled Paper

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Company Information	
Company/Organization	
Contact Person	
E-mail Address	
Address	
Country	
TEL	FAX:
Web Site	
Product Information	
Product Model	
Environment	OS: M/B: CPU: Chipset: BIOS: Video Card: NIC: Other:
Detailed Description	
Suggestions for ADLINK	

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1 Introduction

The ADLINK M-946 is a microATX industrial motherboard supporting the next-generation Intel® Core™2 Duo processor in the LGA775 package to deliver a high-performance and space-saving platform for a wide array of embedded computing applications. With an ergonomic footprint, the M-946 supports high-bandwidth network connectivity and blazing data transfer rates with PCI Express®-based gigabit LAN interface.

These advanced features, coupled with a dual-channel DDR2 system memory architecture, diverse I/O, storage, video, and audio interfaces make the M-946 suitable for rigorous data computing for business, multimedia, automation control, and gaming applications requiring a compact, easy-to-deploy, and cost-effective mainboard.

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1.1 Block Diagram

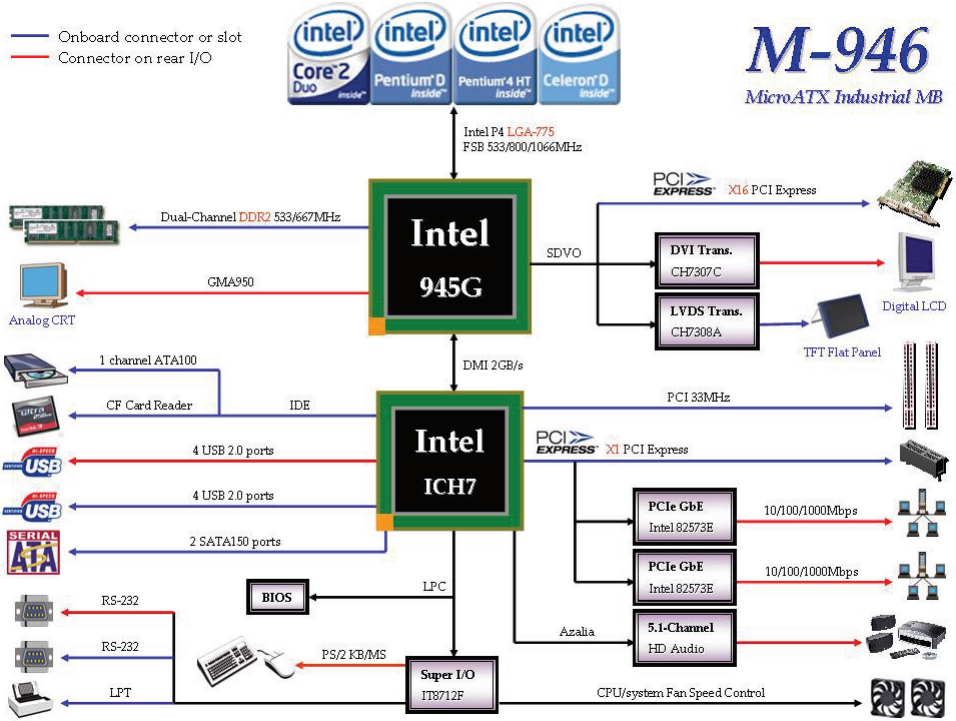


Figure 1-1: Block Diagram

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1.2 Features

Advanced Processor Support

The M-946 motherboard comes with a Socket T designed for the Intel processors in the LGA775 package. The motherboard features a powerful 1066/800/533 MHz Front Side Bus (FSB), supports the Intel® Hyper-Threading Technology, and is fully compatible with Intel® 05B/05A or 04B/04A processors.

Promoting high-performance computing and energy-efficiency, the M-946 supports the next-generation Intel® Core™2 Duo CPU built in the 65 nm process technology. The M-946 backs dual-core processing when deployed with a CPU containing two physical cores and dedicated L2 caches to meet the ever-increasing demands of industrial computing.

Intel® 945G Express chipset

The Intel® 945G Express chipset, featuring the Intel® 945G graphics memory controller hub (GMCH) and the Intel® ICH7 I/O controller hub, provides the vital interfaces for the motherboard. The Intel® 945G comes with the Intel® Graphics Media Accelerator 950—an integrated graphics engine for enhanced 3D/2D graphics rendering and video capabilities. The GMCH also provides the interface for the processor and system memory.

The Intel® ICH7 Southbridge is the seventh generation of Intel I/O controller hub that provides the essential interfaces for the PCI Express®, USB 2.0, and SATA II.

Dual-channel DDR2 memory

To meet the requirements of memory-intensive applications, the M-946 has a dual-channel memory architecture supporting DDR2 667/533/400 MHz DIMMs. The high-bandwidth memory specification, peaking at bandwidths of up to 10.7 GB/s, meets the requirements of the latest 3D graphics, multimedia, and network application, and boosts system performance by eliminating bottlenecks.

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Intel® Graphics Media Accelerator 950

The Intel® Graphics Media Accelerator (GMA) 950 revolutionizes integrated graphics with new capabilities that provide significant increase in graphics performance. With support for DirectX® 9 hardware acceleration, 400 MHz core clock, and up to 224 MB of video memory, the Intel GMA 950 provides a cost-effective and high-performance graphics solution. The Intel GMA comes with the dual-independent display technology, enabling different contents to be displayed on two separate display terminals or a single content stretched across two display devices for expanded workspace.

Display

M-946 features rich display interfaces including VGA, DVI, LVDS and PCI Express x16 slot. The VGA port supports analog CRT monitor up to QXGA (2048 x 1536) with integrated 400 MHz RAMDAC. The SDVO port connects to one DVI transmitter and one LVDS transmitter that supports LCD panel up to UXGA (1600 x 1200) at 165 MHz pixel rate, and also support one channel LFP panel with resolutions up to 1600 x 900 at LVDS 18-bit or 24-bit. The PCI Express x16 slot supports external PCI Express x16 graphics card.

CAUTION: The DVI and LVDS can't simultaneously operate due to share in the same SDVO port.

Gigabit Ethernet

The motherboard is equipped with two Intel® 82573E PCI Express®-bus based gigabit Ethernet controllers that offers a complete network solution. Utilizing the wide PCI Express® bandwidth, the gigabit LAN controller allows up to 1 Gbps of data transfer rate for superior network communications.

PCI Express®

The M-946 fully supports the PCI Express® technology with one PCI Express® x1 slot and one PCI Express x16 slot. PCI Express® is latest I/O standard that accelerates the PCI bus speed and fea-

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tures smaller connectors for additional board surface space. PCI Express® allows faster data transfers through point-to-point serial interconnections between devices and by carrying data in packets. The PCI Express x1 slot is software-compatible with existing PCI specifications, and the PCI Express x16 slot is reserved for an external PCI Express x16 graphics card.

Serial ATA II technology

Storage is efficient and secured with the Serial ATA II interface. Taking cue from the Intel® ICH7, the M-946 supports up to two Serial ATA II devices capable of reading/writing data at up to 3 Gbps. The SATA specification improves chassis airflow via thinner and more flexible cables with lower pin count, reduces voltage requirement, and delivers up to 300 MB/s data transfer rate.

Universal Serial Bus (USB) 2.0

The M-946 incorporates the Universal Serial Bus (USB) 2.0 specification that increases peripheral connection speed from 12 Mbps (USB 1.1) to a fast 480 Mbps. USB 2.0 is backward compatible with USB 1.1.

Hardware monitoring

A built-in, proactive hardware monitoring system in the ASIC monitors the CPU temperature, system fan rotations, and voltage levels to prevent overheating and/or component damage, effect a timely failure detection, and ensure stable supply of current for critical motherboard components.

Watchdog Timer

The watchdog timer (WDT) monitors system operations based on user-defined configurations. The WDT can be programmed for different time-out periods, such as from 1 to 255 seconds or from 1 to 255 minutes. The WDT generates a reset signal, then a reset request, after failure to strobe it within the programmed time period. A register bit may be enabled to indicate if the watchdog timer caused the reset event.

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The WDT register is cleared during the power-on sequence to enable the operating system to take appropriate action when the watchdog generates a reboot.

Software

The M-946 is compatible with all major operating systems. ADLINK provides additional drivers for ADLINK peripherals. Hardware and software drivers may be found in the ADLINK All-in-One CD.

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1.3 Mechanical Drawing

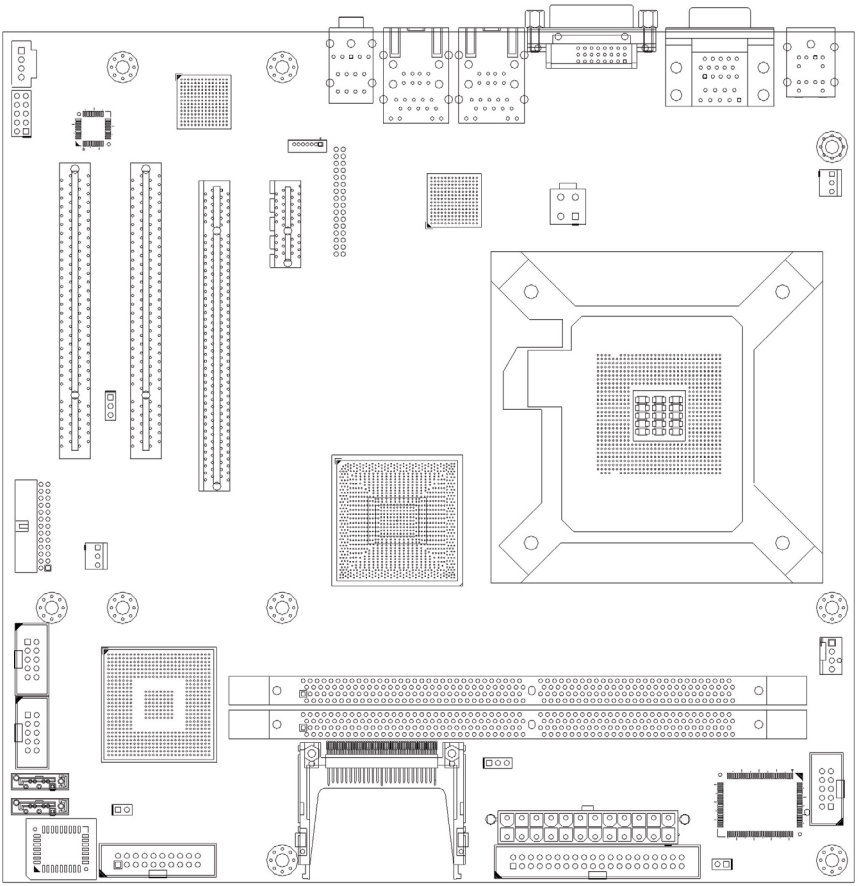


Figure 1-2: Mechanical Drawing

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1.4 Components and Connectors

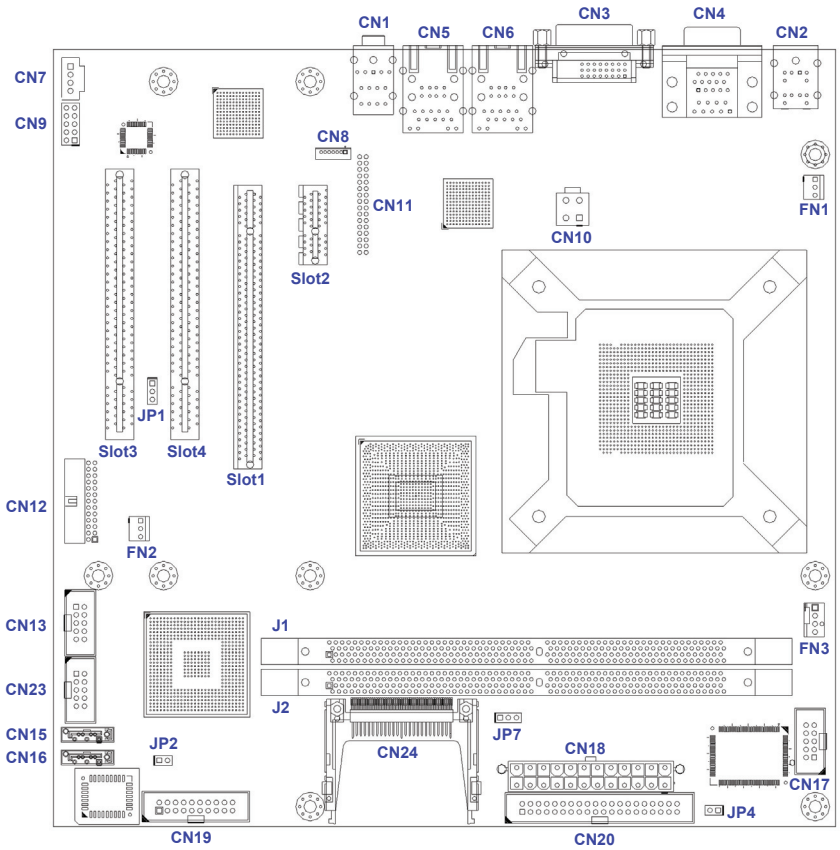


Figure 1-3: Layout

NOTE	Refer to the table on the next page for a description of the connectors and jumper.

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Item	Connector	Description
1	FN1	3-pin System Fan connector
2	FN2	3-pin System Fan connector
3	FN3	4-pin CPU Fan connector
4	J1	240-pin DDR2 DIMM 1
5	J2	240-pin DDR2 DIMM 2
6	Slot1	PCI Express x16 slot
7	Slot2	PCI Express x1 slot
8	Slot3	PCI slot 1
9	Slot4	PCI slot 2
10	CN1	Audio port
11	CN2	PS/2 keyboard/mouse port
12	CN3	DVI port
13	CN4	Serial (COM 1) + VGA port
14	CN5	LAN port (RJ45) + USB 2.0 ports 1 & 2
15	CN6	LAN port (RJ45) + USB 2.0 ports 3 & 4
16	CN7	CD-ROM Audio-in connector
17	CN8	Back-light Inverter Control connector
18	CN9	Front panel audio connector
19	CN10	4-pin ATX 12V power connector
20	CN11	LVDS connector
21	CN12	Parallel Port connector
22	CN13	USB Port connector (for USB 2.0 ports 5 & 6)
23	CN23	USB Port connector (for USB 2.0 ports 7 & 8)
24	CN15	Serial ATA connector (SATA 1)
25	CN16	Serial ATA connector (SATA 2)
26	CN17	Serial Port connector (COM 2)
27	CN18	24-pin ATX power connector
28	CN19	20-pin system panel connector
29	CN20	40-pin IDE connector
30	CN24	CompactFlash card reader
31	JP1	CMOS Clear jumper
32	JP2	Chassis intrusion connector
33	JP4	Temperature sensor connector
34	JP7	CF Master/Slave Option jumper

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1.5 Specifications

Form Factor	MicroATX form factor: 244 mm x 244 mm (9.6" x 9.6")
CPU	• LGA775 socket supports Intel® Core™2 Duo/ Intel® Pentium® D/Intel® Pentium® 4/Intel® Celeron® D processors • Supports Intel® Hyper-Threading Technology • Front side bus: 1066/800/533 MHz
Host Memory	• Dual-channel memory architecture • Two 240-pin DIMM sockets support up to 2 GB of system memory using unbufferred non-ECC 667/533/400 MHz DDR2 DIMMs
Chipset	Northbridge: Intel® 945G Southbridge: Intel® ICH7
Gigabit Ethernet	• Two integrated Intel® 82573E network controllers support 10/100/1000Base-T dual Gigabit Ethernet on the PCI Express® x1 bus • Speed and link LEDs on the RJ-45 ports

Graphics Display	• Intel® Graphics Media Accelerator (GMA) 950 with enhanced 2D/3D graphics acceleration
	• Up to 224 MB shared video memory
	• Resolution up to 2048 x 1536 @ 85 Hz refresh
	  • DVI: Resolution up to UXGA (1600 x 1200) @ 165MHz pixel rate
	  • LVDS: Resolution up to 1600 x 900 @ LVDS 18-bit or 24-bit output

Expansion slots	1x PCI Express® x16 (M-946) 1 x PCI Express® x1 1 x PCI
Storage	2 x Serial ATA 3 Gb/s connectors 1 x UltraATA 100/66/33 IDE connector 1 x CompactFlash card reader
BIOS	• Phoenix Award system BIOS supporting PnP, APM, DMI, ACPI, and multi-device booting • Write-protection and field upgradeable
USB Interface	• Four USB 2.0 ports at the rear I/O panel • Two USB 2.0 connectors at midboard support up to four additional USB 2.0 ports • Up to 480 Mbps data transfer rate • Backward-compatible with USB 1.1 specification

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Rear panel I/O ports	1 x PS/2 keyboard port 1 x PS/2 mouse port 1 x VGA port 1 x Serial port (COM1) 1 x DVI port (M-946L) 2 x LAN (RJ-45) ports 4 x USB 2.0/1.1 ports 3 x audio jacks (Line In/Line Out /MIC In)
Internal connectors	1 x CompactFlash card reader (M-946L) 1 x LVDS connector (M-946L) 1 x Back-light Inverter control connector (M-946L) 1 x IDE connector 2 x Serial ATA connectors 2 x USB 2.0 connectors 1 x COM port connector 1 x Parallel port connector 3 x fan connectors (CPU, chassis, and system) Front panel system connector Front panel audio connector 1 x Chassis Intrusion connector 1 x Temperature Sensor connector Audio-in connector for optical drive 1 x 24-pin ATX power connector 1 x 4-pin ATX 12 V power connector
Environment	• Operating temperature: 0°C – 60°C (with proper airflow and active heatsink) • Storage temperature: -20°C – 80°C • Humidity: 5% – 95% non-condensed • Shock: 30G peak-to-peak, 10 ms, non-operation • Vibration: Non-operation: 6G, 10 Hz –1000 Hz, random Operation: 0.5 G, 510 Hz –1000 Hz, random
Safety Certificates and Tests	CE certified FCC Part 15 class UL-1950, CSA-950, and VDE EN 60 950/IE950

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1.6 Package contents

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from the dealer before returning any product to ADLINK.

Check if the following items are included in the package.

- M-946 industrial motherboard
- 1 x Parallel Port cable with bracket
- 1 x UltraATA 100 IDE cable
- 2 x Serial ATA data cables
- 1 x dual-plug Serial ATA power cable
- 1 x I/O shield
- ADLINK All-in-One driver CD
- User's manual

NOTE The M-946 OEM version package may contain a non-standard configuration, unique functionality, or different packaging according to configuration requests.

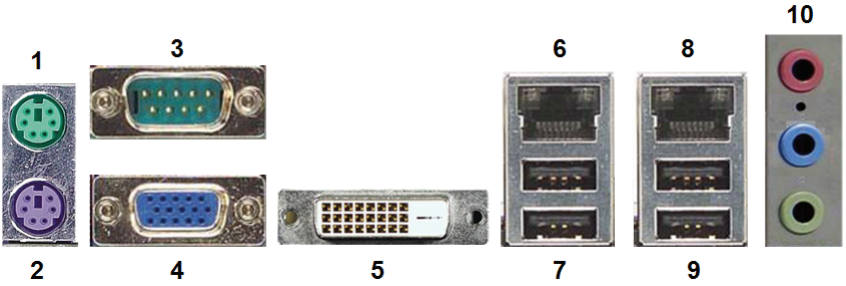
CAUTION The M-946 single board computer must be protected from static discharge and physical shock. Never remove any of the socketed parts except at a static-free workstation. Use the anti-static bag shipped with the product to handle the board. Wear a grounded wrist strap when installing and/or servicing.



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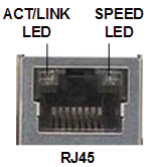
2 Connectors and Jumpers

2.1 Rear panel connectors



1. PS/2 mouse port (green): this port is for a PS/2 mouse.
2. PS/2 keyboard port (purple): this port is for a PS/2 keyboard.
3. Serial port: this 9-pin COM1 port is for serial devices.
4. VGA port: this 15-pin VGA port connects to a CRT or LCD monitor.
5. DVI port: this 24-pin DVI port connects to a LCD monitor.
6. LAN port (RJ-45): this port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.

ACD/LINK LED		SPEED LED	
Status	Description	Status	Description
OFF	No Link	OFF	10Mb connection
GREEN	Linked	ORANGE	100Mb connection
BLINKING	Data Activity	GREEN	1Gb connection

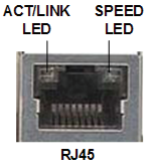


7. USB2.0 ports 1 & 2: these two USB ports are available for connecting USB devices.

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8. LAN port (RJ-45): this port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.

ACD/LINK LED		SPEED LED	
Status	Description	Status	Description
OFF	No Link	OFF	10Mb connection
GREEN	Linked	ORANGE	100Mb connection
BLINKING	Data Activity	GREEN	1Gb connection

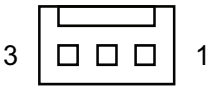


9. USB2.0 ports 3 & 4: these two USB ports are available for connecting USB devices.
10. Audio port: this 3-jack audio port includes Line-In, Line-Out and Mic-In functions. The Line-In jack (blue) connects a tape player or other audio sources; the Line-Out jack (green) connects a speaker or headphone; the Mic-In jack (pink) connects a microphone.

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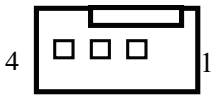
2.2 Internal Connectors

System Fan Connector (FN1, FN2)



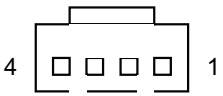
Pin #	Signal
1	GND
2	Fan power (+12V)
3	Detect rotation

CPU Fan Connector (FN3)



Pin #	Signal
1	GND
2	Fan power (+12V)
3	Fan Tachometer
4	Fan Control (optional)

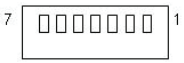
CD-ROM Audio-In Connector (CN7)



Pin #	Signal
1	Left channel
2	GND
3	GND
4	Right channel

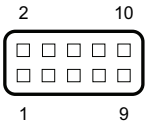
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Back-light Inverter Control Connector (CN8)



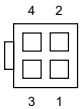
Pin #	Signal	Description
1	VCC_10.8~13.2V	Inverter Power
2	VCC_10.8~13.2V	Inverter Power
3	VEE	Return GND
4	VEE	Return GND
5	INV_EN	0~0.4V: OFF, 2.5~Vin: ON Inverter Enable
6	INV_V/R_Bright	10~3V / 0~50k. Brightness Output
7	INV_Rbrightness	0~50k Brightness Output

Front Panel Audio Connector (CN9)



Pin #	Signal	Pin #	Signal
1	MIC-In left channel	2	Analog GND
3	MIC-In right channel	4	RSV
5	Line-In left channel	6	Analog GND
7	RSV	8	Analog GND
9	Line-In right channel	10	Analog GND

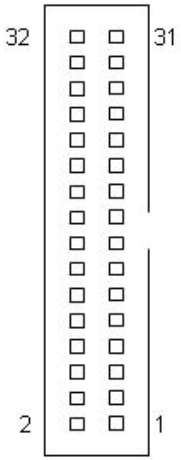
ATX 12V Power Connector (CN10)



Pin #	Signal
1	GND
2	GND
3	+12V DC
4	+12V DC

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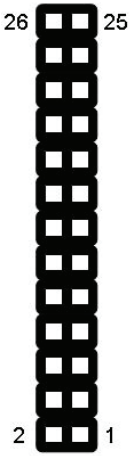
LVDS connector (CN11)



Pin #	Signal	Description
1	SHGND	Shield GND
2	CLK1M	Channel A clock port output -
3	CLK1P	Channel A clock port output +
4	SHGND	Shield GND
5	A3M	Channel A data port output -
6	A3P	Channel A data port output +
7	SHGND	Shield GND
8	A2M	Channel A data port output -
9	A2P	Channel A data port output +
10	SHGND	Shield GND
11	A1M	Channel A data port output -
12	A1P	Channel A data port output +
13	SHGND	Shield GND
14	A0M	Channel A data port output -
15	A0P	Channel A data port output +
16	Reserved	
17	Reserved	
18	DDC_SCL	Disp Data Channel Clock
19	DDC_SDA	Disp Data Channel Data
20	DDC_PWR	Disp Data Channel power
21	VSS	Return GND
22	VSS	Return GND
23	VDD 3.3V	FPD VDD power
24	VDD 3.3V	FPD VDD power
25	VDD 3.3V	FPD VDD power
26	INV_EN	Inverter Enable output
27	INV_V/R_Bright	10~3V / 0~50k. Brightness Output
28	INV_Rbrightness	0~50k Brightness Output
29	VEE	Return GND
30	VEE	Return GND
31	VCC_10.8~13.2V	Inverter Power
32	VCC_10.8~13.2V	Inverter Power

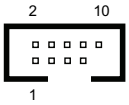
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Printer connector (CN12)



Pin #	Signal	Pin #	Signal
1	STB-L	2	PP_AFD-L
3	PP0	4	PP_ERR-L
5	PP1	6	PP_INIT-L
7	PP2	8	PP_SLIN-L
9	PP3	10	GND
11	PP4	12	GND
13	PP5	14	GND
15	PP6	16	GND
17	PP7	18	GND
19	PP_ACK-L	20	GND
21	PP_BUSY	22	GND
23	PP_PE	24	GND
25	PP_SLCT	26	GND

USB Port Connectors (CN13, CN23)



Pin #	Signal	Pin #	Signal
1	+5V	2	+5V
3	Data 1 -	4	Data 2 -
5	Data 1 +	6	Data 2 +
7	GND	8	GND
9	Key	10	NC

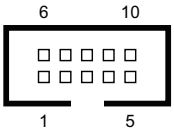
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Serial ATA Connectors (CN15, CN16)



Pin #	Signal
1	GND
2	TXP (A +)
3	TXN (A -)
4	GND
5	RXN (B -)
6	RXP (B +)
7	GND

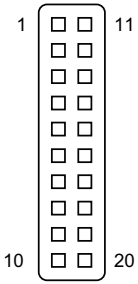
COM2 connector (CN17)



Pin #	Signal	Functions
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
10	NC	No Connect

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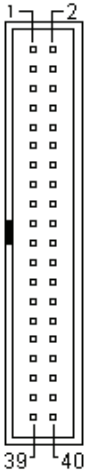
System panel connector (CN19))



Pin #	Signal	Function	Pin Group
1	WDSPK	Speaker signal	Chassis Speaker
2	NC		
3	NC		
4	+5V	Power	
5	NC		
6	GND	Ground	Key Lock
7	KEYLOCK	Keyboard lock	
8	PLED	Power LED signal	Power LED
9	NC		
10	+5V	Power LED pull-up	
11	GND	Ground	RESET button
12	RESETBT	RESET signal	
13	NC		
14	GND	Ground	Power on button
15	POWERBT	Power-on signal	
16	NC		
17	NC		
18	HDDLED	Hard Disk LED signal	Hard Disk LED
19	+5V	Hard Disk LED pull-up	
20	NC		

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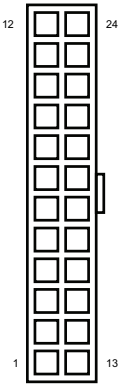
IDE connector (CN20)



Pin #	Signal	Pin #	Signal
1	Reset IDE	2	Ground
3	Host data 7	4	Host data 8
5	Host data 6	6	Host data 9
7	Host data 5	8	Host data 10
9	Host data 4	10	Host data 11
11	Host data 3	12	Host data 12
13	Host data 2	14	Host data 13
15	Host data 1	16	Host data 14
17	Host data 0	18	Host data 15
19	Ground	20	NC
21	DRQ0 / DRQ1	22	Ground
23	Host IOW	24	Ground
25	Host IOR	26	Ground
27	IOCHRDY	28	Host ALE
29	DACK0 / DACK1	30	Ground
31	IRQ14 / IRQ 15	32	No connect
33	Address 1	34	No connect
35	Address 0	36	Address 2
37	Chip select 0	38	Chip select 1
39	Activity	40	Ground

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ATX power connector (CN24)



Pin #	Signal	Pin #	Signal
1	3.3V	13	3.3V
2	3.3V	14	- 12V
3	GND	15	GND
4	5V	16	PS On
5	GND	17	GND
6	5V	18	GND
7	GND	19	GND
8	Power Good	20	- 5V
9	5VSB	21	5V
10	12V	22	5V
11	12V	23	5V
12	3.3V	24	GND

Chassis intrusion connector (JP2)

Signal is connected to a limit switch sensor of the chassis to detect if the case is opened or closed.



Pin #	Signal	Functions
1	CASEOPEN#	Case Open Signal
2	GND	2

Temperature sensor connector (JP4)



Pin #	Signal	Functions
1	TGND	Thermal ground
2	VTIN	Thermal voltage input

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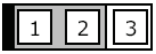
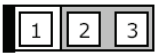
2.3 Jumper

Clear RTC RAM (JP1)

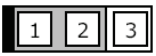
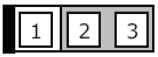
This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

To erase the RTC RAM:

1. Turn off the computer and unplug the power cord.
2. Remove the onboard battery.
3. Move the jumper cap from pins 1-2 (default) to pins 2-3. Keep the cap on pins 2-3 for about 5~10 seconds, and then move the cap back to pins 1-2.
4. Re-install the battery.
5. Plug the power cord and turn on the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

Status	Connection	JP1
Normal	1-2	
Clear CMOS	2-3	

CF Master/Slave option (JP7)

Status	Connection	JP7
Master	1-2	
Slave	2-3	

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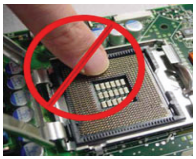
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3 Getting Started

This chapter provides information on how to install components to the M-946 motherboard. Sections discussing the BIOS setup and operating system installation are also found in this chapter.

3.1 Installing the CPU

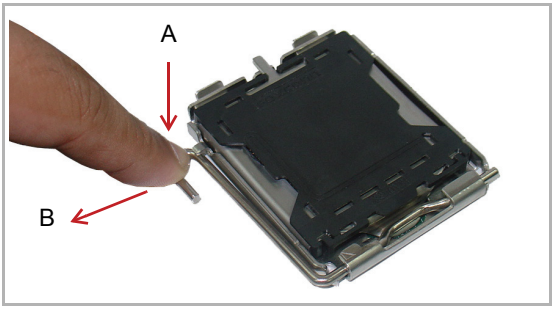
The M-946 supports the Intel® Core™2 Duo/Intel® Pentium® D/ Intel® Pentium® 4/Intel® Celeron® D processor via the surface mount LGA775 socket (Socket T).



WARNING Do not touch socket contacts. Damaging the contacts voids the product warranty. Follow the installation instructions carefully to avoid damaging to motherboard components.

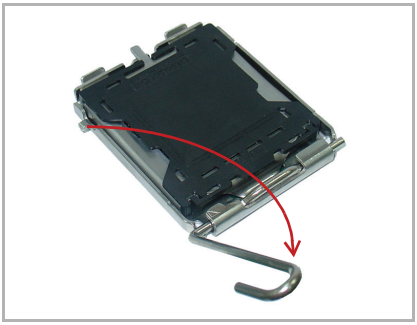
To install the CPU:

1. Press the load lever (A), then disengage it from the retention tab (B).

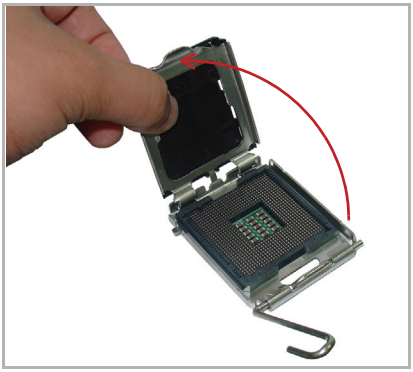


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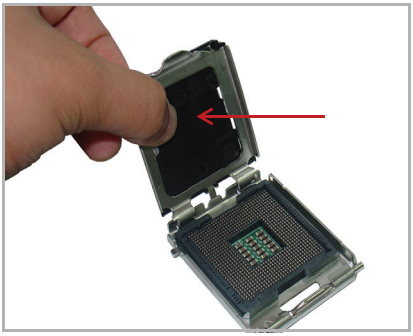
2. Lift and rotate the load lever to a 135° angle.



3. Lift the load plate to a 100° angle using your thumb and forefinger.

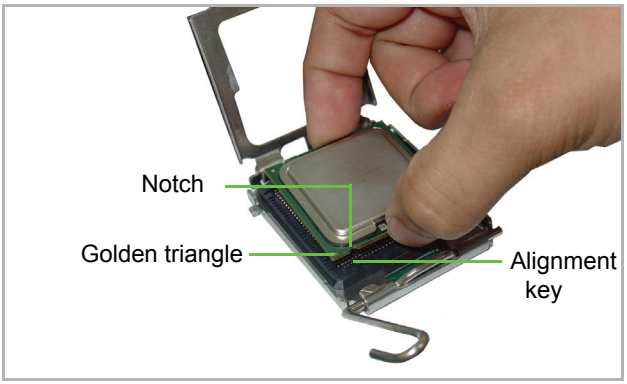


4. Use your thumb to push and remove the protective socket cover (plastic) from the load plate.



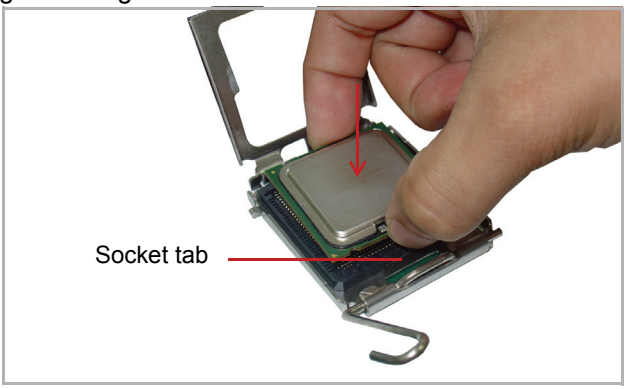
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5. Position the CPU over the socket, then match the notches on the CPU side with the alignment keys on the socket. The golden triangle on the CPU must be positioned on the bottom-left corner of the socket.



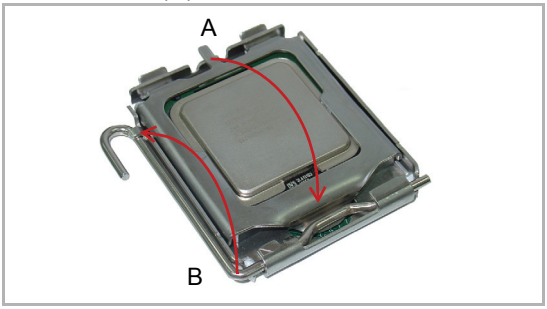
WARNING The CPU fits the socket in only one orientation. DO NOT force the CPU into the socket to avoid damaging them.

6. Carefully place the CPU on the socket in a vertical motion. The socket has tabs that accommodate your fingers during installation.



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7. Close the load plate (A), then fasten the load lever on the retention tab (B).



NOTE In order to boot up the system with a newly-installed CPU, standby power must not be applied to the board before installation.

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3.2 Installing the CPU Fan

When you buy a boxed Intel CPU, a certified CPU fan and heatsink assembly with installation instruction comes standard with the package. If the CPU fan installation procedures presented here are inconsistent with the installation procedures you obtained from the Intel CPU package, follow the latter.

If you intend to purchase a separate CPU fan and heatsink assembly, make sure that the selected model is recommended by Intel. For more information, go to tap://www.intel.com.

CAUTION



The CPU requires a chassis with an airflow inlet and maximum internal ambient temperature of 38°C. A especially-designed CPU fan and heatsink must be installed before using the motherboard. Failure to install a CPU fan and heatsink may damage the motherboard and/or the CPU.

To install the CPU fan:

1. Apply thermal grease evenly on top of the installed CPU.
2. Lower the CPU fan to the CPU, then secure it using the provided attachments or screws.
3. Connect the CPU fan cable to the CPU fan connector on the motherboard labeled FN3.

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3.3 Installing the Memory Module

The M-946 supports up to 2 GB of DDR2 667/533/400 MHz memory modules via four DDR2 DIMM sockets. A DDR2 module has a 240-pin footprint compared to the legacy 184-pin DDR DIMM. DDR2 modules are notched to facilitate correct installation on the DIMM sockets.

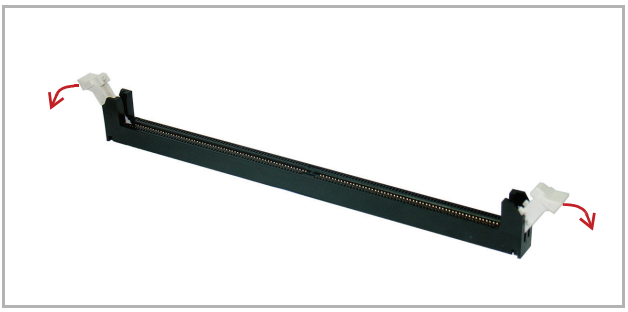
Memory Configuration Options

The M-946 allows you to install 256 MB, 512 MB and 1GB unbuffered non-ECC DDR2 DIMMs into the DIMM sockets following these configuration options:

- Channel A: DIMM1 (J1)
  Channel B: DIMM2 (J2)
- For dual-channel configuration, the total size of memory module(s) installed per channel must be the same (J1 = J2).
- It is recommended that you install DIMMs with the same CAS latency. For maximum compatibility, install memory modules with the same brand, model, and/or rating.

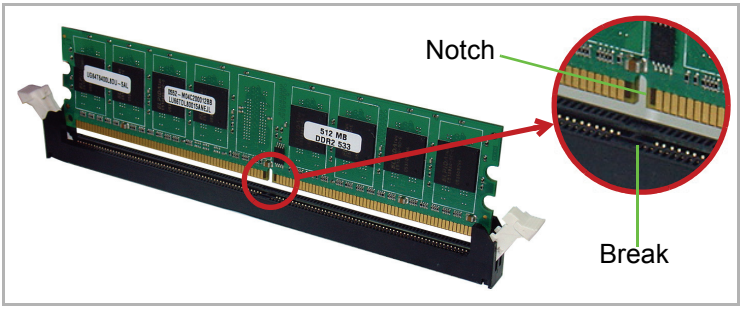
To install a memory module:

1. Locate the DIMM slots on the motherboard (J1, J2).
2. Press the socket's retaining clips outward to unlock.

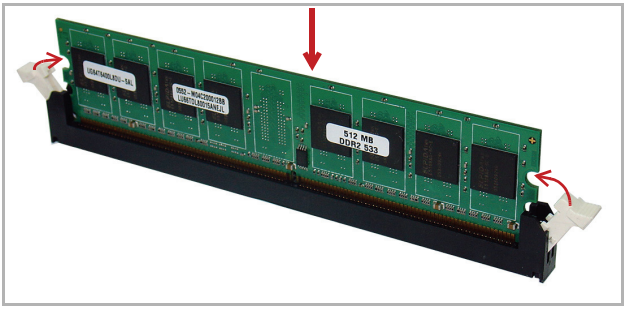


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3. Align the memory module on the socket making sure that the notch matches the break on the socket.



4. Insert the module firmly into the slot until the retaining clips snap back inwards and the module is securely seated.



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3.4 BIOS Configuration Overview

The M-946 BIOS Setup features several, separately configurable parameters. These parameters are selected and configured via the built-in setup utility. System configuration settings are saved in a portion of the battery-powered RAM in the real-time clock device. The BIOS uses these settings to initialize the system during startup or reset. The configuration settings are protected by a checksum word for system integrity.

To access the BIOS Setup, press **Del** during the system boot sequence. The BIOS Setup configuration screen appears.

Setup parameters are divided into categories. The available categories are listed in the main menu. The parameters within the highlighted (current) category are listed in the bottom portion of the BIOS Setup screen. Context sensitive help is displayed in the right portion of the screen for each parameter.

Use the keyboard arrow keys to navigate through the items and/or select a category from the menu. To display a submenu, highlight the category, then press **Enter**.

For detailed information on the BIOS Setup and other utilities, refer to the BIOS Setup manual.

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3.5 Installing the Operating System

The M-946 supports most mainstream operating systems including Windows® XP/2000/Server 2003 and Linux. For more information, refer to the documentation provided by the operating system vendor.

Most operating systems requires installation from a floppy or optical disk drive. These devices must be configured, installed, and tested with the supplied drivers before attempting to install a new operating system.

Consult the release notes and installation documentation provided by the operating system vendor for documentation discrepancies and/or compatibility issues, problems, and solutions.

When you are ready to install the operating system, use the BIOS Setup to assign the first boot device depending on the media used by the OS installer. For example, if the OS installation came on a bootable floppy disk, set the floppy drive as the first boot device, save the configuration setting, then reboot the system. Make sure you insert the installation floppy disk in the floppy drive. When the OS installer is in a non-bootable optical disk, you may have to boot the system using a bootable floppy disk with the proper CD/DVD-ROM drivers to access the optical drive.

Follow the installation screen instructions to proceed. Make sure you select the correct device types and settings, when prompted. Refer to the appropriate hardware manuals for specific device types and compatibility.

After OS installation is completed, reboot the system, then set the boot device sequence from the Boot menu in the BIOS Setup.

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3.6 Installation of Expansion Cards

You can install your expansion card by following the steps outlined below:

1. Read the related expansion card's instruction document before install the expansion card into the system.
2. Remove your chassis cover, screws and slot bracket.
3. Press the expansion card firmly into expansion slot in M-946.
4. Be sure the metal contacts on the card are indeed seated in the slot.
5. Replace the screw to secure the slot bracket of the expansion card.
6. Replace your chassis cover.
7. Power on the computer, if necessary, setup BIOS utility of expansion card from BIOS.
8. Install related driver from the operating system.

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4 Installing Device Drivers

This chapter provides information on basic driver installation for systems running on Windows® 2000/XP. When installing drivers for non-Windows® operating systems, refer to the instructions inside the ADLINK All-in-One CD. The drivers are located in the following directories of the ADLINK All-in-One CD:

Chipset driver	\Industrial Motherboard\M-945_946\Chipset\
Display driver	\Industrial Motherboard\M-945_946\VGA\
LAN driver	\Industrial Motherboard\M-945_946\Ethernet\
Audio driver	\Industrial Motherboard\M-945_946\Audio

4.1 Intel® 945G Chipset Drivers

This section describes the installation of the Intel® 945G chipset driver on systems operating on Windows® 2000/XP.

NOTE Take note of the location of the Windows® 2000/XP directory before installing the driver.

1. Check if your system meets the minimum requirements. Windows® 2000/XP OS must be fully installed and running normally on the system before installing the chipset drivers.
2. Close all applications.
3. Check that the files are stored in an integrated application setup program. This program is designed for a Windows 2000/XP program that allows the INF files to be installed.
4. Locate the directory **X:\Industrial Motherboard\M-945_946\Chipset** from the ADLINK All-in-One CD, select the operating system, then start the installation by clicking on the Setup.exe file.
5. When the initial installation window appears, click **Next** to display the license agreement. When prompted, click **Yes** to continue.

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NOTE Clicking **No** on the license agreement terminates the installation.

6. Click **Next** on the Readme Information screen to begin installing the INF files.
7. When installation is done, click **Finish**. Restart the system when prompted.
8. After restart, follow screen instructions to complete installation. Windows displays a found new hardware window and automatically installs the required drivers. If the New Hardware Found dialog box appears and prompts you to locate the location of the drivers, point it to the relevant Windows directory.
9. Restart the system when prompted.

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4.2 Display Drivers

This section tells you how to install the Intel® Graphics Media Accelerator (GMA) 950 drivers on Windows® 2000/XP systems.

To install the display drivers:

1. Place the ADLINK All-in-One CD to the optical drive.
2. Locate the display drivers from the directory **X:\Industrial Motherboard\M-945_946\VGA**, then double-click on the **win2k_xp141950.exe** file to start installation.
3. Follow screen instructions to complete installation, then restart the system, when prompted.
4. After installation, you may change the display properties from the Windows® Control Panel.

4.3 LAN Drivers

Follow these instructions to install the LAN driver on Windows® 2000/XP systems.

1. Place the ADLINK All-in-One CD to the optical drive.
2. Locate the LAN drivers from the directory **X:\Industrial Motherboard\M-945_946\Ethernet**, then double-click on the **PRO2KXP.exe** file to start installation.
3. Follow screen instructions to complete installation, then restart the system, when prompted.
4. After installation, you may change the network properties from the Windows® Control Panel.

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4.4 Audio Drivers

Follow these instructions to install the audio driver on Windows® 2000/XP systems.

1. Place the ADLINK All-in-One CD to the optical drive.
2. Locate the audio drivers from the directory **X:\Industrial Motherboard\M-945_946\Audio**, then double-click on the **SETUP.exe** file to start installation.
3. Follow screen instructions to complete installation, then restart the system, when prompted.

After installation, you may change the audio properties from the Windows® Control Panel.

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Important Safety Instructions

Read and follow all instructions marked on the product and in the documentation before operating the system. Retain all safety and operating instructions for future use.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- The equipment should be operated in an ambient temperature between 0°C to 50°C.
- The equipment should be operated only from the type of power source indicated on the rating label. Make sure the voltage of the power source is correct when connecting the equipment to the power outlet.
- If the user's equipment has a voltage selector switch, make sure that the switch is set to the proper position for the area. The voltage selector switch is set at the factory to the correct voltage.
- For pluggable equipment, ensure they are installed near a socket-outlet that is easily accessible.
- Secure the power cord to prevent unnecessary accidents. Do not place anything over the power cord.
- If the equipment will not be in use for long periods of time, disconnect the equipment from the power outlet to avoid being damaged by transient overvoltage.
- All cautions and warnings on the equipment must be noted.
- Keep this equipment away from humidity.
- Do not use this equipment near water or a heat source.
- Place this equipment on a stable surface when installingto prevent injury.
- Never pour any liquid into the product to prevent fire or electrical shock.

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- Openings in the chassis are provided for ventilation. Do not block or cover these openings. Make sure there is adequate space around the system for ventilation when setting up the work area. Never insert objects of any kind into the ventilation holes.
- To avoid electrical shock, always unplug all power and modem cables from wall outlets before removing the system covers.
- A Lithium-type battery is provided for the real time clock.

  "CAUTION - Risk of explosion if battery is replaced by an incorrect type. Dispose used batteries as instructed."
- The equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged.
  - Liquid has penetrated the equipment.
  - It has been exposed to moisture.
  - It is not functioning or does not function according to the user's manual.
  - It has been dropped and damaged.
  - It has an obvious sign of breakage.
- Never attempt to fix the equipment. For safety reasons, the equipment should only be serviced by qualified personnel.

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Warranty Policy

Thank you for choosing ADLINK. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ADLINK's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: http://rma.adlinktech.com/policy/.
2. All ADLINK products come with a limited two-year guarantee, one year for products bought in China:
   - The warranty period starts on the day the product is shipped from ADLINK's factory.
   - Peripherals and third-party products not manufactured by ADLINK will be covered by the original manufacturers' warranty.
   - For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ADLINK is not responsible for loss of data.
   - Please ensure the use of properly licensed software with our systems. ADLINK does not condone the use of pirated software and will not service systems using such software. ADLINK will not be held legally responsible for products shipped with unlicensed software installed by the user.
   - For general repairs, please do not include peripheral accessories. If peripherals need to be included, be certain to specify which items you sent on the RMA Request & Confirmation Form. ADLINK is not responsible for

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items not listed on the RMA Request & Confirmation Form.

3. Our repair service is not covered by ADLINK's guarantee in the following situations:
   - Damage caused by not following instructions in the User's Manual.
   - Damage caused by carelessness on the user's part during product transportation.
   - Damage caused by fire, earthquakes, floods, lightening, pollution, other acts of God, and/or incorrect usage of voltage transformers.
   - Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).
   - Damage caused by leakage of battery fluid during or after change of batteries by customer/user.
   - Damage from improper repair by unauthorized ADLINK technicians.
   - Products with altered and/or damaged serial numbers are not entitled to our service.
   - This warranty is not transferable or extendible.
   - Other categories not protected under our warranty.
4. Customers are responsible for shipping costs to transport damaged products to ADLINK.

If you have any further questions, please email our FAE staff: service@adlinktech.com.

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