Hardware User Guide

Wolverine

Industrial Computer

Part No: MAN00055 Rev. H

Document History

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Revision	Date	Description	Author
A	2005.01.05	First revision	D.E.
B	2005.01.18	Add UL Warnings, Add Ethernet to Control Drawing DRW00245	D.E.
C	2005.09.26	Incorporate Wolverine AMS2000 model	J.R.
D	2006.11.14	Incorporate Wolverine II AC model	J.B.
E	2007.05.15	Incorporate Wolverine II DC model	J.B.
F	2009.05.01	Updates to Installation Guidelines and Appendix B – Agency Approvals	D.F.
G	2009.12.15	Updates to align manual with ATEX documentation requirements	J.B.
H	2010.08.19	Remove Wolverine AMS2000 model Replace Control Drawing DRW00245 with Control Drawing DRW00288	J.B.

Copyright Notice

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Disclaimer

Warranty

Warnings, Cautions, and Notes as Used in this Publication

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution notices are used where equipment might be damaged if care is not taken.

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

Important Safety Precautions

Warning

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution

Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

Safety and Warranty

- Please read these safety instructions carefully.
- Please disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning, use a damp cloth.
- For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.
- Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Position the power cord so that people cannot step on it. Do not place anything over the power cord.
- All cautions and warnings on the equipment should be noted.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.
- Never pour any liquid into an opening. This could cause fire or electrical shock.
- Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.
- If any of the following situations arises, get the equipment checked by service personnel:
    o The power cord or plug is damaged.
    o Liquid has penetrated into the equipment.
    o The equipment does not work well, or you cannot get it to work according to the user's manual.
    o The equipment has been dropped and damaged.
    o The equipment has obvious signs of breakage.

Content of this Manual

This manual describes the features and operation of the following industrial computer models. Throughout the manual these will be referenced individually by their model name, and will be collectively referred to as Wolverine industrial computers.

Wolverine – DC powered 15.0" industrial computer with Windows® XP

Wolverine AC – AC powered 15.0" industrial computer with Windows® XP

Wolverine II DC – DC powered 15.0" industrial computer with Windows® XP, enhanced feature set

Wolverine II AC – AC powered 15.0" industrial computer with Windows® XP, enhanced feature set

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1. Computer Features

The Wolverine industrial computers are high performance workstations designed primarily for use in Hazardous and Harsh Environments running on Windows XP® operating systems.

Each member of the Wolverine industrial computer family is a fully self-contained PC-compatible computer with a built-in flat screen display and resistive touch screen. The unit is housed in a rugged metal case to protect the system against dust, water, and damage.

Wolverine industrial computers are available as either 24V DC units that accept a range of 18–30V DC, or as 115/230V AC units that accept a range of 100-240V AC.

Wolverine II AC and Wolverine II DC computers provide an enhanced feature set including optional heaters for extended temperature operation and a front keypad overlay.

The unit is supplied completely assembled and requires only mounting and connecting.
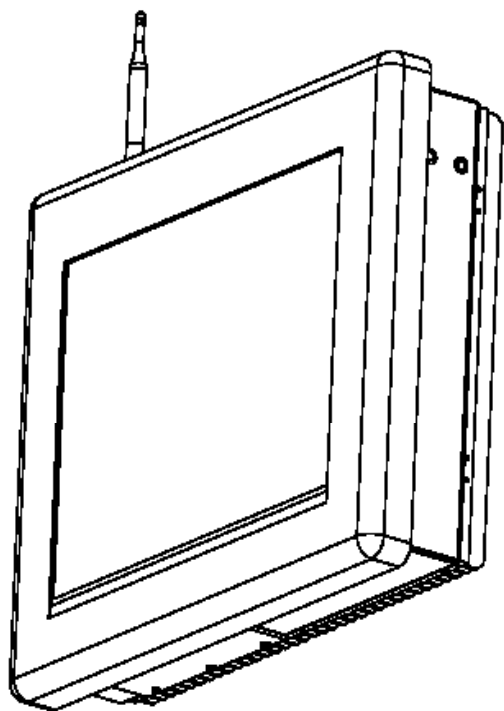
Figure 1.1: Wolverine / Wolverine AC   **Figure 1.2:** Wolverine II DC / Wolverine II AC
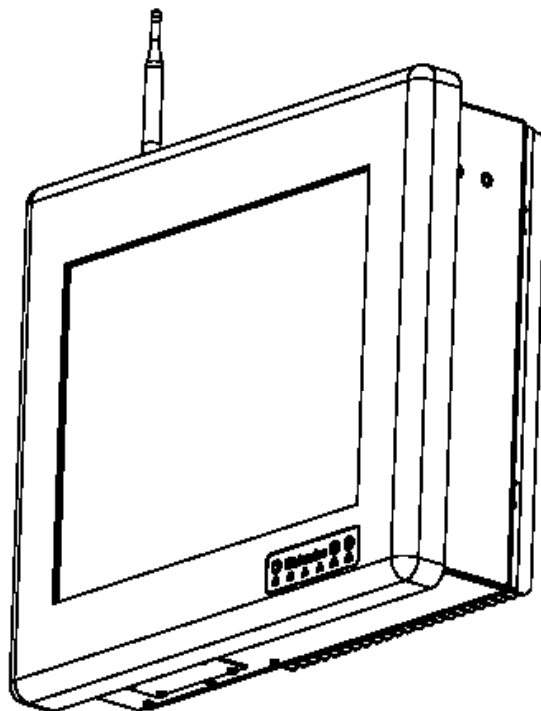
1.1. Feature Summary

When you purchase a Wolverine industrial computer, you receive:

- 15" industrial computer with the operating system software installed.
- Installation hardware
- Microsoft® Windows® documentation, software distribution, Certificate of Authenticity and license agreement

1.1.1. Standard Features

Feature	Description
Operating System:	Windows® XP
CPU	Intel® Pentium M® processor 1.6 GHz
Cache	1 MB L2
Hard disk	40 GB (minimum)
RAM	512 MB, DDR-266 installed by factory.
Display	15.0" Color Active Matrix TFT – XGA 1024x768 resolution
Touch Screen	Resistive
Parallel port	LPT1 located on I/O plate
Serial ports	COM1 (RS-232), COM2 (RS-232/485) located on I/O plate
USB ports	Two USB 2.0 located on I/O plate
Communications	10/100 Ethernet (RJ-45)
Keyboard port	PS/2 located on I/O plate
Mouse port	PS/2 located on I/O plate
PC/104 connector	Populated by PCMCIA PC/104 adapter or A/D card
Panel dimming	I/O Plate Dimming knob (Wolverine, Wolverine AC) Front Keypad Dimming buttons (Wolverine II DC, Wolverine II AC)
ATX Switch	Momentary push button
VGA Port	VGA Port located on I/O plate (Wolverine II DC, Wolverine II AC)

1.1.2. Optional Features

The following features are optional. Contact your Computer Dynamics sales representative for details.

- Additional DDR (DIMMs) (Maximum upgrade to: 2GB)
- Higher/Lower speed CPU
- Enhanced option for Transflective Daylight readable TFT.
- Compact Flash Drive (Note: Refer to Technical Data for important Shock and Vibration specifications)
- RS 422/485 (Bios selectable - Com2 only)
- Two Additional RS232 Ports (Com3, Com4)
- Remote Dimmer cable (Wolverine, Wolverine AC)
- Battery backup – 20 minutes (Only available on DC units without heater option)
- Mounting – VESA, Panel Mount, Yoke
- External connections (Gland Plate used to achieve IP67 & Hazardous Area approvals)
- Wireless Ethernet - 802.11b/g
- Horn Output
- second 10/100 Ethernet Port (RJ-45)
- Heater Option (wolverine II DC, Wolverine II AC)
- Dual PCMCIA adapter for 16 bit PC cards

1.1.3. Back I/O Plates

The Wolverine industrial computers are equipped with a back I/O plate.

The back I/O plate on the Wolverine and Wolverine AC models provide access to three serial ports, one printer port, one PS/2 keyboard, one PS/2 mouse, two USB 2.0 ports, two Ethernet RJ-45 ports, Dimming POT, Remote POT connector, ATX power button, input power terminal block, fuse, and horn output terminal block.

The back I/O plate on the Wolverine II DC and Wolverine II AC models provide access to four serial ports, one printer port, one PS/2 keyboard, one PS/2 mouse, two USB 2.0 ports, two Ethernet RJ-45 ports, input power terminal block, fuse, horn output terminal block, and VGA port.
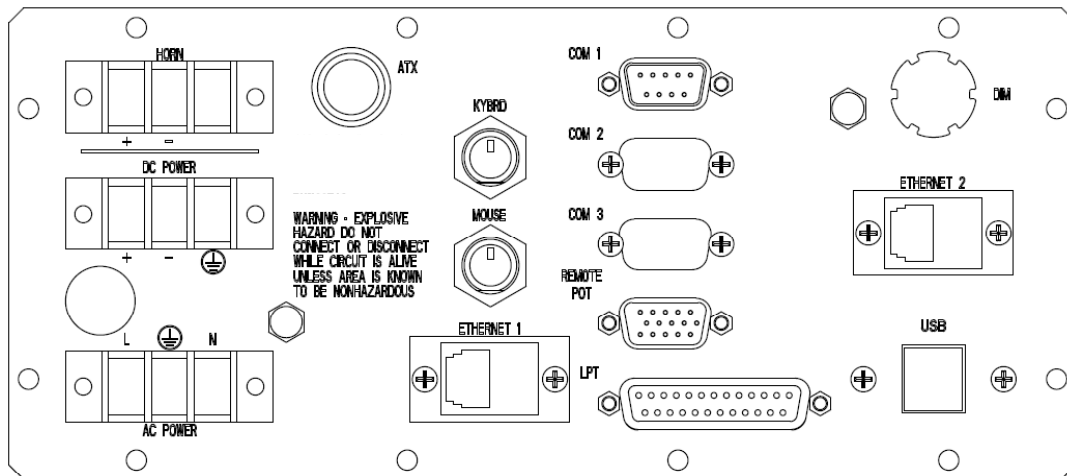
Figure 1.3: Back I/O Plate (Wolverine, Wolverine AC)
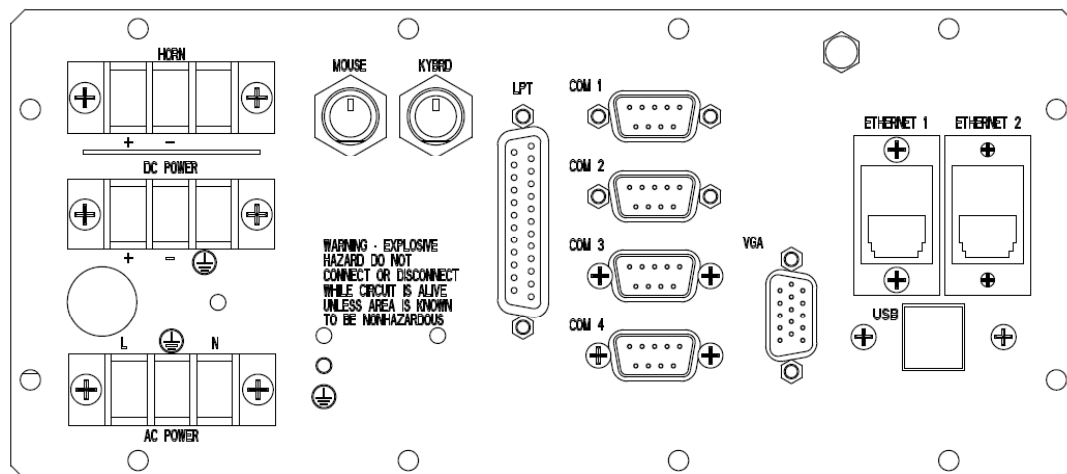
Figure 1.4: Back I/O Plate (Wolverine II DC, Wolverine II AC)

1.1.4. Gland Plate

All cabling will access the back I/O plate through the gland plate.

Modification of Gland Plate invalidates enclosure protection.

When reinstalling the gland plate, the screws must be tightened to 12 in-lbs (136 Ncm) to ensure the unit is sealed correctly to meet the IP67 enclosure rating.

Input and output wiring methods and cable types must be in accordance with Class I, Division 2 or Group II Category 3, Zone 2 wiring methods and in accordance with the authority having jurisdiction.

Keyboard and mouse connectors, the ATX switch, and 4 glands are available on the gland plate shown in Figure 1.5. Keyboard and mouse connectors, two glands, and one USB connector are available on the gland plate shown in Figure 1.6. These figures indicate all available I/O for the gland plate, but do not cover all available configurations. Contact your GE Intelligent Platforms sales representative for details.
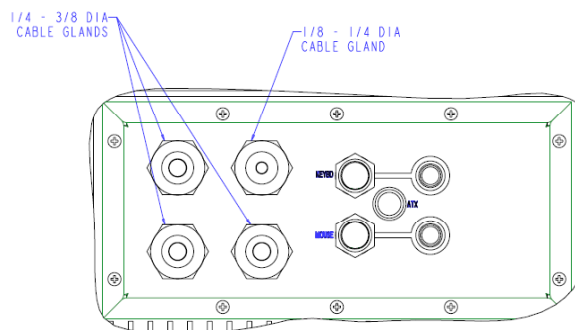
Figure 1.5: Gland Plate Layout – Rear Exit
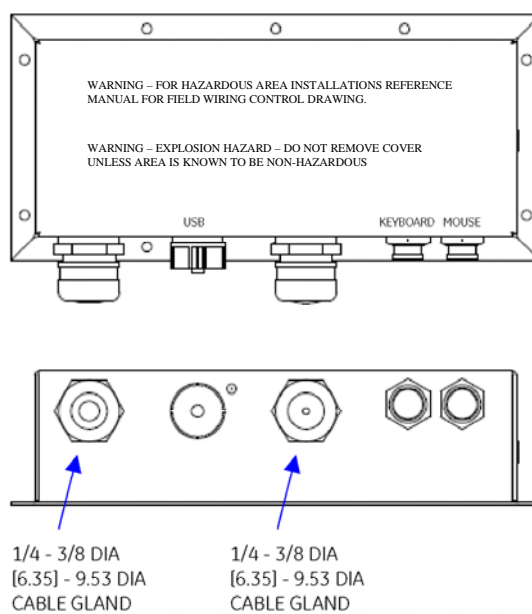
Figure 1.6: Gland Plate Layout – Bottom Exit

1.1.5. Power Input

The input power consists of a three terminal power block. For DC-powered Wolverines, the terminal denoted by the (+) sign is for the +24V, the (-) terminal is for the return of the power supply, and the ground symbol " ⏚ " denotes case ground. The unit is internally protected from a reverse polarity to prevent accidental damage. The unit will not power on until the wiring is corrected. For AC-powered Wolverines, the terminal denoted by the character "L" is for line voltage, the "N" terminal is for the neutral AC return, and " ⏚ " denotes case ground.

The "ATX" switch powers on the unit when depressed. This switch tells the motherboard to turn on the main power supply. Depressing the switch for 4 seconds shuts down the unit. Best practice is for the operating system to power down the unit. Note: The "ATX" switch for Wolverine and Wolverine AC units is located on the I/O plate and gland plate. The "ATX" switch for Wolverine II DC and Wolverine II AC units is located on the front keypad overlay.

1.1.6. Standard I/O

- Four RS-232 serial ports. The user may request an optional RS-422/485 port in place of RS-232 for COM2. COM ports are accessible from the back I/O plate. PC/104 boards such as the PCMCIA card and A/D card use resources for COM3 and COM4; therefore, COM3 and COM4 are not available to the user when the PCMCIA option or 4-20mA Data Input option is ordered. COM4 consumes the cutout normally reserved for Remote POT/Gland ATX switch. Remote POT/Gland ATX switch is not available when COM4 is ordered.
- One enhanced parallel port. LPT1 is located on the back I/O plate.
- Two USB 2.0 Ports are accessible through the back I/O plate.
- VGA port is accessible through the back I/O plate. (Wolverine II DC and Wolverine II AC only)
- One auto-sensing 10/100 Ethernet adapter available through a RJ-45 connector.
- Keyboard and Mouse PS/2 connectors are located on the back I/O plate. These may be routed to external connectors on the Gland plate.

1.1.7. Optional I/O

- 802.11b/g wireless Ethernet with external antenna that is capable of data transfers up to 54 mbps.
- Horn Output
- External USB (USB port routed from I/O plate to connector on gland plate)
- second 10/100 Ethernet Port (RJ-45)

1.1.8. Heaters

Wolverine II DC and Wolverine II AC units may be equipped with heaters for extended temperature operation. AC units are equipped with AC heaters that are powered through the AC input terminal block. DC units are equipped with DC heaters that are powered through the DC input terminal block.

1.1.9. Front Overlay Keypad

A front overlay keypad is available on Wolverine II DC and Wolverine II AC units. The keypad provides an ATX power button and dimming buttons for changing the backlight intensity. LEDs embedded in the overlay provide indicators for system status and various I/O activities. These will be discussed in further detail in Chapter 4 – System Operation.

2. Hardware Installation

This chapter describes the procedures for the safe location and securing of the Wolverine industrial computer. The Wolverine industrial computers have been designed to ensure simple installation of the system.

2.1. Installation Guidelines

- This unit is designed to operate in an outdoor environment.
- The computer is furnished with four ¼ -20 mounting holes two on each side and eight ¼-20 VESA mounting holes on the back of the Heat Sink. A panel mount option is also available (see Figure 2.3 and Figure 2.4 for cutout dimensions and mounting instructions).
- When panel mounting, insert unit through front of panel and install panel mounting clips as shown in Figure 2.3 and Figure 2.4. Torque clips from 5 to 10 in-lbs (57-113Ncm).
- The mounting method must be able to support the weight of the unit under shock and vibration conditions for the given application.
- To insure proper operation take care not to install unit in tight confined areas, during mid day operations when the effects of solar heating are at peak radiance, surrounding walls and surfaces can reflect additional solar energy and cause the unit to over heat and shut down until temperatures fall back to normal operating conditions.
- The unit must have a minimum clearance of 6" (154 mm) per side and back.
- The unit is available with optional pass through glands for cable connections (required to maintain enclosure protection rating). These glands are watertight and must be tightened to two complete turns after hand tightening to keep water out. The customer must pass the cables through the glands and wire the associated I/O connectors to the end of these cables.
- When reinstalling the gland plate, the screws must be tightened to 12 in-lbs (136 Ncm) to insure the unit is sealed correctly to meet the IP67 enclosure rating.
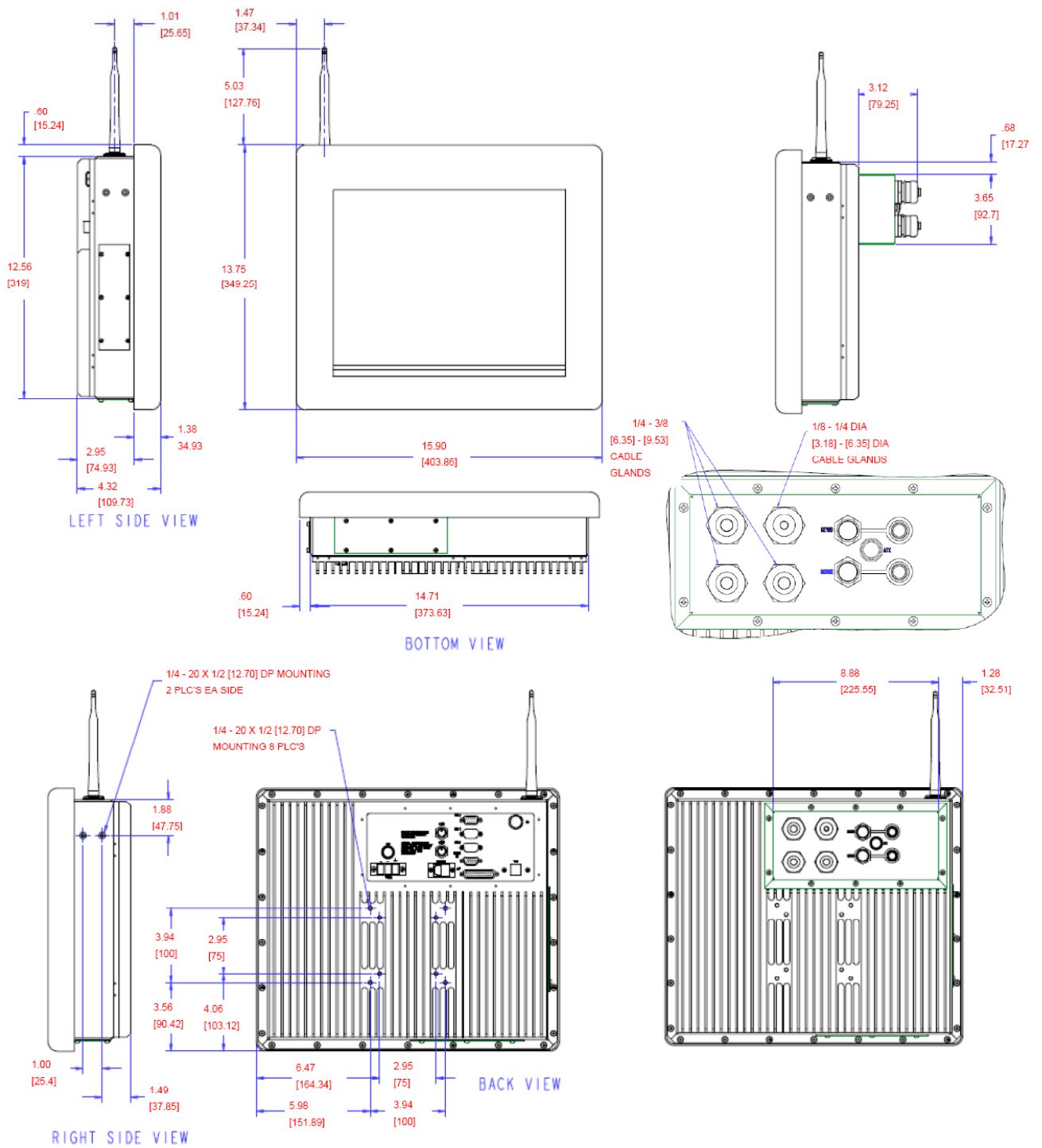
Figure 2.1: Illustrations and Dimensions (Wolverine, Wolverine AC)
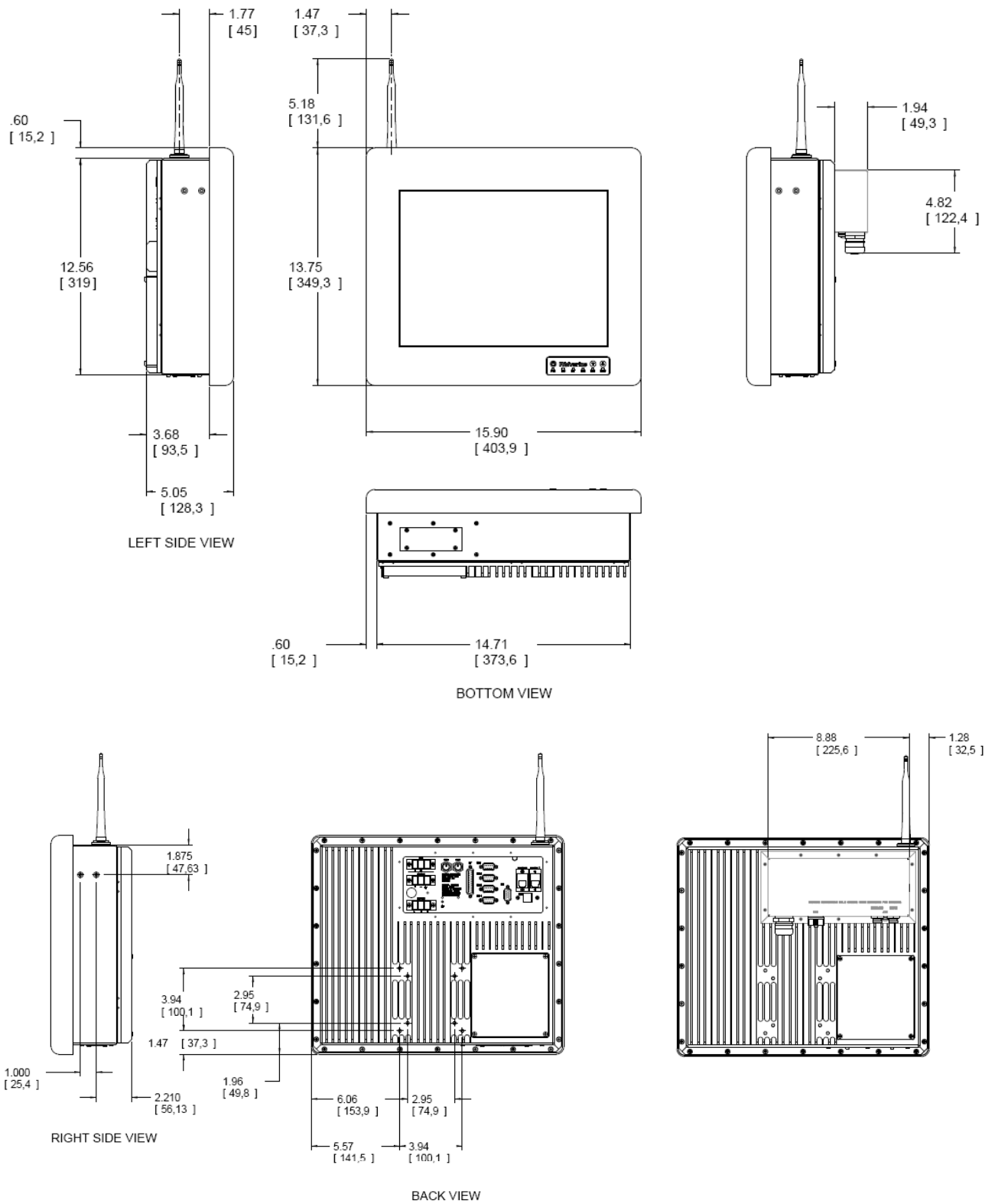
Figure 2.2: Illustrations and Dimensions (Wolverine II DC, Wolverine II AC)
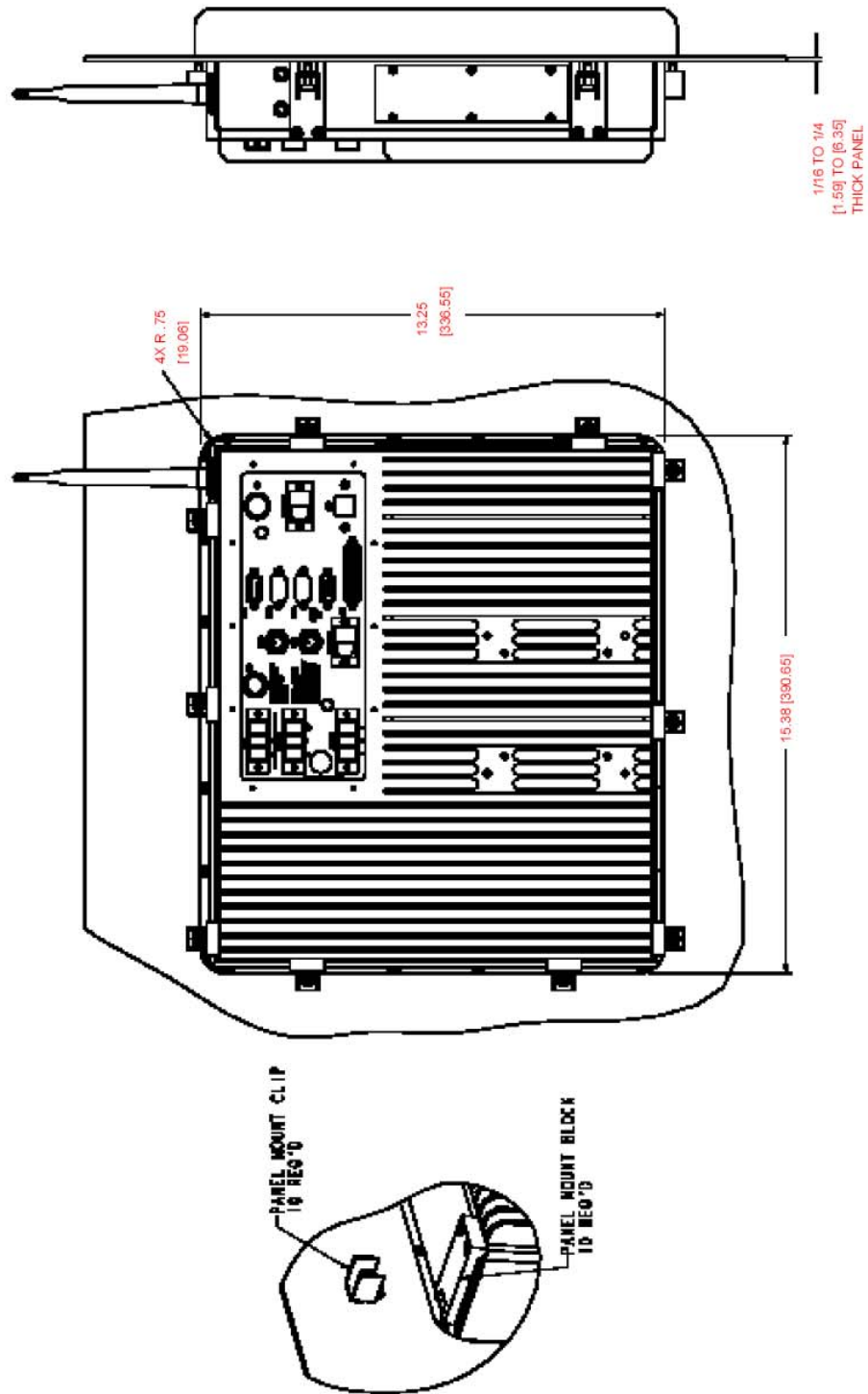
Figure 2.3: Panel Mount Option (Wolverine, Wolverine AC)
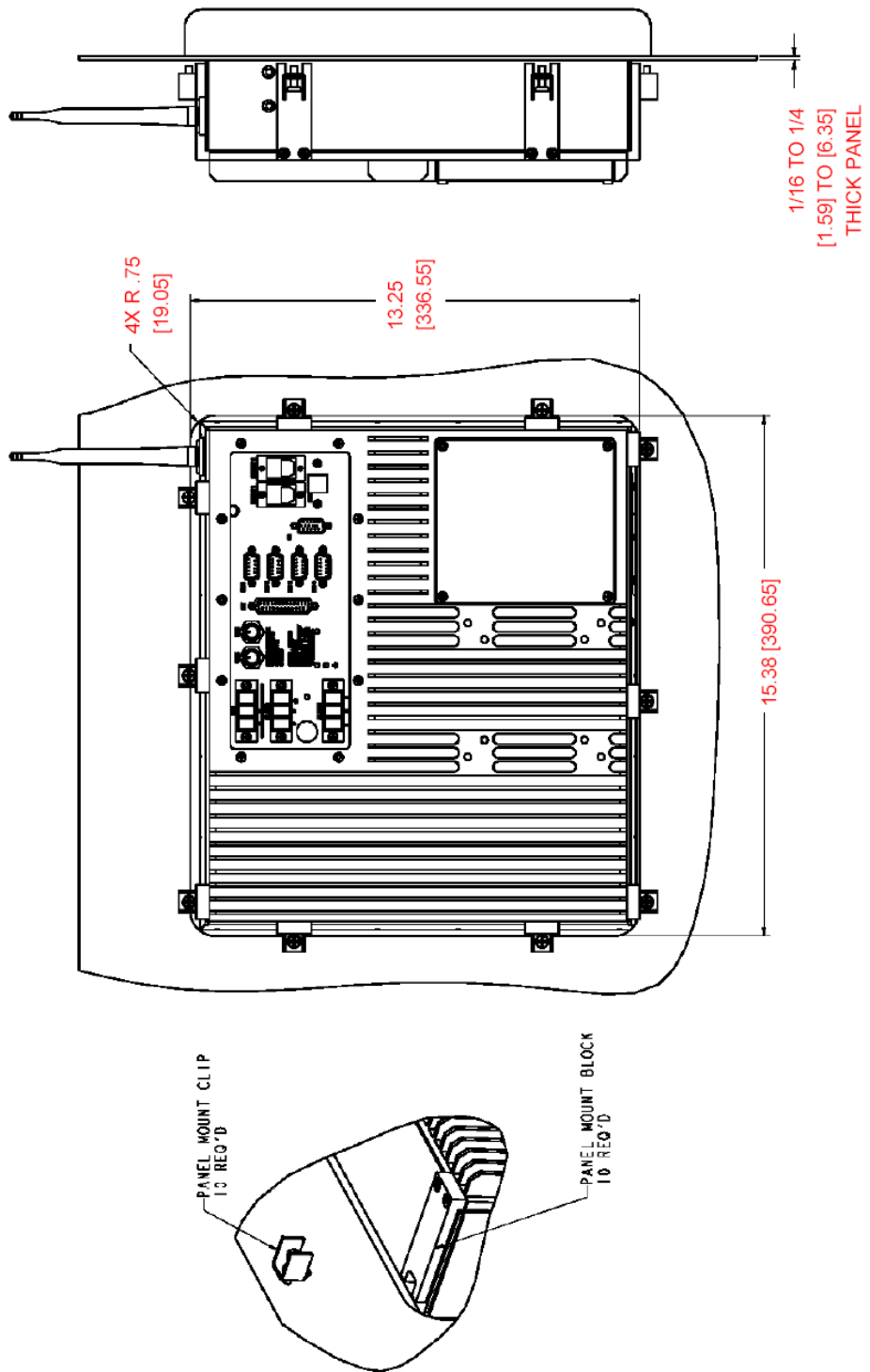
Figure 2.4: Panel Mount Option (Wolverine II DC, Wolverine II AC)

2.2. Warnings for Hazardous Area Approvals

- Input and output wiring methods and cable types must be in accordance with Class I, Division 2 or Group II Category 3, Zone 2 wiring methods and in accordance with the authority having jurisdiction.
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or Group II Category 3, Zone 2, Gas group IIC or non-hazardous locations only.

Explosion Hazard

- Component substitutions may impair suitability for Class I, Division 2 or Group II Category 3, Zone 2.
- Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous*.

- Do not install or remove SCSI devices or cards while circuit is alive.
- Gland Plate shall be installed for hazardous area applications.
- (DC version) Power supply is to be connected to an isolated secondary voltage, which is separated from the primary circuit by reinforced or double insulation. The power supply shall be properly bonded to the main earthing terminal in the end product. Power supply is to be connected to no greater than 50A maximum.
- (AC version) Product shall be connected to no greater than a 50 Amp branch circuit.
- The battery used in this device may present a fire or chemical burn hazard if mistreated. Do not disassemble, heat above 100° C (212° F) or incinerate. Dispose of used batteries promptly. Keep away from children.
- The proper method for removing power from the unit is to switch off power at the circuit breaker.
- See the control drawing located in Chapter 8 for field wiring parameters.
- Antenna Warning – Explosion hazard - Do not remove or install antenna unless area is known to be non-hazardous
- Enclosure Cover Warning – Explosion hazard - Do not remove cover unless area is known to be non-hazardous. (Warning is applicable to any removable cover on the unit - HDD access door, Gland Plate etc.)
- I/O Cover Warning – For hazardous area installations reference manual for field wiring control drawing

2.3. Markings for Hazardous Area Approvals

IP67

II 3(3) G

Ex nC[nL] IIC T4

 0° C <= Ta <= 50° C (All models except those listed below)

 -30° C <= Ta <= 50° C (Wolverine II DC with heater option)

 -40° C <= Ta <= 50° C (Wolverine II AC with heater option)

Not applicable to ports that are covered by the Field Wiring Control Drawing.

3. Connectors & Cabling

This chapter describes the connector layout and cabling on Wolverine industrial computers. All power and communication connectors are described in this section.

Communication connectors are provided from the main CPU motherboard. These connectors are located on the back I/O plate. If the gland plate is installed, the cabling to the I/O plate will be accessed through the glands.

- PS/2 Keyboard (back I/O plate), external Mini-Con-X Keyboard connector (gland plate)
- PS/2 Mouse port (back I/O plate), external Mini-Con-X mouse connector (gland plate)
- Four serial ports, COM1, COM2, COM3, COM4 (back I/O plate).
- Parallel port (back I/O plate)
- Two USB 2.0 ports (back I/O plate), one USB connector (optional gland plate)
- Two Ethernet 10/100baseT ports (RJ-45) (back I/O plate)
- Remote POT/PWR (back I/O plate)
- 4-20mA Data Input (back I/O plate), military connector (optional gland plate)
- Horn Output (back I/O plate)
- VGA port (back I/O plate)

3.1. Power Input – Main Enclosure

Wolverine industrial computers are available as DC-powered or AC-powered. DC-powered Wolverines are powered by 24V DC, and will operate from 18-30V DC. AC-powered Wolverines are powered by 115/230V AC, and will operate from 100-240V AC. The unit is powered on through the ATX button.

The power supply input to the industrial computer uses a terminal block that shall be connected to no greater than a 50 AMP branch circuit. Connect earth ground to the ground terminal on the "⏚" terminal block. The terminal block is rated for wire size 12-22 (0.32-3.3mm2) AWG and has a torque rating of 7 in-lbs (79Ncm) max. It is recommended to use at least 18GA(0.82 mm2) wire for the power input. To remove power from the unit, the proper method is to switch off power at the circuit breaker.

 Serious injury due to shock is possible if unit is wired incorrectly or connected to voltage exceeding the input voltage range.

For power supply details, refer to specifications in Chapter 7 – Technical Data. There is one user-serviceable fuse on the back I/O plate. See Chapter 9 – Field Maintenance for replacement fuse details.

3.2. Battery Backup

DC-powered Wolverines may be ordered with an optional internal 24V battery to act as a battery backup when power is interrupted to the unit. The battery backup will automatically switch to battery power when the external DC power is removed. Battery backup will support the unit for at least 20 minutes at full load. To prevent loss of data, it is recommended to shut the unit down if external DC power has been removed.

The battery charging board charges the battery when the unit is powered on. A completely discharged battery will take approximately 4-5 hours to reach its peak charge. The battery charging board will terminate the charge after the battery has reached its peak charge.

Battery backup is not available on Wolverine II DC units with heaters installed.

3.3. Connector Layout

External devices should not be powered up when connecting to communication ports.

Back I/O Plate Connectors

Glands on the gland plate allow cabling to access the back I/O plate connectors.

The back I/O plate consists of:
- Two USB ports
- ATX switch
- Four RS-232 ports – COM1-4
- LPT port
- Input Power Terminal block
- Keyboard connector
- Mouse connector
- Dimming knob
- Remote dimming connector
- Two RJ-45 Ethernet ports
- Horn output
- VGA port

3.4. Printer Port LPT1

A 25-pin D-type female printer port connector is located on the back I/O plate and labeled accordingly. In order to provide higher EMC immunity and maintain CE Mark compliance, the LPT cable must be shielded.
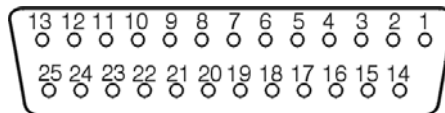
Figure 3.1: Printer Port

Pin	Assignment	Pin	Assignment
1	Strobe	10	Acknowledge
2	Data Bit 0	11	Busy
3	Data Bit 1	12	Paper End
4	Data Bit 2	13	Select Out
5	Data Bit 3	14	Auto Feed XT
6	Data Bit 4	15	Error
7	Data Bit 5	16	Initialize Printer
8	Data Bit 6	17	Select In (from Printer)
9	Data Bit 7	18 to 25	Ground

3.5. Serial Communication Ports

Four RS-232 COM ports (1-4) are available on the back I/O plate. COM3 and COM4 are used by PC/104 boards (such as the PCMCIA card and 4-20mA Data Input) and are not available to the user when a PC/104 board option is ordered. COM4 consumes the cutout normally reserved for Remote POT/Gland ATX switch (Wolverine and Wolverine AC). Remote POT/Gland ATX switch is not available when COM4 is ordered. The standard 9-pin D-sub connector pin out is shown below.
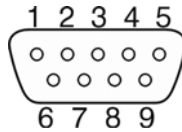
Figure 3.2: COM Port

RS-232C Name	Pin	Assignment
CF	1	DCD (Data Carrier Detect)
BB	2	RX (Receive Data)
BA	3	TX (Transmit Data)
CD	4	DTR (Data Terminal Ready)
AB	5	GND (Signal Ground)
CC	6	DSR (Data Set Ready)
CA	7	RTS (Request to Send)
CB	8	CTS (Clear to Send)
CE	9	RI (Ring Indicator)

3.5.1. RS-485 Option

Only COM2 can be selected for RS-485 through SW1 located near the bios chip. To select RS-485 set SW1 to the following:

(1) On

(2) On

(3) Off

(4) On

Pin	Assignment
1	RS-485 TX-
2	RS-485 TX+
5	GND

3.5.2. RS-422 Option

Only COM2 can be selected for RS-422 through SW1 located near the bios chip. To select RS-422 set SW1 to the following:

(1) On

(2) On

(3) On

(4) On

Pin	Assignment	Pin	Assignment
1	TX-	6	RTS-
2	TX+	7	RTS+
3	RX+	8	CTS+
4	RX-	9	CTS-
5	GND		

3.5.3. Shielding

In order to provide higher EMC immunity and maintain CE Mark compliance, the serial cables must be shielded.

3.6. USB Ports

The two USB ports are 2.0 compliant and are located on the back I/O plate. In order to provide higher EMC immunity and maintain CE Mark compliance, the USB cables must be shielded.

3.7. Network Interface

An RJ-45 Ethernet connector is available on the back I/O plate for connecting standard, unshielded twisted pair cable. The Wolverine also offers 802.11b/g, 2.4 GHz wireless with an external antenna attached to the top of the unit. A second RJ-45 Ethernet connector is also offered as an option; however, it is unavailable when the wireless Ethernet option is ordered.

3.8.   Remote Dimming Connector

Remote dimming is available by cabling a potentiometer to the Remote Pot connector. Maximum cable length is limited to less than 3 meters. Available on Wolverine and Wolverine AC models only.
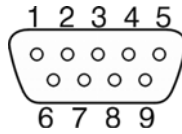
Figure 3.3: Remote Dimming

Pin	Assignment	Pin	Assignment
1	Low	6	
2	Wiper	7	
3	High	8	
4		9	
5			

3.9. Horn Output

The Horn output is available on the back I/O plate through a terminal block. The terminal block is rated for wire size 12-22 (0.32-3.3 mm2) AWG and has a torque rating of 7 in-lb. (79 Ncm) max. For DC-powered Wolverines, the terminal denoted by the (+) sign is +V DC switched through an internal relay; the (-) terminal is DC return. For AC-powered Wolverines, the terminal denoted by the (+) sign is AC Line voltage switched through an internal relay; the (-) terminal is AC return. Maximum cable length is limited to less than 3 meters.
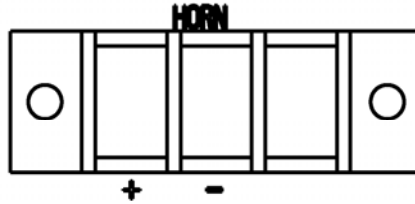
Figure 3.4: Horn Terminal Block

3.10. VGA Port

The VGA port is available on Wolverine II DC and Wolverine II AC models. The VGA connector is located on the back I/O plate. The standard 15-pin D-sub connector pin out is shown below.
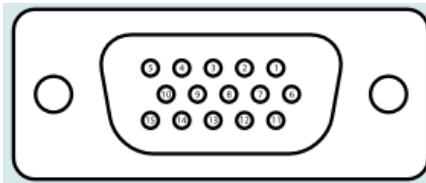
Figure 3.5: VGA Port

Pin	Assignment	Pin	Assignment
1	Red	9	+5V
2	Green	10	Ground
3	Blue	11	Pull-Up
4	N/C	12	DDC Data
5	V Ground	13	HSYNC
6	V Ground	14	VSYNC
7	V Ground	15	DDC Clock
8	V Ground		

3.11. Mouse & Keyboard Ports

PS/2 ports for Mouse & Keyboard are available on the back I/O plate and labeled accordingly. This temporary maintenance connection is intended for such things as initial setup, downloading data, uploading software, etc.

Connectors are also available on the gland plate to allow NEMA4/IP67 connections to a keyboard and mouse without removal of the gland plate. This temporary maintenance connection is intended for such things as initial setup, downloading data, uploading software, etc. The connectors provided on the gland plate are Conxall Mini-Con-X sockets part number 7282-6SG-XXX. See Figure 3.4 for pin-out of these connectors. The mating cable plug is Conxall part number 6282-6PG-XXX. An adapter cable is also available to convert these connections to standard PS/2 connectors. The adapter cable can be ordered through Computer Dynamics part number CAB011840 (CAB, NEMA4 6-PIN MALE TO PS/2 FEM, 72", TEST) or Conxall part number C1545.
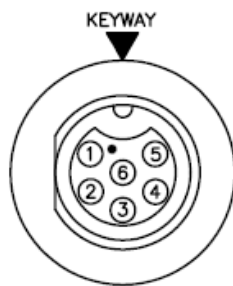
Figure 3.6: Keyboard Port	**Figure 3.7:** Mouse Port

Pin	Signal
1	KB Data
2	NC
3	GND
4	+5V
5	KB Clock
6	NC

Pin	Signal
1	Mouse Data
2	NC
3	GND
4	+5V
5	Mouse Clock
6	NC

4. System Operation

This chapter provides details of system operation. The following topics are covered:

- Setup
- System Peripherals
- External Keyboard and Mouse
- Graphic System
- Operator Interfaces
- Communications
- Heater Option
- Shutdown

4.1. Setup

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or Group 2 Category 3, Zone 2, Gas group IIC, or nonhazardous locations only. Before you attempt to power up the system for the first time, inspect the unit for loose or damaged components.

Before you power up your system, you may want to attach a standard PS/2-type keyboard and mouse to the external ports on the industrial computer. Most configuration activities that you perform on the unit can be more easily completed using a keyboard and mouse.

4.2. Powering Up the Wolverine Industrial Computer

The system will power up when the ATX power button on the back I/O plate, gland plate, or front keypad overlay is pressed. For DC-powered Wolverines, attach the +24V DC line to the (+) connection, the return line to the (-) connection, and earth ground to the ground symbol connection " ⏚ " of the DC power terminal block on the back I/O plate. For AC-powered Wolverines, attach the 115/230V AC line to the "L" connection, the AC neutral to the "N" connection, and earth ground to the " ⏚ "connection of the AC power terminal block on the back I/O plate. Product shall be connected to no greater than a 50 AMP branch circuit.

During power up, the processor will run its normal diagnostic checks and indicate the presence of any errors with a screen prompt.

4.3. Powering Down the Wolverine Industrial Computer

In a proper shutdown, the operating system will turn off the power supply and the unit will power down. In the case of an emergency, the ATX switch can be depressed for a quick controlled shutdown of Windows. The ATX switch can also be held down for four seconds for the system to power down without Windows shutting down (this is not a recommended shut down process).

Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous*. To ensure power has been switched off to the unit, the main power should be removed at the circuit breaker, followed by removal of the power cables at Wolverine's power terminal block.

Not applicable to ports that are covered by the Field Wiring Control Drawing.

4.4. System Peripherals

> Do not connect or disconnect external devices while the unit is powered on and the area is considered hazardous unless the Field Wiring Control Drawing covers the port.
>
> Do not install or remove Hard Disk Drive or PCMCIA cards while circuit is alive. Failure to observe this precaution could result in damage to the equipment.

4.4.1. Removable Storage Media

The Wolverine industrial computer system has a single removable hard disk drive. The disk drive has a standard EIDE/ATA-2 interface. The standard size is 40 GB or larger. An optional dual compact flash adapter may be substituted for the hard drive. An optional Solid State IDE Flash Drive may also be substituted for the hard drive. Access to the storage media is from the bottom access plate (Wolverine, Wolverine AC) or from the rear access plate (Wolverine II DC, Wolverine II AC). *NOTE: To achieve the shock and vibe specs detailed in Chapter 7, a solid-state media compact flash card must be used rather than the hard drive.*
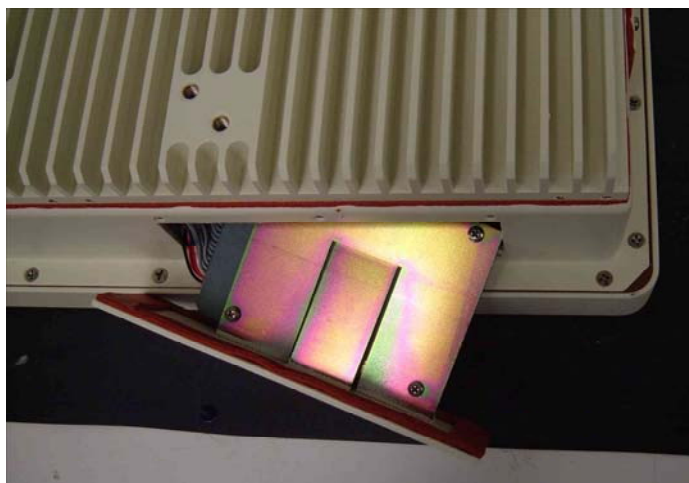
Figure 4.1: Storage Media Access (Wolverine, Wolverine AC)
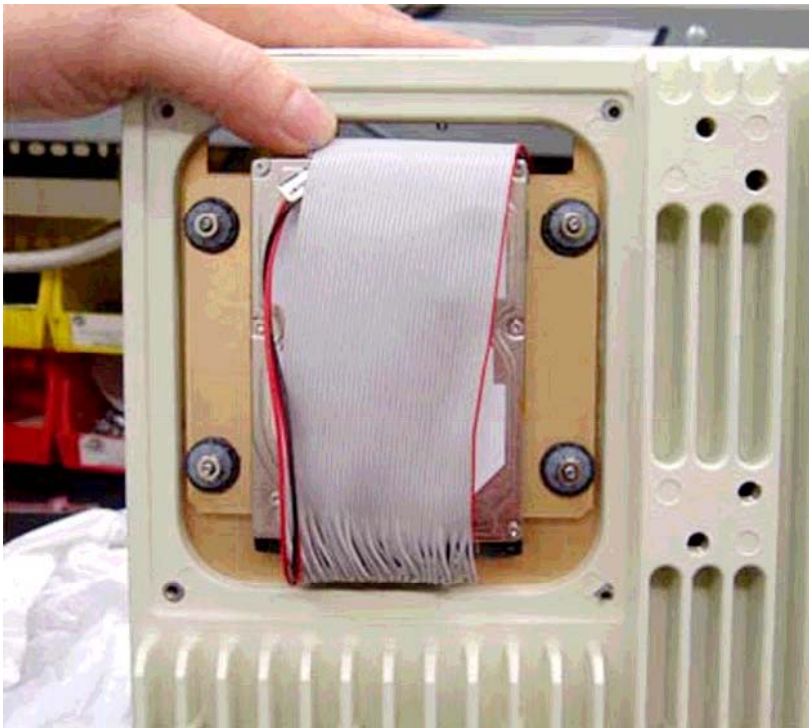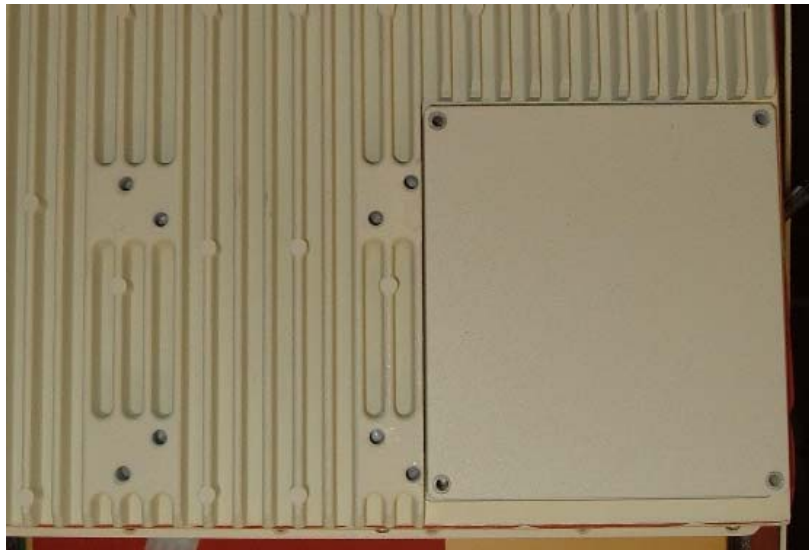
Figure 4.2: Storage Media Access (Wolverine II DC, Wolverine II AC)

When reinstalling the hard drive access plate, the screws must be tightened to 12 in-lbs (136 Ncm) to insure the unit is sealed correctly to meet the IP67 enclosure rating.

4.4.2. PCMCIA Slots

Wolverine industrial computers include two optional PCMCIA slots. These are accessible from the side access plate (Wolverine, Wolverine AC) or from the bottom access plate (Wolverine II DC, Wolverine II AC). The Wireless Ethernet card occupies one slot. The customer can use the other slot. NOTE: The lower slot is not available when the optional second Ethernet port is selected.
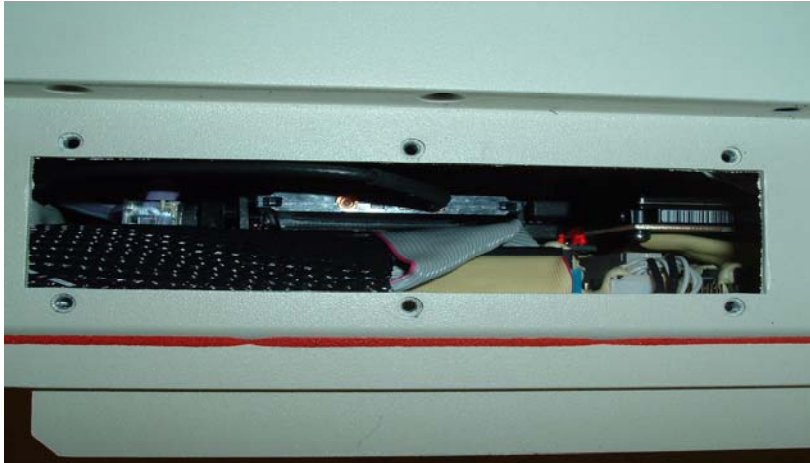
Figure 4.3: PCMCIA Access

When reinstalling the PCMCIA access plate, the screws must be tightened to 12 in-lbs (136 Ncm) to insure the unit is sealed correctly to meet the IP67 enclosure rating.

4.4.3. Compact Flash Socket

The Wolverine contains one Compact Flash socket located on the internal Motherboard. This socket is not accessible by the user. Any device populating the Compact Flash socket must be installed prior to the unit leaving the factory.

4.5. External Keyboard and Mouse

An external PS/2 keyboard and mouse can be attached via two external connectors on the gland plate or to the PS/2 keyboard and mouse connectors on the back I/O plate.

The touch screen and PS/2 mouse will work simultaneously if the mouse is Microsoft® or IBM® PS/2 compatible.

4.6. Graphic System

The Wolverine industrial computer includes a 15-inch color TFT (XGA resolution) screen. The flat screen display has the following features:

- High luminance (equal to or greater than 500cd/m^2)
- Wide angle viewing
- A built-in back light with a long life back light tube (equal to or greater than 50,000 hrs)
- Optional Transflective technology – allows for sunlight readable viewing

4.7. Touch Screen

The Wolverine industrial computer includes a Resistive touch screen on the flat panel display.

The touch screen has a resolution of 1024x1024 touch points (independent of screen size) and provides an efficient and reliable method of entering information. The screen responds to the touch of your finger with or without a glove.

The touch screen is connected internally to a USB port.

4.8. Touch Screen Driver for Windows

The touch screen driver is installed, configured and calibrated at the time of manufacture.

4.9. Communications

Your industrial computer has been configured with networking components that enable you to establish new networks or connect to existing networks easily. If you intend to use Microsoft® NetBEUI, TCP/IP, or Direct Cable Connection, some minimal setup changes are required before you can use the system for network applications. In Windows® XP systems, these settings are changed using the Network application in the Control Panel program group.

Installed Network Components

Network Component	Comments
PCI Network Adapter	Automatically configured in system
TCP/IP	Default settings must be changed before connecting to an existing network. Contact your network administrator for appropriate settings.
NetBEUI	Default settings must be changed before connecting to an existing network. Contact your network administrator for appropriate settings.
System Identification	Computer Name: Each system is uniquely identified by its serial number and can be renamed before adding it to an existing network
	Workgroup: The default workgroup is Workgroup. This should be renamed before adding it to an existing network.

4.10. Heater Operation

Wolverine II DC and Wolverine II AC models may be ordered with optional heaters to extend the operating temperature range. Ambient temperatures below or near 0° C will require a warm-up period before power will be applied to the internal ATX power supply. Once power is applied to the ATX power supply the unit will power on automatically*. The heaters will continue to operate following power-up as needed to maintain internal temperatures above the turn-off threshold.

The HTR LED on the front keypad overlay will illuminate steady when heat is being applied. If the HTR LED flashes then an error has been detected within the heater control system. In this case disconnect external power. Wait 10 seconds and reconnect power. If the problem persists, contact Computer Dynamics at (864-627-8800).

If the BIOS power setting for 'Power on after Power Fail' has been changed then pressing the ATX switch will be required to power the unit on after the warm-up period. Under most conditions the LCD should power on in less than 30 minutes. DC units will require a longer warm-up time if the voltage is below 24V DC.

4.11. Front Overlay Keypad

Wolverine II DC and Wolverine II AC models include a front overlay keypad, which provides an ATX power button, dimming buttons, and LEDs to indicate system status and I/O activity.

Figure 4.4: Front Overlay

4.11.1. Keypad Buttons and Operation

* ATX power button – press and release to power up or power down the unit. The ATX power button can also be held down for four seconds for the system to power down without Windows shutting down (this is not a recommended shut down process).
* Dimming buttons – used to change backlight intensity. There are seven distinct levels of backlight intensity available. Pressing and releasing a dimming button will change the backlight intensity one level. Holding down a dimming button will quickly scroll through the various backlight intensity levels. The selected brightness level is stored in non-volatile memory. On power up the unit will return to the last brightness level selected.

4.11.2. LED Operation

LED Function	Label	Color	Operation
Power Status	PWR	Green	On when unit is powered on
Heater Status	HTR	Yellow	OFF = Normal operation ON STEADY = Heating Mode FLASHING = Error Detected - unit will not heat or power on
Battery Status	BAT	Green or Red	Green when unit is running on external power Red when unit is running on battery power Remains unlit on units that do not have battery backup
Hard Drive Status	HDD	Green	On when there is Hard Drive/Compact Flash Activity
Ethernet 1 Status	LINK1	Green or Amber	Green when there is a Link on Ethernet 1 Amber when there is also Activity on Ethernet 1
Ethernet 2 Status	LINK2	Green or Amber	Green when there is a Link on Ethernet 2 Amber when there is also Activity on Ethernet 2

4.12. Shutting Down the Computer

To avoid damaging files, always shut down Windows software before removing power from your Wolverine.

To shut down Windows® XP software, select Shut Down from the Start menu.

5. BIOS Settings

It is normally not necessary to change the hardware configuration settings in the CMOS memory. If settings become corrupted, follow the procedures here to reload the factory configuration.

1. Power down the computer, connect a keyboard and turn on the power. Enter the Setup mode by pressing the DEL key when prompted during the computer power-up sequence. The main BIOS setup utility screen will appear offering several options for changing settings.

2. Once in the BIOS load optimized defaults – this will restore all defaults.

3. Save BIOS and exit.

6. Diagnostics and Troubleshooting

This chapter consists of "Self-Test Diagnostics," "Troubleshooting," and "Corrective Actions." "Self-Test Diagnostics," describes how to respond to errors that could be detected by the automatic self-test that is performed each time the Wolverine industrial computer powers up. "Troubleshooting" contains tables of symptoms, their possible causes, and recommended corrective actions. "Corrective Actions" contains detailed procedures that are too lengthy to include in the Troubleshooting tables.

6.1. Self-Test Diagnostics

The computer automatically performs self-test diagnostics each time it is powered up. The self-test consists of a series of checks that verify correct performance of the computer hardware. When the self-test is being performed, you will see the message XXXX M OK displayed on the screen, where XXXX is a number that increases until it matches the amount of usable memory.

6.1.1. System Test and Initialization

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will see an error message on the screen. There are two kinds of errors: fatal and non-fatal. If a non-fatal error occurs, the system can usually continue the boot up sequence. Non-fatal error messages usually appear on the screen with the following instruction:

Press <F1> to RESUME

Write down the message and press the F1 key to continue the boot-up sequence.

6.1.2. System Configuration Verification

These routines check the current system configuration against the values stored in the CMOS memory. If they don't match, the program will generate an error message. To correct this condition, you will need to run the BIOS setup program and correct the configuration information in memory.

There are three situations in which you might need to change the CMOS settings:

1. You are starting your system for the first time.

2. You have changed the hardware attached to your system.

3. The CMOS memory had lost power and the configuration information has been erased. If this has happened, call Computer Dynamics (864-627-8800).

6.2. Troubleshooting

6.2.1. Power Up

Symptom	Possible Causes	Solution
Computer does not power up.	Power not on. Improper shutdown – loss of power Unit in 'warm-up' mode HTR LED will be on Steady Error within heater control system HTR LED will be flashing	Make sure that computer is plugged in. Make sure that power source is functioning properly. Depress "ATX" button for 4 seconds. Depress the button again to power on. Wait for unit to finish heating. LCD should power on after warm-up is complete. Press the ATX switch if LCD does not power on automatically after warm-up period. See Chapter 4 – Heater Operation for more details. Disconnect external power. Wait 10 seconds and reconnect power. If the problem persists contact the Computer Dynamics at (864-627-8800).
Display is blank.	See "Display" topic in this Chapter	See "Display" topic in this Chapter
Safe Recovery Error message displayed.	Occurs on initial power up if the unit is accidentally turned off without first shutting down the Windows software.	The computer will power up normally.
CMOS checksum error — Defaults loaded **CMOS battery failed** message displayed.	CMOS battery failure.	This battery has a lifetime of up to 10 years under normal operating conditions. For more information, see "CMOS Checksum Error" topic in this chapter.
A screen appears just after power-up, or just after reset, which has the title "CMOS Setup Utility."	The DEL key has been accidentally pressed.	Cycle power again. The computer will power up normally.
The computer has reset even though the power was not interrupted.	The CTRL-ALT-DEL keys were pressed twice at the same time.	This should never be done, unless you are attempting to reset the computer.

6.2.2. Display

Symptom	Possible Causes	Solution
Characters are dim.	Computer screen is in direct light. Dimming is turned down	Change lighting or adjust contrast. Adjust dimming knob to increase brightness
Display is blank.	System temperature is outside operating range.	Keep unit in specified operating temperature range.
	Computer is set up for invalid video mode.	Reboot. Select VGA Mode
	Screen saver is active.	Touch the screen.

6.2.3. Memory

Symptom	Possible Causes	Solution
Out of Memory message is displayed or insufficient memory error occurs during operation.	System ran out of memory for the application.	Check the memory requirements for the application. (Refer to the application documentation.)
	Too many terminate and stay resident (TSR) programs running.	Modify the startup folder to use only those TSR applications that are really needed.

6.2.4. External PS/2 Mouse

Symptom	Possible Causes	Solution
Cursor does not respond to mouse movement.	Mouse not plugged in.	Power down computer. Plug mouse into mouse port on computer and reboot.
	The type of mouse is not supported.	Use a PS/2 mouse.
	System is busy.	Press CTRL-ALT-DELETE to view task list.
	Mouse not detected.	Restart computer with external mouse connected.

6.2.5. Keyboard

Symptom	Possible Causes	Solution
External keyboard locks up.	The type of keyboard is not supported.	Use PS/2 compatible keyboard
	Keyboard not plugged into keyboard port on the computer.	Plug keyboard in. (Power down computer first.)
	System is busy.	Press CTRL-ALT-DELETE to view task list.

6.2.6. Communications

6.2.6.1. COM Port Connection

Symptom	Possible Causes	Solution
Communications between the host computer and the controller are unsuccessful.	COM port not configured in system.	Verify that the COM port is configured in the system.
	Cabling between computer and controller.	Verify that the cable between the computer and the controller is correctly wired.
	Baud rate and parity configured incorrectly.	Verify that the baud rate and parity on the computer are consistent with those on the controller.
	Wrong address.	Verify that the slave address is correct.

6.2.6.2. Network Communications

Symptom	Possible Causes	Solution
Conflicts on network.	IP Address not unique.	Change the IP address to a unique address. (Contact your system administrator if this or other settings need to be changed.)
	Identical computer name.	Change computer name. Computers cannot share computer name on network.

6.2.6.3.   Printing

Symptom	Possible Causes	Solution
Printer will not turn on.	Cables not connected properly. Printer power cord not plugged in.	Ensure that the cables are properly connected and that the power cord is connected to the electrical outlet.
Printer will not print.	Printer is not turned on.	Turn on the printer
	Printer is not online.	Set the printer to online.
	The device drivers for your application are not installed.	Install the correct printer drivers for your application in Windows.
	Printer that is set up for a network is not connected to the network.	Connect the printer to the network.
	Printer cable is too long, unshielded, or defective.	Replace the cable.
Printer is offline.	Paper tray is empty.	Fill the paper tray with paper. Set printer to online.
Printer prints garbled information.	Correct printer drivers not installed.	Install the correct printer driver.
	Cable is not connected properly.	Ensure that the printer cable is connected properly to the computer.
	Problem specific to printer.	Run a printer self-test. Refer to the documentation provided with your printer for instructions. If the self-test fails, the problem is printer-specific. The printing section of the software documentation and in Windows online Help may also be helpful.

6.3.   Corrective Actions

6.3.1.   CMOS Checksum Error

If the CMOS battery has failed, the following error messages will be displayed on the screen:

CMOS checksum error - Defaults loaded

CMOS battery failed

This battery has a lifetime of up to 10 years under normal operating conditions. If the battery failed, contact Computer Dynamics (864-627-8800).

7. Technical Data

7.1. Mechanical Specifications

7.1.1. Main Chassis

The main chassis is manufactured from aluminum and houses the motherboard, which is mounted securely in a vertical plane.   The PC/104 add-on board plugs directly onto the motherboard. Two access panels for the hard drive and PC cards are also located on the main chassis.

7.1.2. Gland Plate

The gland plate is fixed to the main chassis so that yoke and pedestal mounting configurations have necessary hardware to wire the unit for Hazardous Areas, and also to maintain the enclosure protection rating.

Modification of Gland Plate invalidates enclosure protection.

When reinstalling the gland plate, the screws must be tightened to 12 in-lbs (136 Ncm) to insure the unit is sealed correctly to meet the IP67 enclosure rating.

Input and output wiring methods and cable types must be in accordance with Class I Division 2 or Group II Category 3, Zone 2 wiring methods and in accordance with the authority having jurisdiction.

7.2. Functional Specifications

CPU and Memory	
Microprocessor	Intel® Pentium® M processor 1.6 GHz
User Memory	512 MB, DDR-266 minimum installed by factory.
Operating System	Windows XP
Hard Disk	40 GB minimum, IDE standard 2.5-inch mounting
Two PCMCIA Slots(optional)	16 bit PC Cards
Compact Flash	Compact Flash
PC/104 connector	Populated by PC/104 board

Contact your local distributor for upgrades.

Display	
Display Variants	15-inch Color TFT – XGA
Active Display Area	15-inch (246 mm x 184.5 mm)

Power Requirements – Wolverine, Wolverine II DC (without heater option)	
DC Input	24V DC
Voltage Range	18-30V DC
Power Rating	120W, 5.0 Amp max

Power Requirements – Wolverine II DC (with heater option)	
DC Input	24V DC
Voltage Range	18-30V DC
Power Rating	560W, 18.6 Amp max

Power Requirements – Wolverine AC, Wolverine II AC (without heater option)	
AC Input	115/230V AC, 50/60 Hz
Voltage Range	100-240V AC
Power Rating	120W, 0.8 Amp max

Power Requirements – Wolverine II AC (with heater option)	
AC Input	115/230V AC, 50/60 Hz
Voltage Range	100-240V AC
Power Rating	780W, 5.8 Amp max

Ports	
Parallel Port	LPT1 (back I/O plate)
Serial Ports	COM1 external RS-232 port (back I/O plate)
	COM2 external RS-232 port (back I/O plate); Optional RS-485/422
	COM3 external RS-232 port (back I/O plate)
	COM4 external RS-232 port (back I/O plate)
Keyboard Port	PS/2 (back I/O plate)
	External Mini-Con-X connector (gland plate)
Mouse Port	PS/2 (back I/O plate)
	External Mini-Con-X connector (gland plate)
USB Ports	USB1 (back I/O plate) USB2 (back I/O plate)
	External USB (gland plate)
Panel dimming	Back I/O plate; optional Remote POT (Wolverine, Wolverine AC)
	Front Overlay Keypad (Wolverine II DC, Wolverine II AC)
Communication	10/100 Ethernet (RJ-45) (back I/O plate)
	Optional second 10/100 Ethernet (RJ-45) (back I/O plate)
	Optional 802.11 b/g Wireless Ethernet
VGA Port	VGA port (back I/O plate) (Wolverine II DC, Wolverine II AC)

Physical – Wolverine, Wolverine AC	
Dimensions	404 mm wide (15.90")
	349 mm high (13.75") without antenna
	477 mm high (18.78") with antenna
	110 mm deep (4.32") without gland plate
	189 mm deep (7.44") with rear exit gland plate
	159 mm deep (6.26") with bottom exit gland plate
Weight	15.0 Kg (33 lbs) with gland plate
	13.6 Kg (30 lbs) without gland plate

Physical – Wolverine II DC, Wolverine II AC	
Dimensions	404 mm wide (15.90")
	349 mm high (13.75") without antenna
	477 mm high (18.78") with antenna
	128 mm deep (5.02") without gland plate
	207 mm deep (8.14") with rear exit gland plate
	177 mm deep (6.96") with bottom exit gland plate
Weight	15.9 Kg (35 lbs) with gland plate
	14.5 Kg (32 lbs) without gland plate

| Environmental Conditions		
Temperature Wolverine, Wolverine AC, Wolverine II DC (without heater option), Wolverine II AC (without heater option)	Operation	0° C to +50° C
	Storage	-20° C to +70° C
Temperature Wolverine II AC (with heater option)	Operation	-40° C to +50° C
	Storage	-40° C to +70° C
Temperature Wolverine II DC (with heater option)	Operation	-30° C to +50° C
	Storage	-40° C to +70° C
Humidity	5 to 95% RH (non-condensing)	
Enclosure Protection	NEMA4/4X, UL50 Type 4/4X, IP67	
Vibration (Operating)	2g, 10 – 500 Hz (compact flash media only)	
Shock (Operating)	40G pulse, 3 – Axis (compact flash media only)	
Altitude (Operating)	Less than 2,000M	

8. Agency Approvals & Government Regulations

8.1. Agency Approvals

Description	Agency Standard or Marking	Comments
N.A. Safety for Industrial Control Equipment	c(UL)us LISTED	Certification by Underwriter's Laboratories to UL508 standard and equivalent CSA C22.2 No 142 - M1987standard
N.A. Safety for Hazardous Locations Class I, Div. 2, Groups A, B, C, D	c(UL)us LISTED	Certification by Underwriter's Laboratories to UL1604 standard and equivalent CSA C22.2 No 213-M1987 standard
Low Voltage Directive European Safety for Industrial Control Equipment	CE	Self-Declaration in accordance with European LVD Directive 2006/95/EC; Independent 3rd party assessment (Notified Body #0673)
Electromagnetic Compatibility Directive European EMC for Industrial Control Equipment	CE	Self-Declaration in accordance with European EMC Directive 2004/108/EC; Independent 3rd party assessment (Notified Body #0673)
Explosive Atmospheres Directive European Safety for Hazardous Locations Equipment Group II, Category 3, Gas Group IIC	⟨Ex⟩	Self-Declaration in accordance with ATEX Directive 94/9/EC; Independent 3rd party assessment (Notified Body #0673)

A product's approval should be verified by the marking on the unit.

8.2. Product Family Table – Agency Approvals

Model #	EMC	LVD	ATEX	ATEX Classification	European Marking	Ambient Rating
Wolverine	YES	N/R	YES	⟨Ex⟩ II 3(3) G	Ex nC[nL] IIC T4	$0 \leq Ta \leq 50°$ C
Wolverine AC	YES	YES	YES	⟨Ex⟩ II 3(3) G	Ex nC[nL] IIC T4	$0 \leq Ta \leq 50°$ C
Wolverine II DC (without heater option)	YES	N/R	YES	⟨Ex⟩ II 3(3) G	Ex nC[nL] IIC T4	$0 \leq Ta \leq 50°$ C
Wolverine II AC (without heater option)	YES	YES	YES	⟨Ex⟩ II 3(3) G	Ex nC[nL] IIC T4	$0 \leq Ta \leq 50°$ C
Wolverine II DC (with heater option)	YES	N/R	YES	⟨Ex⟩ II 3(3) G	Ex nC[nL] IIC T4	$-30 \leq Ta \leq 50°$ C
Wolverine II AC (with heater option)	YES	YES	YES	⟨Ex⟩ II 3(3) G	Ex nC[nL] IIC T4	$-40 \leq Ta \leq 50°$ C

8.3. Government Regulations

U.S., Canadian, Australian and European regulations are intended to prevent equipment from interfering with approved transmissions or with the operation of other equipment through the AC power source.

The Wolverine industrial computer has been tested and found to meet or exceed the requirements of U.S. (47 CFR 15), Canadian (ICES-003), Australian (AS/NZS 3548), and European (EN55022) regulations for Class A digital devices when installed in accordance with the guidelines noted in the appropriate product section. These various regulations share commonality in content and test levels with that of CISPR 22 and based on this commonality testing to the each individual standard was deemed inappropriate.

The FCC requires the following to be published according to FCC guidelines:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications to the product or installation that are not expressly approved by Computer Dynamics could void the user's authority to operate the equipment under FCC rules.

Industry Canada requires the following note to be published:

This Class A digital apparatus complies with Canadian ICES-003.

8.4. Field Wiring Control Drawing

Field Wiring Control Drawing – Wolverine, Wolverine AC, Wolverine II DC, Wolverine II AC

DRW00288 Rev A

Hazardous (Classified) Locations
Class I, Division 2 Groups A, B, C and D
Group II Category 3 Gas Group IIC,
Zone 2 environments

Hazardous (Classified) Locations
Class I, Division 2 Groups A, B, C and D
Group II Category 3 Gas Group IIC,
Zone 2 environments or Non Hazardous
Environments

Wolverine Associated
Apparatus Parameters

Field Wiring
Apparatus Parameters

Keyboard and Mouse (PS2 ports)

$U_o = 5V\,DC$
$I_o = 100\,mA$
$L_o = 5\,mH$
$C_o = 1000\,uF$

For Connection to Keyboard and Mouse (PS2 ports)

$U_i \geq 5VDC$
$I_i \geq 100\,mA$
$L_i + L_c \leq 5\,mH$
$C_i + C_c \leq 1000\,uF$

Ethernet (RJ-45 Port)

$U_o = 5V\,DC$
$I_o = 100\,mA$
$L_o = 5\,mH$
$C_o = 1000\,uF$

For Connection to Ethernet (RJ-45 Port)

$U_i \geq 5VDC$
$I_i \geq 100\,mA$
$L_i + L_c \leq 5\,mH$
$C_i + C_c \leq 1000\,uF$

USB Port

$U_o = 5V\,DC$
$I_o = 100\,mA$
$L_o = 3\,uH$
$C_o = 15\,uF$

For Connection to USB Port

$U_i \geq 5VDC$
$I_i \geq 100\,mA$
$L_i + L_c \leq 3\,uH$
$C_i + C_c \leq 15\,uF$

Wolverine Field
Wiring Parameters

Ethernet (RJ-45 Port)

$U_i = 5VDC$
$I_i = 100\,mA$
$L_i = 0\,mH$
$C_i = 0.5\,uF$

USB Port

$U_i = 5VDC$
$I_i = 100\,mA$
$L_i = 0\,mH$
$C_i = 0.1\,uF$

- Associated Field Apparatus equations for evaluation using Wolverine Field wiring parameters:
  $U_i > U_o$
  $I_i > I_o$
  $L_i + L_c < L_o$
  $C_i + C_c < C_o$
- If the electrical parameters of the cable are unknown, the following values may be used.
  $L_c - 0.20uH/0.305m\,(1\,ft)$
  $C_c - 60pF/0.305m\,(1\,ft)$
- Non-incendive Field Wiring must be installed in accordance with Article 501 of the National Electrical Code ANSI/NFPA 70 or authority Having jurisdiction.

9. Field Maintenance

9.1. Inspection

The Wolverine industrial computer is housed in a sealed enclosure with an IP67 enclosure rating. Care must be taken to insure the enclosure is not damaged due to mishandling etc. which could compromise the seal. If the enclosure is damaged then the unit must be returned to the manufacturer for repair.

The gaskets are an integral part of the IP67 seal. If any of the access plates are removed then the gasket should be inspected before re-installing the plate to insure it has not been damaged. If visible damage is apparent then the gasket must be replaced. The unit may be returned to the manufacturer for repair or alternately a replacement gasket kit may be ordered for field replacement.

All components and interconnects in the Wolverine industrial computers have been firmly secured during the assembly process. It is not necessary to inspect the internal components. If internal damage is suspected then the unit should be returned to the manufacturer for repair.

9.2. Field Serviceable Components

Most of the components internal to the enclosure are not accessible to the user and do not allow for field serviceability. The unit must be returned to the manufacturer for repair or replacement of components not addressed in this section.

9.2.1. Fuses

There is one user-serviceable fuse on the back I/O plate. The gland plate must be removed to access the fuse holder. Fuse sizes and suggested replacements are listed below. Contact your Computer Dynamics sales representative for spare fuses.

Model #	Fuse Size	Suggested Replacement Fuse	CDI PN
Wolverine	5A 250V 5x20 mm	Littelfuse 217-005 or Bussmann GDB-5A	81A6192-0001
Wolverine AC	2A 250V 5x20 mm	Littelfuse 215002 or Wickman USA 181120000	7FUS0-0003-0400
Wolverine II DC (without heater option)	5A 250V 5x20 mm	Littelfuse 217-005 or Bussmann GDB-5A	81A6192-0001
Wolverine II AC (without heater option)	2A 250V 5x20 mm	Littelfuse 215002 or Wickman USA 181120000	7FUS0-0003-0400
Wolverine II DC (with heater option)	25A 32V 3AG	Littelfuse 312025P or Bussmann AGC-25-R	42G6192-0002
Wolverine II AC (with heater option)	8A 250V 5x20 mm	Littelfuse 215008 or Bussmannn S505-8A	81A6112-0001

9.2.2. Hard Drive

To access the hard drive, remove the access plate. The access plate location varies by model - see illustrations in Chapter 4. Depending on the configuration, a Solid State Drive or Compact Flash Drive may be installed instead of a Hard Drive. Contact your Computer Dynamics sales representative for drive replacement options.

9.2.3. Gaskets

Field replacement kits are available for the gaskets that are used to seal the various access plates on the Wolverine industrial computers*. Contact your Computer Dynamics sales representative to order a gasket replacement kit from the table below.

Model #	Gasket Description	Gasket Replacement Kit – CDI PN, Description
Wolverine Wolverine AC	Antenna Mounting Plate	DP058440, PAC-WV, FIELD GASKET KIT, ANTENNA PLATE
	Hard Drive Access Plate	DP058450, PAC-WV, FIELD GASKET KIT, HDD PLATE
	PCMCIA Access Plate	DP058460, PAC-WV, FIELD GASKET KIT, PCMCIA PLATE
	Gland Plate	DP058470, PAC-WV, FIELD GASKET KIT, GLAND PLATE
Wolverine II DC Wolverine II AC	Antenna Mounting Plate	DP058440, PAC-WV, FIELD GASKET KIT, ANTENNA PLATE
	Hard Drive Access Plate	DP058480, PAC-WV2, FIELD GASKET KIT, HDD PLATE
	Gland Plate	DP058470, PAC-WV, FIELD GASKET KIT, GLAND PLATE

*Note: The PCMCIA Access Plate Gasket on Wolverine II DC and Wolverine II AC models is not field replaceable. Unit must be returned to manufacturer for replacement of this gasket.

10. RMA Request & Return Form

If you need to return one of our products for repair, please complete our RMA Request Form found on the [support page](#) of our website.

About Computer Dynamics

Computer Dynamics (A GE Intelligent Platforms Company) is a leading global provider of flat panel display solutions for a wide range of industries and applications. Our comprehensive product offering includes open-frame, enclosed, and environmentally sealed flat panel display systems in both computer and monitor configurations. The company is headquartered in the U.S. and is a part of GE Intelligent Platforms. Whether you're looking for one of our standard products or a fully custom solution, Computer Dynamics has the breadth, experience and 24/7 support to deliver what you need. For more information, visit www.cdynamics.com.

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Additional Resources

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