UNO-2668

Celeron 400MHZ
UNO with 3 LAN Ports,
8 Isolated RS-232/422/485 Ports
& 1U Form Factor

UNO-2678

Celeron M 600MHZ/ 1GHZ
UNO with 3 LAN Ports,
8 Isolated RS-232/422/485 Ports
& 1U Form Factor

User Manual

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This manual is for UNO-2668/2678.

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Product Warranty (2 years)

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This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

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FCC Class A

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.

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- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Contents

CHAPTER 1

Overview

This chapter provides an overview of UNO-2668/2678's specifications.

Sections include:

- Introduction
- Hardware specification
- Safety precautions
- Chassis dimensions

Chapter 1 Overview

1.1 Introduction

UNO-2668/2678 is an embedded Application Ready Platform (ARP) that can shorten your development time and offers rich networking interfaces to fulfill extensive needs in different projects. Advantech Universal Network Controller is designed to be a total solution for network enabled Application Ready Platforms.

Leveraging field-approved and worldwide approved real-time OS technology, Advantech UNO-2668/2678 series provides a Windows CE .NET and Windows XP Embedded ready solution, and supports several standard networking interfaces, such as Ethernet, RS-232/422/485 and more. Because of its openness, great expansion capability and reliable design (fanless and diskless), the UNO-2668/2678 series are ideal embedded platforms for implementing custom applications for diverse applications.

Open Architecture Designed for Automation

For applications demanding customized control, an UNO-2668/2678 that uses more flexible, off-the-shelf technology is a better option. UNO-2668/2678 uses off-the-shelf components such as an x86 processor, an Ethernet chip set, CompactFlash., and DRAM. At the same time, the UNO-2668/2678 unit can broadcast the process data through the Ethernet and share the data with operators and managers. By using off-the-shelf components, machine builders can customize the control scheme they use for other machines that require multiple inputs, optimized control, or Ethernet communication. So, UNO-2668/2678 offers the I/O connectivity of PCs with options like: 3 x 10/100Base-T Ethernet, 8 x RS-232/422/485, 2 x USB, CompactFlash and VGA interfaces for display panels.

An Industry-Proven Design

Industrial and mobile applications require controllers with high-vibration specifications and a wide temperature range. Machines or controllers in light industrial environments also require flexible and stable mounting. Many machine builders underestimate the need for a more rugged controller because their end applications are mounted in an industrial enclosure.

Advantech UNO-2668/2678 has a special design without the weaknesses of a standard PC. No fan, and no HDD prevent dust and vibration problems. With a smart mechanical design, UNO-2668/2678 can meet 50 G shock (Use CompactFlash® card), 2 G vibration (Use CompactFlash card), up to 50° C operating temperature and almost anything an industrial environment can demand.

Designed to Fit Comfortably Into Racks

In completely new packaging, UNO-2668/2678 has standard 1U rack size as 440 x 220 x 44 mm (W x H x D) could fit your rack. You could easily mount UNO-2668/2678 on rack and manage all UNOs in one rack and easily develop your application on rack.

Flexible Networking Options

The Advantech UNO-2668/2678 offers two ways to connect to a network: Ethernet and Modem. The three built-in Ethernet ports provide high-speed networking capability up to 100 Mbps. And through UNO-2668/2678's isolated serial COM ports, you could link industrial modems to offer the most popular and easiest networking method by PSTN. Not only 8 channel serial COM port has 3 serial type but also provides surge and isolation protection up to 2,000V_{DC}, protecting your system from abrupt high voltage attack and accident or damage in harsh environments.

Popular Operating Systems and Rapid Application Development

The Advantech UNO-2668/2678 supports the popular off-the-shelf Microsoft Windows 2000/NT/XP operating systems and the Linux operating system. UNO-2668/2678 also features pre-built Microsoft Windows XP embedded or Windows CE solutions offering a pre-configured image with optimized onboard device drivers. Microsoft Windows CE and XP Embedded are compact, highly efficient, and real-time operating systems that are designed for embedded systems without a HDD. There is no need to waste time and energy on developing onboard device drivers or using the Platform Builder to build a custom Windows CE image, they have all been done for the Advantech UNO-2668/2678 series! Through the built-in runtime library and Software Development Kit (SDK), the UNO-2668/2678 series leverages your existing Windows-based programming skills to rapidly develop applications.

1.2 Hardware Specifications

General

Certifications	CE, FCC class A,
Dimensions (W x D x H)	1U (440 x 220 x 44 mm) (17.3” x 8.6” x 1.7”)
Enclosure	SECC
Mounting	Rack, wall
Power Consumption	22 W (Typical)
Power Input	Min. 48 W (9 ~ 36 V_{DC}) (e.g +24 V @ 2 A)
Weight	3.6 kg
OS Support	Windows XP Embedded SP2, Windows 2000/ XP,Windows CE .NET 5.0, Linux

System Hardware

CPU	
UNO-2668:	Celeron 400 Mhz
UNO-2678:	Celeron 600 MHz (Celeron M Core), or Celeron M 1 GHz
Indicators	Power, Power input 1, Power input 2, Power fault, IDE, & all serial port Tx/Rx monitoring
Keyboard/Mouse	1 x PS/2
Memory	
UNO-2668:	256 MB SDRAM
UNO-2678:	256/512 MB DDR DRAM
Storage	
SSD:	1 x internal type I/II CompactFlash slot
HDD:	Extension kit for one standard 2.5” HDD
VGA	DB15 VGA connector

Communications

Serial Ports

Eight RS-232/422/485 ports include:

- 2 x DB-9 connectors with 9-wired RS-232
- 6 x screw terminals with 5-wired RS-232

Automatic RS-485 data flow control

2000 V_{DC} surge protection & isolation

Serial Port Speed

RS-232:	50 ~ 230.4 kbps
RS-422/485:	50 ~ 921.6 kbps (Max.)
LAN:	3 x 10/100Base-T RJ-45 ports

USB Ports

UNO-2668:	2 x USB, UHCI, Rev. 1.1 compliant
UNO-2678:	2 x USB, UHCI, Rev. 2.0 compliant

Environment

Humidity	95% @ 40° C (non-condensing)
Operating Temperature	-10 ~ 50° C (14 ~ 122° F)
Shock Protection	IEC 68 2-27
CompactFlash:	50 G @ wall mount, half sine, 11 ms
HDD:	20 G @ wall mount, half sine, 11 ms
Vibration Protection	IEC 68 2-64 (Random 1 Oct./min, 1hr/axis.)
CompactFlash:	2 Grms @ 5 ~ 500 Hz,
HDD:	0.5 Grms @ 5 ~ 500 Hz

1.3 Safety Precautions

The following,messages informs how to make each connection. In most cases, you will simply need to connect a standard cable.

Warning!

Always disconnect the power cord from your chassis whenever you are working on it. Do not connect while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.

Caution! *Always ground yourself to remove any static electric charge before touching UNO-2668/2678. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.*

Attention! *If DC voltage is supplied by an external circuit, please put a protection device in the power supply input port.*

1.4 Chassis Dimensions

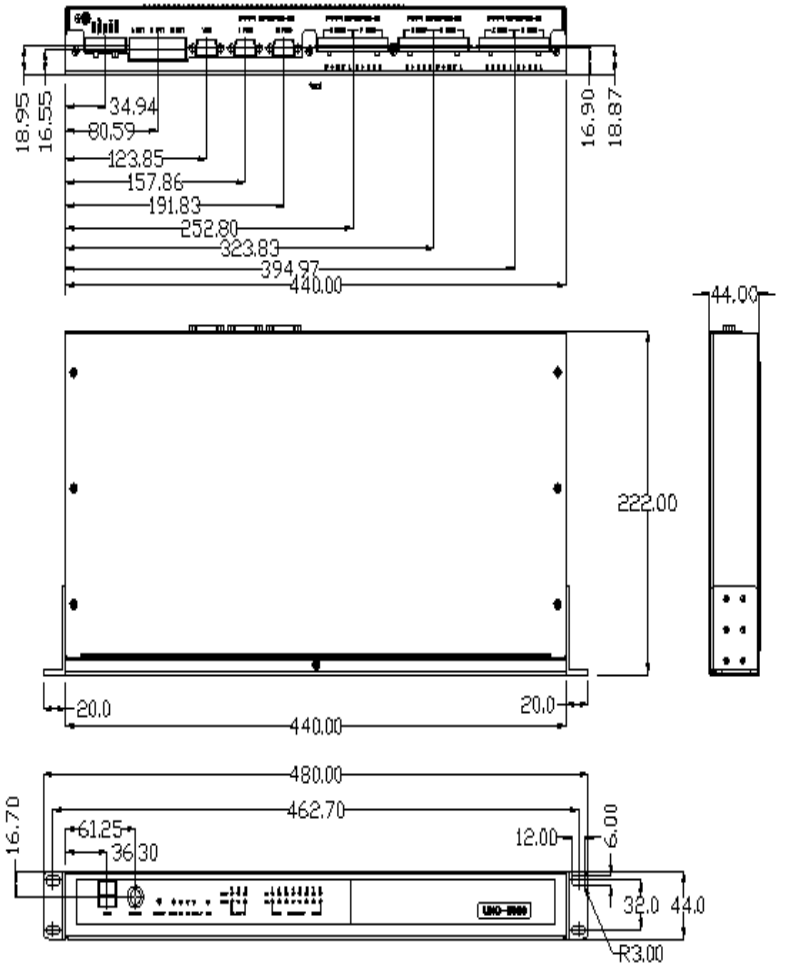

Figure 1.1: Chassis Dimensions

1.5 Packing List

The accessory package of UNO-2668/2678 contains the following items:

(A) UNO-2668 or UNO-2678

(B) 2 x rack mounting kit

(C) 8 x screw for rack mount kit

(D) UNO series Driver and Utility CD-ROM

(E) Keyboard/Mouse PS/2 cable

(F) IDE cable for 2.5" HDD

(G) 2.5" HDD extension kit; 8 screws and 4 HDD extension kit buffers

CHAPTER 2

Hardware Functionality

This chapter shows how to setup the UNO-2668/2678's hardware functions, including connecting peripherals, setting switches and indicators.

Sections include:

- Introduction
- RS-232/422/485 Interface
- LAN / Ethernet Connector
- Power Connector
- PS/2 Mouse and Keyboard Connector
- USB Connector
- VGA Display Connector
- Reset Button

Chapter 2 Hardware Functionality

2.1 Introduction

The following two figures show the connectors on UNO-2668/2678. The following sections give you detailed information about function of each peripheral.

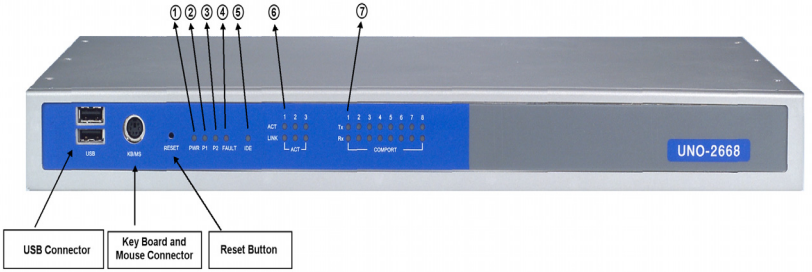

Figure 2.1: Front Panel of UNO-2668/2678

Table 2.1: LED Definition

Item	LED	Status	Description
1	PWR	On	System power is on
		Off	System power is off
2	P1	On	Power input 1 is active
		Off	Power input 1 is inactive
3	P2	On	Power input 2 is active
		Off	Power input 2 is inactive
4	Fault	On	Power input 1 or Power input 2 have failed
		Off	Power input 1 and Power input 2 are active
5	IDE	On	Data being received/transmitted on IDE
		Off	No data being received/transmitted on IDE
6	ACT	On	Ethernet data being received/transmitted
		Off	No data being received/transmitted
	LINK	On	10/100Mbps Network links
		Off	Invalid 10/100 Mbps Network link
7	Tx (Port N) N = 1~ 8	On	Serial port data being transmitted
		Off	No data being transmitted
	Rx (Port N) N = 1~ 8	On	Serial port data being received
		Off	No data being received

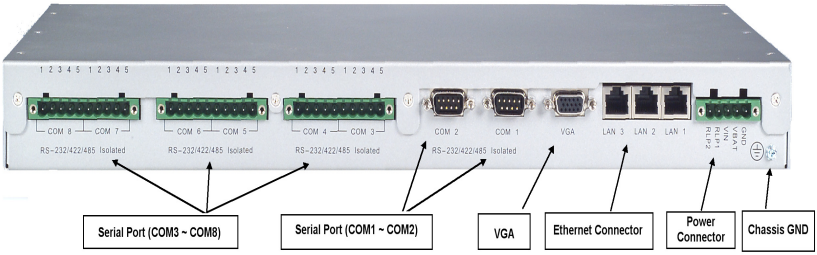

Figure 2.2: Rear Panel

2.2 RS-232/422/485 Interface (COM1~COM8)

The UNO-2668/2678 offers eight RS-232/422/485 serial communication interface ports: COM1 and COM8. Please refer to Appendix A.3 & A.4 for their pin assignments. The default settings of COM1 through COM8 are all RS-232.

2.2.1 16PCI954 UARTs with 128-byte standard

Advantech UNO-2668/2678 comes with 16PCI954 UARTs containing 128 byte FIFOs.

2.2.2 RS-422/485 detection

In RS-422/485 mode, UNO-2668/2678 automatically detects signals to match RS-422 or RS-485 networks. (No jumper change required)

2.2.3 Automatic Data Flow Control Function for RS-485

In RS-485 mode, UNO-2668/2678 automatically detects the direction of incoming data and switches its transmission direction accordingly. So no handshaking signal (e.g. RTS signal) is necessary. This lets you conveniently build an RS-485 network with just two wires. More importantly, application software previously written for half duplex RS-232 environments can be maintained without modification.

2.2.4 RS-232/422/485 Selection

COM1 ~ COM8 support RS-232, RS-422 and RS-485 interfaces. The system detects RS-422 or RS-485 signals automatically in RS-422/485 mode.

To select between RS-422/485 and RS-232 for COM1 ~ COM8, adjust JP3 ~ JP10.

Jumper settings for RS-422/485 interface: (JP3 ~ JP10)

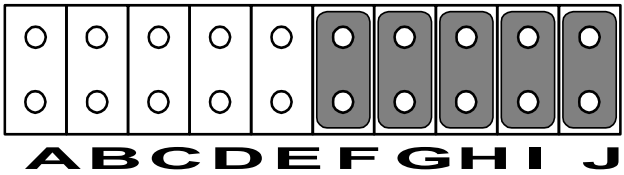

Figure 2.3: RS-422/485 jumper setting

Jumper settings for RS-232 interface: (Default setting) (JP3 ~ JP10)

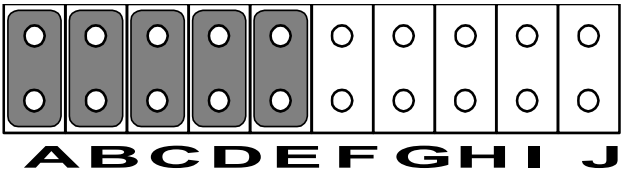

Figure 2.4: RS-232 jumper setting

2.2.5 Auto Flow Control & Master/Slave Modes

You can set the "Auto Flow Control" mode of RS-485 or "Master/Slave" mode of RS-422 by using the SW2 DIP switch for each RS-422/485 port.

In RS-485, if the switch is set to "Auto", the driver automatically senses the direction of the data flow and switches the direction of transmission. No handshaking is necessary.

In RS-422, if DIP switch is set to "On," the driver is always enabled, and always in high or low status.

2.2.6 Termination Resistor (JP1 ~ JP8)

The onboard termination resistor (120 ohm) for COM1 ~ COM8 (J1 ~ J8) can be used for long distance transmission or device matching. (Default Open.).

COM	Close A	Enable TR for Data/TX
	Close B	Enable TR for RX

2.3 LAN: Ethernet Connector

The UNO-2668 is equipped with a Realtek RTL8100 Ethernet LAN controller and UNO-2678 is equipped with a Realtek RTL8139 Ethernet LAN controller, which are fully compliant with IEEE 802.3u 10/100Base-T CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack on board, and LED indicators on the front side to show its Link (Green LED) and Active (Yellow LED) status.

2.4 Power Input

The UNO-2668/2678 comes with a Phoenix connector that carries 9~36 VDC external power input, and features reversed wiring protection. Therefore, it will not cause any damage to the system by reversed wiring of ground line and power line. Please refer to Appendix A.6

UNO-2668/2678 supports two individual power inputs (P1/P2). If the voltage of power input < 9 V_{DC}, it will switch to another power input and the FAULT LED will be enable.

2.5 PS/2 Keyboard and Mouse Connector

The UNO-2668/2678 provides a PS/2 keyboard and PS/2 mouse connector. A 6-pin mini-DIN connector is located on the front panel of the UNO-2668/2678. The UNO-2668/2678 comes with an adapter to convert from the 6-pin mini-DIN connector to two 6-pin mini-DIN connectors for PS/2 keyboard and PS/2 mouse connection. Please refer to Appendix A.7 for its pin assignments.

2.6 USB Connector

The USB connector is used for connecting any device that conforms to the USB interface. Many recent digital devices conform to this standard. The USB interface supports Plug and Play, which enables you to connect or disconnect a device whenever you want, without turning off the computer.

The UNO-2668/2678 provides two USB interface connectors, which provide complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 1.1 compliant of UNO-2668. The USB interface complies with USB UHCI, Rev. 2.0 compliant of UNO-2678. The USB interface can be disabled in the system BIOS setup. Please refer to Appendix A.8 for its pin assignments.

Note *It is recommended that a CD-ROM attached by USB is used to install Windows or other operating systems.*

2.7 VGA Display Connector

The UNO-2668 provides a VGA controller (Chipset VIA Twister chip with Integrated Savage4 2D/3K/Video Accelerator for a high resolution VGA interface. It supports up to 1280 x 1024 @ 32bpp (60Hz) / 1024 x 768 @ 32bpp (85Hz)and support 8/16/32 MB frame buffer with system memory. The UNO-2678 provides a VGA controller (Intel 855/852 GME, supports a single 1.5V accelerated graphics port interface) for a high resolution VGA interface. It supports CRT Mode: 1280 x 1024 @ 32bpp (60Hz), 1024 x 768 @ 32bpp (85Hz); LCD/Simultaneous Modes: 1280 x 1024 @ 16bpp(60Hz), 1024 x 768 @16bpp(60Hz) and up to 32 MB shared memory.

2.8 Reset Button

Press the "Reset" button on the front panel to activate the reset function.

CHAPTER 3

Initial Setup

This chapter introduces how to initialize the UNO-2668/2678.

Sections include:

- Inserting a CompactFlash™ Card
- Conneting Power
- Connecting a Hard Disk
- BIOS Setup and System Assignments

Chapter 3 Initial Setup

3.1 Inserting a CompactFlash Card

UNO-2668/2678 provides one CompactFlash slot. Following is the procedure for the installing a CompactFlash card (Slot CN7).

Please follow these steps carefully.

1. Remove the power cord.
2. Unscrew the screws from the top cover of UNO-2668/2678.
3. Remove the top cover.
4. Plug a CompactFlash card with your OS and application program into a CompactFlash card slot on board.
5. Screw back the top cover with screws.

NOTE: CompactFlash disk (CN7) is Second IDE and HDD (CN5) is Primary IDE.

3.2 Connecting Power

Connect the UNO-2668/2678 to a 9~36 VDC power source. The power source can either be from a power adapter or an in-house power source.

3.3 Installing a Hard Disk

Please follow these steps to install a hard disk into the UNO-2668/2678.

1. Remove the power cord.
2. Unscrew the screws from the top cover of UNO-2668/2678.
3. Remove the top cover.
4. Install the HDD in HDD bracket and screw on the HDD with the four screws.
5. Put HDD extension kit buffer on down cover of UNO-2668/2678, and put HDD extension kit on four buffers and screw on it.
6. Connect the IDE flat cable to IDE connector (CN5), then connect the other side of the connector to the hard disk.
7. Screw back the top cover with screws.

3.4 BIOS Setup and System Assignments

UNO-2668 adopts Advantech's SOM-4475 CPU module. Further information about the SOM-4475 CPU module, can be found in SOM-4475's user's manual. You can find this manual on the UNO-2668 driver and utility CD-ROM.

UNO-2678 adopts Advantech.s SOM-4481 CPU module. Further information about the SOM-4481 CPU module, can be found in SOM-4481's user's manual. You can find this manual on the UNO-2678's driver and utility CD-ROM.

Please note that you can try to "LOAD BIOS DEFAULTS" from the BIOS Setup manual if the UNO-2668/2678 does not work properly.

Appendix A

System Settings and Pin Assignments

Appendix A System Settings and Pin Assignments

A.1 UNO-2668 System I/O & Interrupt Assignments

Table A.1: UNO-2668 System I/O Ports

Address Range	Device
000-01F	DMA controller (slave)
020-03F	Interrupt controller 1, (master)
040-05F	8254 timer/counter
060-06F	8042 (keyboard controller)
070-07F	Real-time clock, non-maskable interrupt (NMI)mask
080-09F	DMA page register,
0A0-0BF	Interrupt controller 2 (slave)
0C0-0DF	DMA controller (master)
0F0	Clear math co-processor
0F1	Reset math co-processor
0F8-0FF	Math co-processor
1F0-1F8	1st fixed disk
278-27F	Reserved
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller
443	Watchdog timer

Table A.2: UNO-2668 Interrupt Assignments

Interrupt No.	Interrupt Source
NMI	Parity error detected
IRQ 0	Interval timer

Table A.2: UNO-2668 Interrupt Assignments

Interrupt No.	Interrupt Source
IRQ 1	Keyboard
IRQ 2	Interrupt from controller 2 (cascade)
IRQ 3	Free
IRQ 4	Free
IRQ 5	Free
IRQ 6	Diskette controller (FDC)
IRQ 7	Free
IRQ 8	Real-time clock
IRQ 9	Free
IRQ 10	Free
IRQ 11	Reserved for watchdog timer
IRQ 12	PS/2 mouse
IRQ 13	INT from co-processor
IRQ 14	Primary IDE
IRQ 15	Secondary IDE for CompactFlash

A.2 UNO-2678 System I/O & Interrupt Assignments

Table A.3: UNO-2678 System I/O Ports

Address Range	Device
000-01F	DMA controller (slave)
020-03F	Interrupt controller 1, (master)
040-05F	8254 timer/counter
060-06F	8042 (keyboard controller)
070-07F	Real-time clock, non-mask interrupt (NMI)
080-09F	DMA page register,
0A0-0BF	Interrupt controller 2 (slave)
0C0-0DF	DMA controller (master)
0F0	Clear math co-processor

Table A.3: UNO-2678 System I/O Ports	
0F1	Reset math co-processor
0F8-0FF	Math co-processor
1F0-1F8	1st fixed disk
278-27F	Reserved
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller

Table A.4: UNO-2678 Interrupt Assignments	
Interrupt No.	**Interrupt Source**
NMI	Parity error detected
IRQ 0	Interval timer
IRQ 1	Keyboard
IRQ 2	Interrupt from controller 2 (cascade)
IRQ 3	Free
IRQ 4	Free
IRQ 5	Free
IRQ 6	Diskette controller (FDC)
IRQ 7	Free
IRQ 8	Real-time clock
IRQ 9	Free
IRQ 10	Free
IRQ 11	Free
IRQ 12	PS/2 mouse
IRQ 13	INT from co-processor
IRQ 14	Primary IDE
IRQ 15	Secondary IDE for CompactFlash

A.3 RS-232/422/485 9pin Serial Port (COM1~COM2)

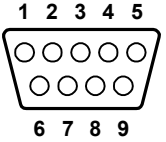

Table A.5: RS-232/422/485 pin assignments

Pin	RS-232	RS-422	RS-485
1	DCD	Tx-	Data-
2	Rx	Tx+	Data+
3	Tx	Rx+	-
4	DTR	Rx-	-
5	GND	GND	GND
6	DSR	-	-
7	RTS	-	-
8	CTS	-	-
9	RI	-	-

A.4 RS-232/422/485 5pin Serial Port (COM3~COM8)

Table A.6: RS-232/422/485 pin assignments

Pin	RS-232	RS-422	RS-485
1	Rx	Tx+	Data+
2	Tx	Tx-	Data-
3	RTS	Rx+	-
4	CTS	Rx-	-
5	GND	GND	GND

A.5 Ethernet RJ-45 Connector (LAN1~LAN2)

Table A.7: Ethernet RJ-45 connector pin assignments

Pin	10/100Base-T Signal Name
1	XMT+
2	XMT-
3	RCV+
4	NC
5	NC
6	RCV-
7	NC
8	NC

A.6 Power Screw Terminal (PWR)

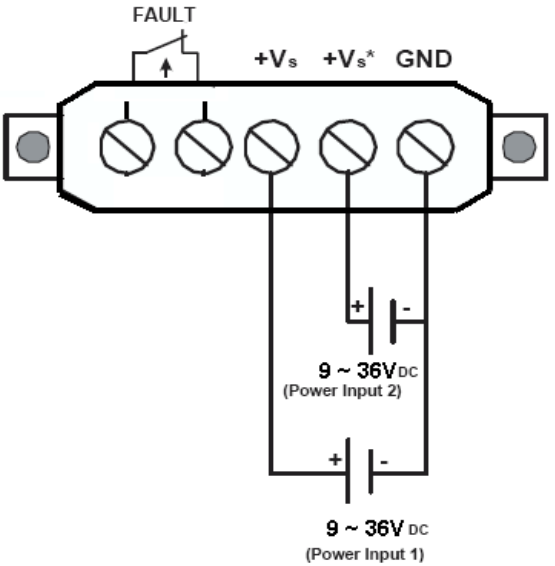

Figure A.1: Power Connector Pin Assignments

Pin	Signal Name
+Vs	Power input 1; Range: 9~36 V_{DC}
+Vs*	Power input 2; Range: 9~36 V_{DC}
GND	Ground

UNO-2668/2678 supports two individual power inputs (P1/P2). If the voltage of the power input < 9 V_{DC}, it will switch to another power input and the FAULT LED will be enabled.

A.7 PS/2 Keyboard and Mouse Connector

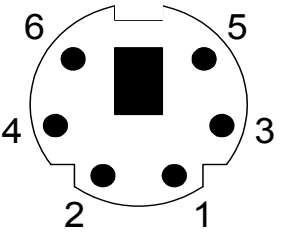

Table A.8: Keyboard & mouse pin assignments

Pin	Signal Name
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB Clock
6	MS Clock

A.8 USB Connector (USB1~USB2)

Table A.9: USB connector pin assignments

Pin	Signal Name	Cable Color
1	VCC	Red
2	DATA+	White
3	DATA-	Green
4	GND	Black

A.9 VGA Display Connector

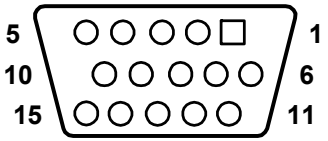

Table A.10: VGA adaptor cable pin assignment

Pin	Signal Name
1	Red
2	Green
3	Blue
4	NC
5	GND
6	GND
7	GND
8	GND
9	NC
10	GND
11	NC
12	NC
13	H-SYNC
14	V-SYNC
15	NC

Appendix B

Programming the Watchdog Timer

Sections include:

- UNO-2668
- UNO-2678

Appendix B Watchdog Timer Programming

B.1 UNO-2668

To program the watchdog timer, you must write a program which writes I/O port address 443 (hex). The output data is a value of time interval. The value range is from 01 (hex) to 3E (hex), and the related time interval is 1 sec. to 62 sec.

Data	Time Interval
01	1 sec.
02	2 sec.
03	3 sec.
04	4 sec.
..	
..	
..	
3E	62 sec.

After data entry, your program must refresh the watchdog timer by rewriting the I/O port 443 (hex) while simultaneously setting it. When you want to disable the watchdog timer, your program should read I/O port 443 (hex).

The following example shows how you might program the watchdog timer in BASIC:

```
10   REM Watchdog timer example program
20   OUT &H443, data REM Start and restart the watchdog
30   GOSUB 1000 REM Your application task #1,
40   OUT &H443, data REM Reset the timer
50   GOSUB 2000 REM Your application task #2,
60   OUT &H443, data REM Reset the timer
70   X=INP (&H443) REM, Disable the watchdog timer
80   END
1000  REM Subroutine #1, your application task
..
..
..
1070   RETURN
2000   REM Subroutine #2, your application task
..
..
..
2090   RETURN
```

B.2 UNO-2678

Below is a sample of programming code for controlling the Watchdog Timer function.

```
--------------------------------------------------------------------------------
Enter the extended function mode, interruptible double-write |
--------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
--------------------------------------------------------------------------------
Configured logical device 8, configuration register CRF6 |
--------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,2BH
OUT DX,AL
MOV DX,2FH
IN AL,DX
AND AL.OEFH;Setbit 4=0 Pin 89=WDTO
OUT DX,AL
MOV DX,2EH
MOV AL,07H; point to Logical Device Number Reg.
OUT DX,AL
MOV DX,2FH
MOV AL,08H; select logical device 8
OUT DX,AL;
MOV DX,2EH
MOV AL,30H;Set watch dog activate or inactivate
OUT DX,AL
MOV DX,2FH
MOV AL,01H; 01:activate 00:inactivate
```

```
OUT DX,AL;
MOV DX,2EH
MOV AL,F5H; Setting counter unit is second
OUT DX,AL
MOV DX,2FH
MOV AL,00H
OUT DX,AL;
MOV DX,2EH
MOV AL,F6H
OUT DX,AL
MOV DX,2FH
MOV AL,05H; Set 5 seconds
OUT DX,AL
;-----------------------------------------
; Exit extended function mode |
;-----------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL
```