

**NOVA-600-R2**  
**User Manual**  
**Version 2.0**

**EBX Pentium® Embedded Board**

March 16, 2004



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# Chapter 1 Introduction

Thank you for choosing NOVA-600-R2 EBX Pentium® Embedded Board. NOVA-600-R2 board is an EBX form factor board equipped with high performance Pentium® CPU, an advanced high performance LCD/CRT interface, and 10/100Mbps Ethernet etc. designed for system manufacturers, integrators, or VARs to provide all reliable and quality performance at a reasonable price.

This board has a built-in DiskOnChip™ (DOC) Flash Disk for embedded application. The DOC Flash Disk is 100% compatible to hard disk. Users can use any DOS command without any extra software utility. The DOC currently is available from 2MB to 72MB.

An isolated digital I/O function is designed on the board. The function provides 4-bit digital inputs and 4-bit digital outputs. It is very useful in embedded application.

In addition, NOVA-600-R2 has built-in C&T 69000 HiQPro™ LCD/CRT Chipset and 2MB EDO RAM. The LCD interface can drive up to 1280x1024 with 256 colors. The support flat panel will cover Color STN, TFT, EL etc., and also 3.3V or 5V version.

## 1.1 Specifications

NOVA-600-R2 Pentium® with HiQPro™ LCD/CRT Single Board Computer provides the following specifications:

| Field                    | Description   |
|--------------------------|---|
| CPU                      | Pentium® MMX up to 233Mhz, AMD K6 processor up to 300MHz, Cyrix 6x86MX and IDT C6 processor   |
| Bus                      | ISA bus and PCI 32-bit local bus, PCI 2.1 standard  |
| Chipset                  | ALI Alladin 4+  |
| LCD/CRT Interface        | <ul style="list-style-type: none"><li>➤ C&amp;T 69000 Chipset with 2MB EDO RAM</li><li>➤ CRT Resolution:<br/>1280x1024, 256 colors<br/>1024x768, 64K colors<br/>800x600, 16M colors</li><li>➤ 36-bit LCD Interface Resolution:<br/>1280x1024, 256 colors<br/>1024x768, 64K colors<br/>800x600, 16M colors</li></ul> Please contact <a href="http://www.chips.com">www.chips.com</a> for more information. |
| Ethernet                 | Built-in the RTL8100 Chipset<br>IEEE 802.3u 100BASE-TX standard<br>Auto-sensing interface to 10Mbps or 100Mbps networks<br>Full duplex capability<br>More information: <a href="http://www.realtek.com.tw">www.realtek.com.tw</a>   |
| Real-time clock/calendar | Built-in Alladin 4+ chipset, backup by industrial Li-battery, 3V/850mAH   |
| RAM memory               | Up to 128MB, SDRAM supported  |
| Second Cache Memory      | 512KB Pipelined Burst SRAM on board   |

|                              |  |
|------------------------------|--|
| Ultra DMA/33 IDE Interface   | Up to four PCI Enhanced IDE hard drives. The Ultra DMA/33 IDE can handle data transfer of up to 33MB/s. The best of all is that the new technology is compatible with existing ATA-2 IDE specifications. So there is no need to do any change to customer's current accessory. |
| Floppy disk drive interface  | Two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives.  |
| Four high speed Series ports | NS16C550 compatible UARTs  |
| Bi-directional Parallel Port | IrDA port: Support Serial Infrared (SIR) and Amplitude Shift Keyed IR (ASKIR) interface.<br><br>USB port: Support two USB ports for future expansion.  |
| Watchdog Timer               | The Watchdog Timer can be set by 1, 2, 10, 20,110 or 220 seconds period. Reset or NMI was generated when CPU did not periodically trigger the timer. Your program use hex 043 and 443 to control the watchdog timer and generate a system reset.                               |
| Flash Disk – DiskOnChip™     | The Flash Disk provides 100% compatible with hard disk. The built-in TrueFFS Transparent Flash Block Management and Space Reclamation will let customer to use the Flash Disk with DOS command, no need to install any extra software utility.                                 |
| Keyboard Connector           |  |
| Mouse                        | PS/2 Mouse Port on-board.  |
| Power Consumption            | +5V @ 5.1A (Pentium/MMX-200, 32MB SDRAM)   |
| Operating Temperature        | 0° ~ 55° C (CPU needs Cooler)  |

## 1.2 Package Contents

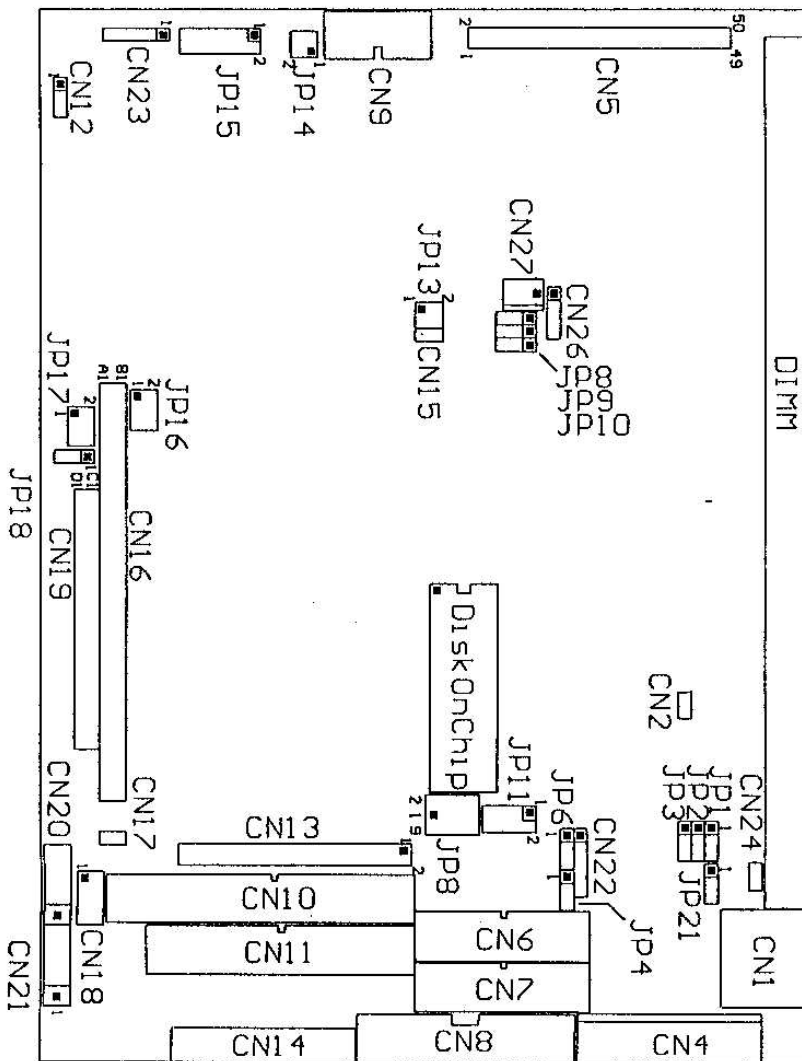
The package contents of NOVA-600-R2 include:

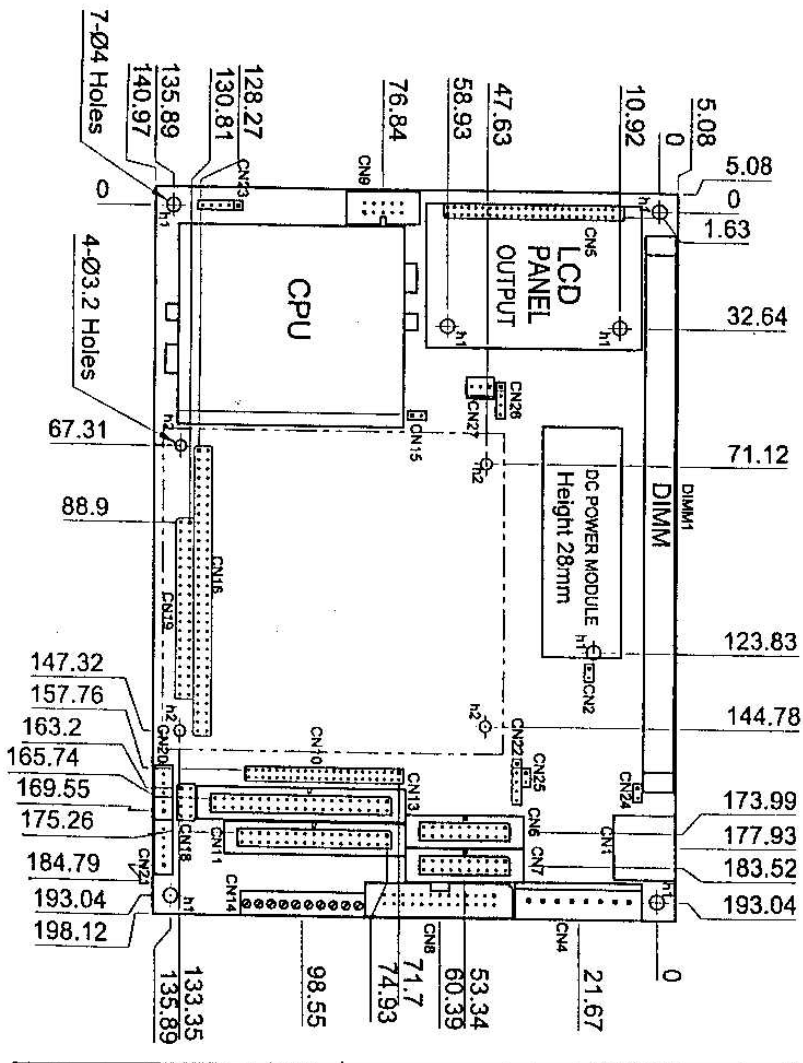
- NOVA-600-R2 Pentium® with HiQPro™ LCD/CRT Single Board Computer x 1
- Installation Guide CD (user manual included) x 1
- Quick Startup Reference x 1

## Chapter 2 Installation

This chapter describes how to install the NOVA-600-R2. At first, the layout of NOVA-600-R2 is shown, and the unpacking information that you should be careful is described. The jumpers and switches setting for NOVA-600-R2's configuration, such as CPU type selection, system clock setting, and watchdog timer, are also included.

### 2.1 NOVA-600-R2 Layout and Dimensions





## 2.2 Setting the CPU of NOVA-600-R2

- **CPU Clock Setting**

| CPU Speed/Clock | JP15<br>1-2 | JP15<br>9-10 | JP15<br>11-12 |
|-----------------|-------------|--------------|---------------|
| 60MHz           | SHORT       | OPEN         | OPEN          |
| <b>66MHz</b>    | <b>OPEN</b> | <b>OPEN</b>  | <b>OPEN</b>   |

- **CPU to Bus Multiple**

| Multiplier | JP15<br>3-4 | JP15<br>5-6  | JP15<br>7-8 |
|------------|-------------|--------------|-------------|
| 1.5 x      | OPEN        | OPEN         | OPEN        |
| 2x         | SHORT       | OPEN         | OPEN        |
| 2.5x       | SHORT       | SHORT        | OPEN        |
| <b>3 x</b> | <b>OPEN</b> | <b>SHORT</b> | <b>OPEN</b> |
| 3.5 x      | OPEN        | OPEN         | OPEN        |
| 4 x        | SHORT       | OPEN         | SHORT       |
| 4.5x       | SHORT       | SHORT        | SHORT       |

**CPU Frequency = CPU Clock x Multiplier, e.g. Pentium® 200MHz = 66MHz  
CPU Clock x 3**

- **CPU Core Voltage Selection**

Please check the CPU Core Voltage before you install the CPU. Right now new Intel MMX CPU is dual voltages for core and I/O, the I/O is 3.3V but the core is 2.8V. This kind of CPU design will enhance the low power consumption capability. As for the general Pentium CPU is one voltage for I/O and Core - 3.3V, 3.4V, or 3.5V.

- **JP1 CPU Core Voltage Setting**

(JP1 is in the DC Power Module)

| CPU Core Voltage  | JP1<br>1-2  | JP1<br>3-4  | JP1<br>5-6  | JP1<br>7-8   |
|-------------------|-------------|-------------|-------------|--------------|
| 3.5V(P54C/CS) VRE | SHORT       | SHORT       | SHORT       | SHORT        |
| 3.4V(P54C/CS) STD | OPEN        | SHORT       | SHORT       | SHORT        |
| 3.3V              | SHORT       | OPEN        | SHORT       | SHORT        |
| 3.2V              | OPEN        | OPEN        | SHORT       | SHORT        |
| 3.1V              | SHORT       | SHORT       | OPEN        | SHORT        |
| 3.0V              | OPEN        | SHORT       | OPEN        | SHORT        |
| 2.9V              | SHORT       | OPEN        | OPEN        | SHORT        |
| <b>2.8V</b>       | <b>OPEN</b> | <b>OPEN</b> | <b>OPEN</b> | <b>SHORT</b> |
| 2.7V              | SHORT       | SHORT       | SHORT       | OPEN         |
| 2.6V              | OPEN        | SHORT       | SHORT       | OPEN         |
| 2.5V              | SHORT       | OPEN        | SHORT       | OPEN         |
| 2.4V              | OPEN        | OPEN        | SHORT       | OPEN         |
| 2.3V              | SHORT       | SHORT       | OPEN        | OPEN         |
| 2.2V              | OPEN        | SHORT       | OPEN        | OPEN         |
| 2.1V              | SHORT       | OPEN        | OPEN        | OPEN         |
| 2.0V              | OPEN        | OPEN        | OPEN        | OPEN         |



- **Dual / Single CPU Voltage Setting**

| <b>Vcore &amp;VIO</b>                                    | <b>JP13<br/>1-2</b> | <b>JP13<br/>3-4</b> | <b>JP14<br/>1-2</b> | <b>JP14<br/>3-4</b> |
|--|---------------------|---------------------|---------------------|---------------------|
| Pentium® (P54C) IDT C6                                   | SHORT               | SHORT               | OPEN                | OPEN                |
| <b>Pentium® MMX AMD K6 Cyrix<br/>6x86MX Dual Voltage</b> | <b>OPEN</b>         | <b>OPEN</b>         | <b>SHORT</b>        | <b>SHORT</b>        |

- **Cyrix 6x86MX PR Rating Table (Vcore: 2.9V, dual voltage)**

| <b>PR Rating</b> | <b>Bus MHz</b> | <b>CPU Core MHz</b> | <b>Clock Multiplier</b> |
|------------------|----------------|---------------------|-------------------------|
| 6x86MX-PR133     | 50             | 100                 | 2x                      |
| 6x86MX-PR133     | 55             | 110                 | 2x                      |
| 6x86MX-PR150     | 60             | 120                 | 2x                      |
| 6x86MX-PR150     | 50             | 125                 | 2.5x                    |
| 6x86MX-PR166     | 66             | 133                 | 2x                      |
| 6x86MX-PR166     | 55             | 138                 | 2.5x                    |
| 6x86MX-PR166     | 50             | 150                 | 3x                      |
| 6x86MX-PR166     | 60             | 150                 | 2.5x                    |
| 6x86MX-PR200     | 55             | 165                 | 3x                      |
| 6x86MX-PR200     | 66             | 166                 | 2.5x                    |
| 6x86MX-PR200     | 60             | 180                 | 3x                      |
| 6x86MX-PR233     | 66             | 200                 | 3x                      |
| 6x86MX-PR266     | 66             | 233                 | 3.5x                    |

- **AMD K6 MMX Rating Table, dual voltage**

| <b>Product Name</b> | <b>Core Freq</b> | <b>Vcore</b> | <b>Bus MHz</b> | <b>Multiplier</b> |
|---------------------|------------------|--------------|----------------|-------------------|
| K6-233 model 6      | 233MHz           | 3.2V         | 66             | 3.5x              |
| K6-200 model 6      | 200MHz           | 2.9V         | 66             | 3x                |
| K6-166 model 6      | 166MHz           | 2.9V         | 66             | 2.5x              |
| K6-300 model 7      | 300MHz           | 2.2V         | 66             | 4.5x              |
| K6-266 model 7      | 266MHz           | 2.2V         | 66             | 4x                |
| K6-233 model 7      | 233MHz           | 2.2V         | 66             | 3.5x              |

## 2.3 Watchdog Timer

Watchdog Timer is enabled by reading port 443H. It should be triggered before the time-out period ends, otherwise it will assume the program operation is abnormal and will issue a reset signal to start again, or activate NMI to CPU. The Watchdog Timer is disabled by reading port 043H.

- **JP18: Watchdog Active Type Setting**

| JP18       | Description                           |
|------------|---------------------------------------|
| <b>2-3</b> | <b>RESET WHEN WDT TIME-OUT</b>        |
| 1-2        | ACTIVATE NMI TO CPU WHEN WDT TIME-OUT |
| OPEN       | DISABLE WDT                           |

- **JP11: WDT Time-out Period**

| PERIOD         | 1-2         | 3-4          | 5-6         | 7-8         |
|----------------|-------------|--------------|-------------|-------------|
| 1 sec.         | OPEN        | OPEN         | SHORT       | OPEN        |
| 2 sec.         | OPEN        | OPEN         | SHORT       | SHORT       |
| <b>10 sec.</b> | <b>OPEN</b> | <b>SHORT</b> | <b>OPEN</b> | <b>OPEN</b> |
| 20 sec.        | OPEN        | SHORT        | OPEN        | SHORT       |
| 110 sec.       | SHORT       | OPEN         | OPEN        | OPEN        |
| 220 sec.       | SHORT       | OPEN         | OPEN        | SHORT       |

## 2.4 DiskOnChip™ Flash Disk

DiskOnChip™ Flash Disk Chip (DOC) is produced by M-Systems. As DOC is 100% compatible to hard disk, there is no need to install any extra software utility. It is just "plug and play", easy and reliable to use.

- **JP16: DiskOnChip Memory Address Setting**

| Address      | JP16       |
|--------------|------------|
| CE000        | 1-2        |
| <b>D6000</b> | <b>3-4</b> |
| DE000        | 5-6        |

## 2.5 LCD Voltage Setting

NOVA-600-R2 supports 3.3V or 5V LCD panel by jumper setting. The setting will control the CN5's PIN 29 & 30 as 3.3V or 5V output.

- **JP10: LCD Voltage Setting**

| Function  | JP10       |
|-----------|------------|
| 3.3V      | 1-2        |
| <b>5V</b> | <b>2-3</b> |

## 2.6 Clear CMOS Setup

To clear CMOS Setup, close the CN26 pin 3-4 about 3 seconds, then open again. Set back to normal operation mode, close pin 2-3.

- **CN26: Clear CMOS Setup (Reserved function)**

| <b>CN26</b> | <b>Description</b>      |
|-------------|-------------------------|
| <b>2-3</b>  | <b>Normal Operation</b> |
| 3-4         | Clear CMOS Setup        |

## 2.7 Battery Backup for CMOS Setup

There is one 4-pin header CN26 for battery backup function. Closing the pin 2-3 will use the on board battery. When using external battery, you should take off the jumper and use the connector as external battery connector.

- **CN26: Battery Backup Function**

| <b>CN26</b>      | <b>Description</b>                |
|------------------|-----------------------------------|
| <b>2-3 SHORT</b> | <b>Using Internal Battery</b>     |
| Vbat 4- Ground   | Use as External Battery Connector |

## 2.8 BIOS Flash Chip Write Voltage Setting

The BIOS Flash Chip could be two types, one is 12V write voltage and another one is 5V.

- **JP17: 5V/12V Flash Chip Write Voltage Setting**

(This jumper is a factory default setting, customers may not change it.)

| <b>JP17</b>        | <b>Description</b>                             |
|--------------------|--|
| 1-3<br>2-4         | +12V 1Mbit Flash<br>Write Voltage              |
| 1-3<br>4-6         | +12V 1Mbit/2Mbit Flash<br>Write Voltage        |
| <b>3-5<br/>4-6</b> | <b>+5V 1Mbit/2Mbit Flash<br/>Write Voltage</b> |

## 2.9 PortB RS-232, RS-422, or RS-485 Setting

The PortB on CN6 can be set as RS-232, RS-422, or RS-485 mode by the JP4, JP6, or JP12.

| PortB Mode | JP4        | JP6 | JP12                    |
|------------|------------|-----|-------------------------|
| RS-232     | Don't care | 2-3 | 1-9, 3-10<br>5-11, 7-12 |
| RS-422     | 2-3        | 1-2 | 1-2, 3-4<br>5-6, 7-8    |
| RS-485     | 1-2        | 1-2 | 1-2, 3-4<br>5-6, 7-8    |

## 2.10 PortC/PortD RI Pin Setting

The PortC's RI pin (pin 19) on CN7 and the PortD's RI pin (pin 19) on CN6 can be set as RI, +5V, or +12V mode.

| PortC<br>CN7 PIN 19 | JP1 | JP3        |
|---------------------|-----|------------|
| RI                  | 2-3 | Don't Care |
| +5V                 | 1-2 | 1-2        |
| +12V                | 1-2 | 2-3        |

| PortD<br>CN6 PIN 19 | JP2 | JP21       |
|---------------------|-----|------------|
| RI                  | 2-3 | Don't Care |
| +5V                 | 1-2 | 1-2        |
| +12V                | 1-2 | 2-3        |

**Note that when setting the +12V output, the board should have +12V input from the power supply by CN4 power connector.**

## Chapter 3 Connection

This chapter describes how to connect peripherals, switches and indicators to the NOVA-600-R2 board.

### 3.1 Floppy Disk Drive Connector

NOVA-600-R2 board equipped with a 34-pin daisy-chain driver connector cable.

- **CN11: FDC Connector**

| <b>PIN</b> | <b>Description</b> | <b>PIN</b> | <b>Description</b> |
|------------|--------------------|------------|--------------------|
| 1          | GROUND             | 2          | REDUCE WRITE       |
| 3          | GROUND             | 4          | N/C                |
| 5          | GROUND             | 6          | N/C                |
| 7          | GROUND             | 8          | INDEX#             |
| 9          | GROUND             | 10         | MOTOR ENABLE A#    |
| 11         | GROUND             | 12         | DRIVE SELECT B#    |
| 13         | GROUND             | 14         | DRIVE SELECT A#    |
| 15         | GROUND             | 16         | MOTOR ENABLE B#    |
| 17         | GROUND             | 18         | DIRECTION#         |
| 19         | GROUND             | 20         | STEP#              |
| 21         | GROUND             | 22         | WRITE DATA#        |
| 23         | GROUND             | 24         | WRITE GATE#        |
| 25         | GROUND             | 26         | TRACK 0#           |
| 27         | GROUND             | 28         | WRITE PROTECT#     |
| 29         | GROUND             | 30         | READ DATA#         |
| 31         | GROUND             | 32         | SIDE 1 SELECT#     |
| 33         | GROUND             | 34         | DISK CHANGE#       |

### 3.2 PCI E-IDE Disk Drive Connector

You can attach four IDE (Integrated Device Electronics) hard disk drives to the NOVA-600-R2 IDE controller. The IDE support Ultra DMA/33 interface.

**CN13 (IDE 1): Primary IDE Connector, 2.54mm pitch**

**CN10 (IDE 2): Secondary IDE Connector, 2.0mm pitch for 2.5" IDE HDD**

- **CN13: Primary IDE Interface Connector**

| PIN | Description | PIN | Description      |
|-----|-------------|-----|------------------|
| 1   | RESET#      | 2   | GROUND           |
| 3   | DATA 7      | 4   | DATA 8           |
| 5   | DATA 6      | 6   | DATA 9           |
| 7   | DATA 5      | 8   | DATA 10          |
| 9   | DATA 4      | 10  | DATA 11          |
| 11  | DATA 3      | 12  | DATA 12          |
| 13  | DATA 2      | 14  | DATA 13          |
| 15  | DATA 1      | 16  | DATA 14          |
| 17  | DATA 0      | 18  | DATA 15          |
| 19  | GROUND      | 20  | N/C              |
| 21  | N/C         | 22  | GROUND           |
| 23  | IOW#        | 24  | GROUND           |
| 25  | IOR#        | 26  | GROUND           |
| 27  | N/C         | 28  | BALE - DEFAULT   |
| 29  | N/C         | 30  | GROUND - DEFAULT |
| 31  | INTERRUPT   | 32  | IOCS16#-DEFAULT  |
| 33  | SA1         | 34  | N/C              |
| 35  | SA0         | 36  | SA2              |
| 37  | HDC CS0#    | 38  | HDC CS1#         |
| 39  | HDD ACTIVE# | 40  | GROUND           |

- **CN10: Secondary IDE Interface Connector**

| <b>PIN</b> | <b>Description</b> | <b>PIN</b> | <b>Description</b> |
|------------|--------------------|------------|--------------------|
| 1          | RESET#             | 2          | GROUND             |
| 3          | DATA 7             | 4          | DATA 8             |
| 5          | DATA 6             | 6          | DATA 9             |
| 7          | DATA 5             | 8          | DATA 10            |
| 9          | DATA 4             | 10         | DATA 11            |
| 11         | DATA 3             | 12         | DATA 12            |
| 13         | DATA 2             | 14         | DATA 13            |
| 15         | DATA 1             | 16         | DATA 14            |
| 17         | DATA 0             | 18         | DATA 15            |
| 19         | GROUND             | 20         | N/C                |
| 21         | N/C                | 22         | GROUND             |
| 23         | IOW#               | 24         | GROUND             |
| 25         | IOR#               | 26         | GROUND             |
| 27         | N/C                | 28         | BALE - DEFAULT     |
| 29         | N/C                | 30         | GROUND - DEFAULT   |
| 31         | INTERRUPT          | 32         | IOCS16#-DEFAULT    |
| 33         | SA1                | 34         | N/C                |
| 35         | SA0                | 36         | SA2                |
| 37         | HDC CS0#           | 38         | HDC CS1#           |
| 39         | HDD ACTIVE#        | 40         | GROUND             |
| 41         | +5V                | 42         | +5V                |
| 43         | Ground             | 44         | Pull High          |

### 3.3 Parallel Port

This port is usually connected to a printer. NOVA-600-R2 includes an on-board parallel port, accessed through a 26-pin flat-cable connector CN8.

- **CN8: Parallel Port Connector**

| PIN | Description        | PIN | Description      |
|-----|--------------------|-----|------------------|
| 1   | STROBE#            | 2   | DATA 0           |
| 3   | DATA 1             | 4   | DATA 2           |
| 5   | DATA 3             | 6   | DATA 4           |
| 7   | DATA 5             | 8   | DATA 6           |
| 9   | DATA 7             | 10  | ACKNOWLEDGE      |
| 11  | BUSY               | 12  | PAPER EMPTY      |
| 13  | PRINTER SELECT     | 14  | AUTO FORM FEED # |
| 15  | ERROR#             | 16  | INITIALIZE       |
| 17  | PRINTER SELECT LN# | 18  | GROUND           |
| 19  | GROUND             | 20  | GROUND           |
| 21  | GROUND             | 22  | GROUND           |
| 23  | GROUND             | 24  | GROUND           |
| 25  | GROUND             |     |                  |

### 3.4 Serial Ports

NOVA-600-R2 offers four high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports.

- **CN6 (PortB, PortD): 20-pin Header**

| PIN | Description | PIN | Description      |
|-----|-------------|-----|------------------|
| 1   | DCD2/TX2-   | 11  | DSR2/RX2+        |
| 2   | RXD2/TX2+   | 12  | RTS2/RX2-        |
| 3   | TXD2        | 13  | CTS2             |
| 4   | DTR2        | 14  | RI2              |
| 5   | GND         | 15  | NC               |
| 6   | DCD4        | 16  | DSR4             |
| 7   | RXD4        | 17  | RTS4             |
| 8   | TXD4        | 18  | CTS4             |
| 9   | DTR4        | 19  | RI, +5V, or +12V |
| 10  | GND         | 20  | NC               |

- **CN7 (PortA, PortC): 20-pin Header**

| PIN | Description | PIN | Description      |
|-----|-------------|-----|------------------|
| 1   | DCD1        | 11  | DSR1             |
| 2   | RXD1        | 12  | RTS1             |
| 3   | TXD1        | 13  | CTS1             |
| 4   | DTR1        | 14  | RI               |
| 5   | GND         | 15  | NC               |
| 6   | DCD3        | 16  | DSR3             |
| 7   | RXD3        | 17  | RTS3             |
| 8   | TXD3        | 18  | CTS3             |
| 9   | DTR3        | 19  | RI, +5V, or +12V |
| 10  | GND         | 20  | NC               |



### 3.5 Keyboard and Mouse Connector

NOVA-600-R2 provides 5-pin keyboard and mouse connectors. The connector is 2.5mm pitch model Say Yea 2570-05P or equivalent one.

- **CN20: 5-pin Header Keyboard Connector**

| PIN | Description    |
|-----|----------------|
| 1   | KEYBOARD CLOCK |
| 2   | KEYBOARD DATA  |
| 3   | N/C            |
| 4   | GROUND         |
| 5   | +5V            |

- **CN21: 5-pin Mouse Connector**

| PIN | Description |
|-----|-------------|
| 1   | MOUSE CLOCK |
| 2   | MOUSE DATA  |
| 3   | N/C         |
| 4   | GND         |
| 5   | +5V         |

### 3.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board.

- **CN15: Reset Connector**

| PIN | Description  |
|-----|--------------|
| 1   | RESET SIGNAL |
| 2   | GROUND       |

- **CN2: Speaker Connector**

| PIN | Description |
|-----|-------------|
| 1   | +5V         |
| 2   | SPEAKER     |

- **CN25: IDE LED Connector**

| PIN | Description |
|-----|-------------|
| 1   | +5V         |
| 2   | HDD ACTIVE# |

- **CN22: KeyLock & Power**

| PIN | Description |
|-----|-------------|
| 1   | +5V         |
| 2   | N/C         |
| 3   | GROUND      |
| 4   | KEYLOCK     |
| 5   | GROUND      |

### 3.7 USB Port Connector

NOVA-600-R2 has two built-in USB ports for the future new I/O bus expansion.

- **CN18: USB 0/1**

| <b>PIN</b> | <b>Description</b> | <b>PIN</b> | <b>Description</b> |
|------------|--------------------|------------|--------------------|
| 1          | +5V                | 2          | GND                |
| 3          | D0-                | 4          | D1+                |
| 5          | D0+                | 6          | D1-                |
| 7          | GND                | 8          | +5V                |

### 3.8 IrDA Infrared Interface Port

NOVA-600-R2 has a built-in IrDA port which supports Serial Infrared (SIR) or Amplitude Shift Keyed IR (ASKIR) interface. When using the IrDA port, you have to set SIR or ASKIR model in the BIOS's Peripheral Setup's PortD. Then the normal RS-232 PortD will be disabled.

- **CN23: IrDA Connector**

| <b>PIN</b> | <b>Description</b> |
|------------|--------------------|
| 1          | VCC                |
| 2          | NC                 |
| 3          | IR-RX              |
| 4          | Ground             |
| 5          | IR-TX              |

### 3.9 LCD/CRT Connector

NOVA-600-R2 has a built-in 10-pin VGA connector directly attached to your CRT monitor, and a built-in 50-pin connector for LCD interface.

- **CN9: 10-pin VGA Header Connector**

| <b>PIN</b> | <b>Description</b> | <b>PIN</b> | <b>Description</b> |
|------------|--------------------|------------|--------------------|
| 1          | RED                | 6          | N/C                |
| 2          | GREEN              | 7          | N/C                |
| 3          | BLUE               | 8          | GROUND             |
| 4          | HSYNC              | 9          | GROUND             |
| 5          | VSYNC              | 10         | GROUND             |

- **CN5: 50-pin LCD Interface Connector**

| <b>PIN</b> | <b>Description</b> | <b>PIN</b> | <b>Description</b> |
|------------|--------------------|------------|--------------------|
| 1          | VPCLK              | 2          | P33                |
| 3          | P34                | 4          | P31                |
| 5          | P35                | 6          | P32                |
| 7          | P30                | 8          | P28                |
| 9          | P29                | 10         | P27                |
| 11         | P25                | 12         | P26                |
| 13         | P24                | 14         | P21                |
| 15         | P23                | 16         | P22                |
| 17         | P16                | 18         | P20                |
| 19         | P17                | 20         | P18                |
| 21         | P19                | 22         | P14                |
| 23         | P13                | 24         | P12                |
| 25         | P15                | 26         | P11                |
| 27         | P7                 | 28         | P10                |
| 29         | 5V or 3.3V         | 30         | 5V or 3.3V         |
| 31         | P9                 | 32         | P8                 |
| 33         | P4                 | 34         | P6                 |
| 35         | P3                 | 36         | P5                 |
| 37         | P2                 | 38         | P1                 |
| 39         | M                  | 40         | P0                 |
| 41         | SHFCLK             | 42         | ENABKL             |
| 43         | FPVDD              | 44         | FLM (V SYS)        |
| 45         | FPVEE              | 46         | LP (H SYS)         |
| 47         | GND                | 48         | GND                |
| 49         | +12V               | 50         | +12V               |

### 3.10 Fan Connector

NOVA-600-R2 provides CPU cooling fan connector and chassis fan connector. These connectors can supply 12V/500mA max. to the cooling fan. The 12V on the fan connector is converted from 5V, so it is limited in fan using. Don't use it for other purpose.

- **CN27: CPU Fan Connector**

| <b>PIN</b> | <b>Description</b> |
|------------|--------------------|
| 1          | N/C                |
| 2          | 12V                |
| 3          | Ground             |

### 3.11 LAN RJ45 Connector

NOVA-600-R2 has a built-in RJ45 LAN connector for 10/100Mbps Ethernet communication.

- **CN1: LAN RJ45 Connector**

| PIN | Description | PIN | Description |
|-----|-------------|-----|-------------|
| 1   | TX+         | 5   | NC          |
| 2   | TX-         | 6   | RX-         |
| 3   | RX+         | 7   | NC          |
| 4   | NC          | 8   | NC          |

- **CN24 LAN Active LED Connector**

| PIN | Description |
|-----|-------------|
| 1   | 5V          |
| 2   | RX/TX       |

LED1 YELLOW: RX/TX Active  
LED2 GREEN: 100Mbps Active  
LED3 GREEN: 10Mbps Active

### 3.12 Power Connector

NOVA-600-R2 provides an 8-pin power connector. The connector type is Molex 26-60-4080 or equivalent one. The power connector's each pin max. rating is 7A. It will accept max. 14A by the 2pin 5V input.

- **CN4: Power Connector**

| PIN | Description |
|-----|-------------|
| 1   | +5V         |
| 2   | Ground      |
| 3   | Ground      |
| 4   | +12V        |
| 5   | N/C         |
| 6   | Ground      |
| 7   | +5V         |
| 8   | -12V        |

### 3.13 Isolated Digital I/O Connector

NOVA-600-R2 has a built-in 4-bit IN and 4-bit OUT digital I/O connector. The connector type is DINKLE ED350V-10P.

As this is an isolated Digital I/O design, it will need an external power supply to the connector's PIN 9 and PIN10 to activate the circuit. You may refer the following block diagram for details. The DC output of the external power supply should not be connected with the NOVA-600-R2's power supply at 5V, 12V or ground to isolate the NOVA-600-R2 main system and the external I/O device.

In case you could not find an external power supply to active the Digital I/O, you may use the 5V or 12V from the system's power supply. Under the situation the digital I/O function will be not isolated.

- **CN14: DIO Connector**

| PIN | Signal Name | Function               |
|-----|-------------|------------------------|
| 1   | IN00        | Data IN                |
| 2   | IN01        | Data IN                |
| 3   | IN02        | Data IN                |
| 4   | IN03        | Data IN                |
| 5   | OUT00       | Data OUT               |
| 6   | OUT01       | Data OUT               |
| 7   | OUT02       | Data OUT               |
| 8   | OUT03       | Data OUT               |
| 9   | COM -       | External Power Ground  |
| 10  | COM +       | External Power 5 – 30V |

The digital I/O are addressed at 220H, 240H, 260H, or Disable through CMOS peripheral setup selection. You may refer the following table for the address and matching I/O port.

| Bit 0 | Bit 1 | Bit 2 | Bit 3 | Bit 4 | Bit 5 | Bit 6 | Bit 7 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| IN00  | IN01  | IN02  | IN03  | OUT00 | OUT01 | OUT02 | OUT03 |

The Digital Input specifications are:

- Isolated channel with common power
- Digital input level
- Logic level 0: +1V max.
- Logic level 1: +3.5V to 30V
- Input impedance: 3K ohm, 0.5W

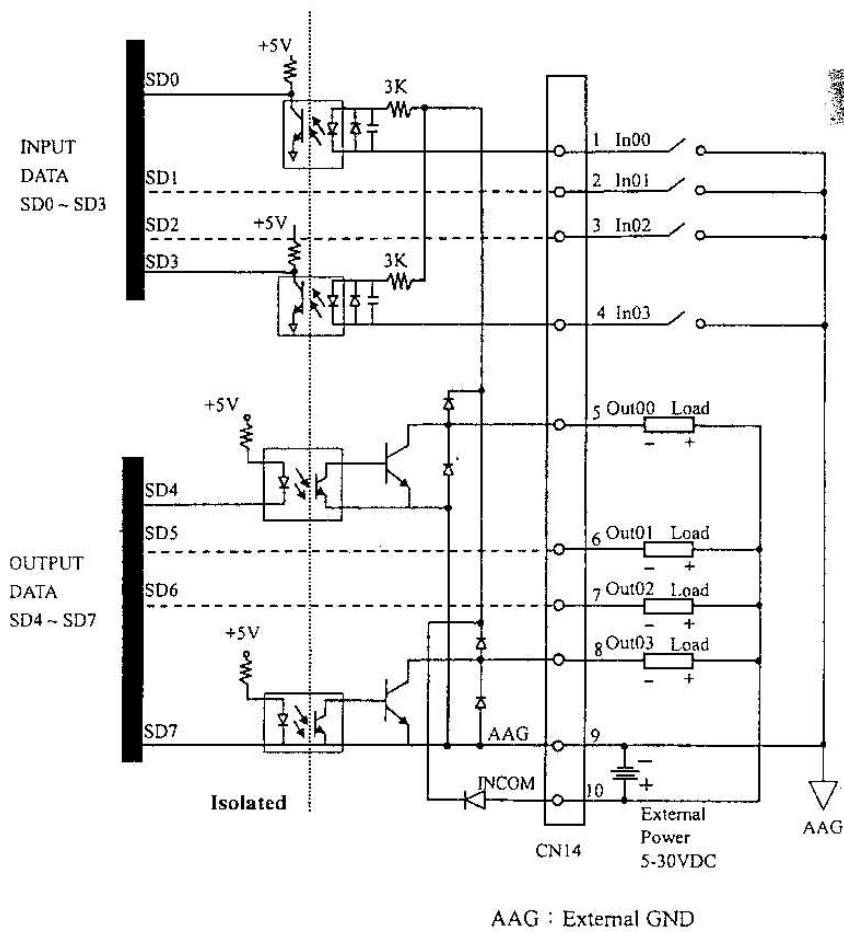
The Digital Output specifications are:

- Isolated channel with common power
- Open collector to 30V
- Output current: 600mA per channel, total 3A max.

- **Windows 95/NT Driver for DIO application**

The WDT-01 Windows 95/NT software utility are included in the CD ROM. From the WDT-01 utility you may use the **DIO.H**, **DIO.LIB**, and **DIO.DLL** for the digital I/O application.

The software user manual is also included in the CD ROM. You may print it out for better reference.



## Chapter 4 AMI BIOS Setup

The NOVA-600-R2 uses the AMI BIOS for system configuration. The AMI BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options, which may be selected for end-user requirements. This chapter is written to assist you in the proper usage of these features.

### 4.1 Getting Started

When power on the system, the BIOS will enter the Power-On-Self-Test routines. These routines will be executed for system test and initialization and system configuration verification. After the POST routines are completed, the following message appears:

**" Hit DEL if you want to run SETUP"**

To access AMI BIOS Setup program, press <Del> key, then you could see the screen to make some options as follows,

When choose **Load BIOS Defaults** will load the minimized settings for Troubleshooting. The performance should be very poor when use this setting.

When choose **Load Setup Defaults** will load optimized defaults for regular use. Choosing this setting will modify all applicable settings.

### 4.2 Standard CMOS Setup

The Standard CMOS Setup is used for basic hardware system configuration. The main function is for Date/Time setting and Floppy/Hard Disk Drive setting. Please refer the following screen for this setup.

For IDE hard disk drive setup, please check the following possible setup procedure,

Use the Auto setting for detection during bootup. Use the IDE HDD AUTO DETECTION in the main menu to automatically enter the drive specifications. Manually enter the specifications by yourself from the "User" option.

| AMIBIOS SETUP - STANDARD CMOS SETUP                   |                 |      |      |      |              |        |     |     |           |
|---|-----------------|------|------|------|--------------|--------|-----|-----|-----------|
| (C)1996 American Megatrends, Inc. All Rights Reserved |                 |      |      |      |              |        |     |     |           |
| Date (mm/dd/yyyy):                                    | Mon Jul 13,1998 |      |      |      | Base Memory: | 640 KB |     |     |           |
| Time (hh/mm/ss) :                                     | 16:45:18        |      |      |      | Extd Memory: | 31 MB  |     |     |           |
| Floppy Drive A:                                       | 1.44 MB 3½"     |      |      |      |              |        |     |     |           |
| Floppy Drive B:                                       | Not Installed   |      |      |      |              |        |     |     |           |
|   | Type            | Size | Cyln | Head | WPcom        | Sec    | LBA | Blk | PIO 32Bit |
| Pri Master :  | User            | 2442 | 4962 | 16   | 0            | 63     | On  | On  | 4 On      |
| Pri Slave :   | CDROM           |      |      |      |              |        | On  | Off | 4 On      |
| Sec Master :  | Not Installed   |      |      |      |              |        |     |     |           |
| Sec Slave :   | Not Installed   |      |      |      |              |        |     |     |           |
| Boot Sector Virus Protection                          | Disabled        |      |      |      |              |        |     |     |           |
| Month:  | Jan - Dec       |      |      |      | ESC:Exit     | ↑↓:Sel |     |     |           |
| Day:  | 01 - 31         |      |      |      | PgUp/PgDn:   | Modify |     |     |           |
| Year:   | 1901 - 2099     |      |      |      | F2/F3:       | Color  |     |     |           |

## 4.3 Advanced CMOS Setup

This Advanced CMOS Setup is designed for customer's tuning best performance of the NOVA-600-R2 board. For general operation customers, there is no need to change any default setting. The default setting is pre-set for most reliable operation.

You also can option the system keyboard, primary display, PS/2 mouse to enable or disable. The system boot sequence is also set here by first, second, third and fourth boot device setting.

| AMIBIOS SETUP - ADVANCED CMOS SETUP<br>(C)1996 American Megatrends, Inc. All Rights Reserved |          |                    |
|--|----------|--------------------|
| 1st Boot Device  | Floppy   | Available Options: |
| 2nd Boot Device  | IDE-0    | Disabled           |
| 3rd Boot Device  | CDROM    | IDE-0              |
| 4th Boot Device  | Disabled | IDE-1              |
| Try Other Boot Devices   | Yes      | IDE-2              |
| Quick Boot   | Disabled | IDE-3              |
| BootUp Num-Lock  | On       | Floppy             |
| Floppy Drive Swap  | Disabled | ARMD-FDD           |
| Floppy Drive Seek  | Enabled  | ARMD-HDD           |
| Floppy Access Control  | Normal   | CDROM              |
| HDD Access Control   | Normal   | SCSI               |
| PS/2 Mouse Support   | Enabled  | NETWORK            |
| System Keyboard  | Absent   |                    |
| Primary Display  | VGA/EGA  |                    |
| Password Check   | Setup    |                    |
| Boot To OS/2   | No       |                    |
| Wait For 'F1' If Error   | Enabled  | ESC:Exit ↑:Sel     |
| Hit 'DEL' Message Display  | Enabled  | PgUp/PgDn:Modify   |
| External Cache   | Enabled  | F2/F3:Color        |
| System BIOS Cacheable  | Enabled  |                    |

## 4.4 Advanced Chipset Setup

These setup functions are almost working for ChipSet (ALI 4+). These options are used to change the ChipSet's registers. Please carefully change any default setting; otherwise the system could become unstable.

### Auto Configuration: Enabled or Disabled

When using 60nS general type DRAM, enable the setting to get the optimal timings.

### SDRAM Speculative Read: Enabled or Disabled

When enable this option, the PCU will send predict commands to the SDRAM, if a miss happens, the CPU will cancel this command. Because some OS under certain situations have problem for this feature, it is normally disable.

| AMIBIOS SETUP - ADVANCED CHIPSET SETUP<br>(C)1996 American Megatrends, Inc. All Rights Reserved |          |                    |
|---|----------|--------------------|
| USB Function  | Disabled | Available Options: |
| USB Keyboard/Mouse Legacy Support   | Disabled | Disabled           |
| L2 Tag Width  | 10 bits  | Enabled            |
| DRAM Write Timing   | 3-2-2-2  |                    |
| Page Mode DRAM Read Timing  | X-3-3-3  |                    |
| RAS Precharge Period  | 3T       |                    |
| RAS to CAS Delay Time   | 3T       |                    |
| EDO DRAM Read Timing  | X-2-2-2  |                    |
| DRAM Speculative Read   | Disabled |                    |
| SDRAM CAS Latency   | 2        |                    |
| SDRAM Timing  | 3-4-7    |                    |
| SDRAM Speculative Read  | Enabled  |                    |
| Pipe Function   | Enabled  |                    |
| Gated Clock   | Disabled |                    |
| Slow Refresh  | 60 us    |                    |
| DRAM Data Integrity Mode  | Disabled |                    |
| Primary Frame Buffer  | 2 MB     |                    |
| VGA Frame Buffer  | Enabled  | ESC:Exit ↑:Sel     |
| Passive Release   | Enabled  | PgUp/PgDn:Modify   |
| ISA Line Buffer   | Enabled  | F2/F3:Color        |



## 4.5 Peripheral Setup

This setup is almost working for Multi-I/O Chip (W83877F and ALI Alladin 4+ chipset). These options are used to change the ChipSet's registers. Please carefully change any default setting to meet your application need perfectly. The only special concern is Onboard Serial PortD. If you are using the IrDA port, you have to set this port accordingly.

Customer also can set the **Isolated Digital I/O** function's I/O addressing here by **220h, 240h, 260h, or disabled**.

The most important setting in this setup is **LCD Type setting**. In the most right bottom item – Panel Type selection, customer can choose 16 different panel types. The 16 panel types are:

1. 1024x768 Dual Scan STN Color
2. 1280x1024 TFT
3. 640x480 STN
4. 800x600 STN
5. 640x480 TFT
6. 640x480 18bit
7. 1024x768 TFT
8. 800x600 TFT
9. 800x600 TFT
10. 800x600 TFT
11. 800x600 STN
12. 1024x600 TFT
13. 800x600 STN
14. 1024x768 TFT
15. 1280x1024 STN
16. 1024x600 STN

## 4.6 Power Management Setup

Power Management Setup help user handles the "green function" of NOVA-600-R2 board. The features could shut down the video display and hard disk to save energy for example. The power management setup screen is as following, **Power Management/APM: Disable, Max Saving, Min Saving, or User Defined.**

**Note: Advanced Power Management (APM)** has to be installed to keep the system time updated when the computer enters suspend mode activated by the Power Management.

Under DOS environment, you need to add `DEVICE=C:\DOS\POWER.EXE` in your `CONFIG.SYS`

Under Windows 3.x and Windows 95, you have to install Windows with APM feature. A battery and power cord icon labeled "Power" will appear in the "Control Panel".

| AMIBIOS SETUP - POWER MANAGEMENT SETUP<br>(C)1996 American Megatrends, Inc. All Rights Reserved |          |   |
|---|----------|---|
| Power Management/APM  | Disabled | Available Options:<br>Disabled<br>Enabled |
| Green Monitor Power State   | Off      |   |
| Video Power Down Mode   | Disabled |   |
| Hard Disk Power Down Mode   | Disabled |   |
| Standby Time Out  | Disabled |   |
| Suspend Time Out  | Disabled |   |
| Monitor Parallel Port   | Yes      |   |
| Monitor Serial Port   | Yes      |   |
| Monitor Floppy  | Yes      |   |
| Monitor VGA   | No       |   |
| Monitor Audio   | No       |   |
| Monitor Pri-HDD   | Yes      |   |
| Monitor Sec-HDD   | No       |   |
| ESC:Exit   ↑↓:Sel<br>PgUp/PgDn:Modify<br>F2/F3:Color  |          |   |

## Chapter 5 E<sup>2</sup> Key™ Function

The NOVA-600-R2 provides an outstanding E<sup>2</sup>KEY™ function for system integrator. Based on the E<sup>2</sup>KEY™ you could free to store the ID Code, Pass Word, or Critical Data in the 1Kbit EEPROM. As the EEPROM is nonvolatile memory, you don't have to worry the losing of the very important data.

Basically the E<sup>2</sup>KEY™ is based on a 1Kbit EEPROM which is configured to 64 words (from 0 to 63). You could access (read or write) each word at any time.

When you start to use the E<sup>2</sup>KEY™ you should have the utility in the package. The software utility will include four files as follows,

**README.DOC**  
**E2KEY.OBJ**  
**EKEYDEMO.C**  
**EKEYDEMO.EXE**

The E2KEY.OBJ provides two library functions for users to integrate their application with E<sup>2</sup>KEY™ function. These libraries (**read\_e2key** and **write\_e2key**) are written and compiled in C format. Please check the following statement, and you will know how to implement it easily.

**unsigned int read\_e2key(unsigned int address)**

/\* This function will return the data of E<sup>2</sup>KEY™ at address. The address range is from 0 to 63. Return data is one word,16 bits \*/

**void write\_e2key(unsigned int address,unsigned data)**

/\* This function will write the given data to E<sup>2</sup>KEY™ at address. The address range is from 0 to 63. The data value is from 0 to 0xffff. \*/

To easy start to use the function, please refer the include EKEYDEMO.C code at first.

Please note the E<sup>2</sup>KEY™ function is based on the working of parallel port. So you should enable the parallel port of NOVA-600-R2, otherwise the function will be not working.

If you need the Windows NT/95 driver, please download the driver from <ftp.icpacquire.com.tw>.

## Appendix A Watchdog Timer

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that caused the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, hardware on the board will either perform a hardware reset (cold boot) or a non-maskable interrupt (NMI) to bring the system back to a known state.

The Watchdog Timer is controlled by two I/O ports.

|           |      |                                    |
|-----------|------|------------------------------------|
| 443 (hex) | Read | Enable and refresh Watchdog Timer. |
| 043 (hex) | Read | Disable Watchdog Timer.            |

To enable the Watchdog Timer, a read from I/O port 443H must be performed. This will enable and activate the countdown timer, which will eventually time out and either reset the CPU or cause an NMI depending on the setting of JP18. To ensure this reset condition does not occur, the Watchdog Timer must be periodically refreshed by reading the same I/O port 443H. This must be done within the time out period that is selected by jumper group JP11.

A tolerance of at least 30% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time consuming. Therefore if the time out period has been set to 10 seconds, the I/O port 443H must be read within 7 seconds.

**Note:** When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system will reset.

## Appendix B FP24-01 Flat Panel Connection Module

The FP24-01 connection module is installed on the NOVA-600-R2 as a standard product. The FP24-01 converts NOVA-600-R2's on board 50-pin LCD interface signal to the 44-pin (2x20 pin header) and 41pin (Hirose DF9-41P-1V) LCD connectors. The 44-pin or 41-pin connector will only support 24-bit flat panel.

- **J3: 44-pin LCD Interface Connector**

| <b>PIN</b> | <b>Description</b> | <b>PIN</b> | <b>Description</b> |
|------------|--------------------|------------|--------------------|
| 1          | +12V               | 2          | +12V               |
| 3          | GND                | 4          | GND                |
| 5          | 5V or 3.3V         | 6          | 5V or 3.3V         |
| 7          | FPVEE              | 8          | GND                |
| 9          | P0                 | 10         | P1                 |
| 11         | P2                 | 12         | P3                 |
| 13         | P4                 | 14         | P5                 |
| 15         | P6                 | 16         | P7                 |
| 17         | P8                 | 18         | P9                 |
| 19         | P10                | 20         | P11                |
| 21         | P12                | 22         | P13                |
| 23         | P14                | 24         | P15                |
| 25         | P16                | 26         | P17                |
| 27         | P18                | 28         | P19                |
| 29         | P20                | 30         | P21                |
| 31         | P22                | 32         | P23                |
| 33         | GND                | 34         | GND                |
| 35         | SHFCLK             | 36         | FLM                |
| 37         | M                  | 38         | LP                 |
| 39         | GND                | 40         | ENABKL             |
| 41         | N/C                | 42         | N/C                |
| 43         | FPVDD              | 44         | 5V or 3.3V         |

- **J1: 41-pin LCD Interface Connector**

| <b>PIN</b> | <b>Description</b> | <b>PIN</b> | <b>Description</b> |
|------------|--------------------|------------|--------------------|
| 1          | P20                | 2          | GND                |
| 3          | P16                | 4          | 5V or 3.3V         |
| 5          | P21                | 6          | P0                 |
| 7          | P17                | 8          | P8                 |
| 9          | P22                | 10         | P1                 |
| 11         | P18                | 12         | P9                 |
| 13         | P23                | 14         | P2                 |
| 15         | P19                | 16         | P10                |
| 17         | 5V or 3.3V         | 18         | P3                 |
| 19         | FLM                | 20         | P11                |
| 21         | M                  | 22         | P4                 |
| 23         | LP                 | 24         | P12                |
| 25         | SHFCLK             | 26         | P5                 |
| 27         | 5V or 3.3V         | 28         | P13                |
| 29         | 5V or 3.3V         | 30         | P6                 |
| 31         | ENABKL             | 32         | P14                |
| 33         | FPVDD              | 34         | P7                 |
| 35         | FPVEE              | 36         | P15                |
| 37         | GND                | 38         | +12V               |
| 39         | GND                | 40         | +12V               |
| 41         | N/C                |            |                    |

- **J2: LCD Backlight Power Connector\***

| <b>PIN</b> | <b>Description</b>    |
|------------|-----------------------|
| 1          | N/C                   |
| 2          | GND                   |
| 3          | 12V (0.9A max.)       |
| 4          | GND                   |
| 5          | FPVEE Inverter Enable |