MIC-3920/MIC-3921

Intelligent system monitor and alarm module for ***CompactPCI™***

Copyright Notice

Acknowledgments

CE Notification

The MIC-3920/MIC-3921, developed by Advantech CO., LTD., has passed the CE test for environmental specification when shielded cables are used for external wiring. We recommend the use of shielded cables.

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Product warranty

Advantech warrants you, the original purchaser, that each of its products will be free from defects for one year from the date of purchase.

This warranty does not apply to any products which 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.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, please follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Packing List

Before installing your board, ensure that the following materials have been received:

- One MIC-3920/MIC-3921 system monitor and alarm module
- One utility CD-ROM disc
- One 20-pin cable, one 6-pin cable, one 9-pin cable, and two sensor wires
- One warranty certificate
- PC Sentry user's manual
- This user's manual

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Technical Support and Sales Assistance

If you have any technical questions about the MIC-3920/MIC-3921 or any other Advantech products, please visit our support website at:

- **http://www.advantech.com.tw/support**

For more information about Advantech's products and sales information, please visit:

- **http://www.advantech.com**

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CHAPTER 1

Introduction

1.1 Overview

The MIC-3920/MIC-3921 is an intelligent system monitor and alarm module designed to detect abnormal system operating conditions and generate alarm outputs or messages, allowing users to take necessary actions beore system failure. It is designed to be used in Advantech's ComactPCI systems to ensure high system availability and reliability.

The alarm module comes in two versions: The MIC-3920 and MIC-3921. The MIC-3920 is a 3U high, 2-slot (8 TE) wide module, which can be installed in Advantech's 3U CompactPCI systems. It uses front panel LEDs for status display. The MIC-3921 is equipped with a message display and a control keypad, and can be installed in Advantech's 6U CompactPCI systems.

The MIC-3920/MIC-3921 can detect a wide variety of internal system conditions, including temperature, voltage, fan operation, and power supply status. It can generate several different alarm outputs, including audible signals, relay outputs to notify nearby users, or sending out alarm messages through the serial port for remote notification. The on-board CPU allows users to set the alarm criteria for each sense input independently, and to program different alarm outputs.

To ensure operational reliability, the MIC-3920/MIC-3921 features a built-in watchdog timer for self-testing. The on-board backup battery enables non-stop operation even under a total system power failure.

The MIC-3920/MIC-3921 serial port can be configured either as RS-485 to communicate over distances up to 4000 feet, or as RS-232 for connecting to other devices, such as a modem. Users can remotely monitor a number of CompactPCI systems through a host computer's serial port.

The MIC-3920/MIC-3921 ships with a powerful and easy-to-use software utility to minimize the system integration time. The PC Sentry software utility can run under Windows 95/98/NT, allowing the system host to communicate with one or more alarm modules through the serial port for configuration, alarm level setting, real-time status display, alarm event log, etc.

1.2 Features

- Monitoring +3.3 V_{DC}, +5 V_{DC}, -5 V_{DC}, +12 V_{DC}, -12 V_{DC} of system bus voltage
- Four fan-speed inputs for fan speed monitoring
- Three temperature inputs
- One "power good" and one "power fan" signal inputs for power supply monitoring
- Three relay outputs for alarm connection
- One serial port can be set as a RS-232 or RS-485 port, supporting modem output
- Three configurable alarm levels: Critical, Major, Minor
- Audible alarm with three sound effects
- On-board backup battery
- Built-in watchdog timer for self-detection

1.3 Specifications

1.3.1 Standard hardware functions

- **Voltage Inputs:**
  +5 V_{DC}: 0 ~ +6.8 V_{DC}
  +12 V_{DC}: 0 ~ +16.32 V_{DC}
  +3.3 V_{DC}: 0 ~ +4.8 V_{DC}
  -5 V_{DC}: 0 ~ -6.8 V_{DC}
  -12 V_{DC}: 0 ~ -16.32 V_{DC}
  Voltage accuracy: 0.5% of FSR
- **Temperature Sensors:**
  Temperature Sensor 1 (on board): 0 ~ +60°C (30 ~ 140°F)
  Temperature Sensor 2: -30 ~ +125°C (-22 ~ +257°F)
  Temperature Sensor 3: -30 ~ +125°C (-22 ~ +257°F)
  Temperature accuracy: ±3°C
- **Fan Speed Monitor:**
  Fan Sensor 1, 2 and 4: 700 ~ 10000 RPM
  Fan Sensor 3: 2800 ~ 40000 RPM
  Fan speed accuracy: ±10% max.
- **Watchdog timer for system CPU:**
  Programmable interval: 1 ~ 255 sec.
- **Power Good Input:** High: > 2.4 $V_{DC,}$ Low: < 0.8 V_{DC}
- **Power Fan Input:** High: > 2.4 $V_{DC,}$ Low: < 0.8 V_{DC}
- **Relay Outputs:** NC or NO (selectable by jumper)
  Power Rating: 125 V_{AC} @ 0.3 A, 30 V_{DC} @ 1 A
- **Real Time Clock:** Format: YYYY-MM-DD HH:MM
- **Serial Port:**
  RS-232, RS-485 (selectable by jumper)
  Baud rate:1200, 2400, 4800, 9600, 19200 bps
  Board ID: 1 ~ 255 (0 for configuration only)

- **Battery:**
  Charge time: 24 hr
  Battery type: Ni-H
  Battery capacity: 1200 mA-H
  (full charged, for 0.5 ~ 1 hr operation, depends on the output used)
  Bettery life: 6 years @ 20°C, 80% capacity after 1000 cycles of charge and discharge
- **Power Comsuption:** +5 V @ 400 mA (Typical), +5 V @ 650 mA (max.)

1.3.2 Environmental Specifications

- **Storage temperature:** -20 ~ 70°C (4°F ~ 158°F)
- **Operating temperature:** 0 ~ 60°C (32°F ~ 140°F)
- **Relative humidity:** 5 ~ 95% RH non-condensing
- **Board weight**: 0.8 Kg (1.8 lbs)
- **Shock**: 20 G (operating); 50 G (storage/transit)
- **Random vibration**: 1.5 Grms

1.4 Function Block Diagram

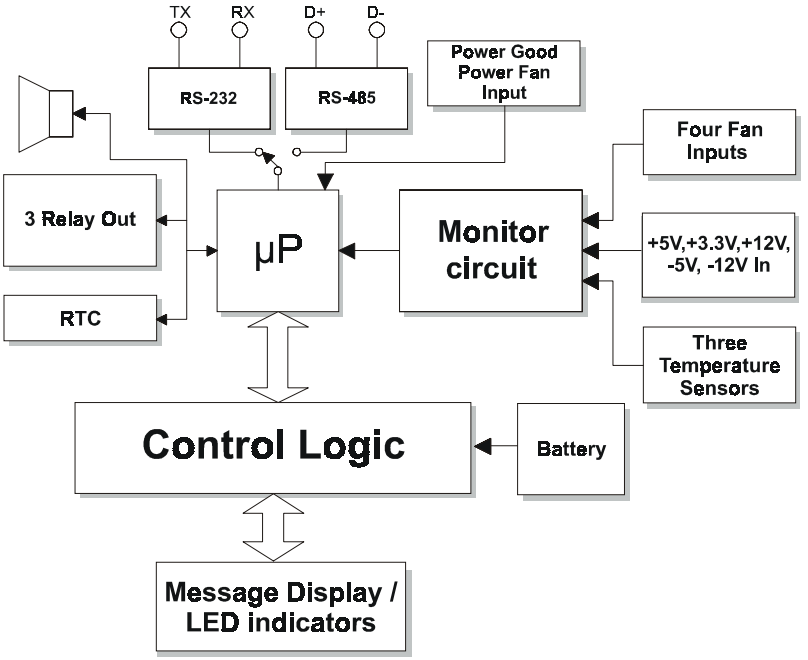


Figure 1-1: MIC-3920/MIC-3921 function block

1.5 Hardware Overview

1.5.1 Bus Voltage Monitoring

The MIC-3920/MIC-3921 monitors the bus voltages (+5 V_{DC}, +3.3 V_{DC}, +12 V_{DC}, -5 V_{DC}, -12 V_{DC}) through the 20-pin box header connector.

1.5.2 Fan Monitoring

The MIC-3920/MIC-3921 detects fan speed by the tachometer output. Up to four fans can be connected and measured independently.

Note: *Only the fans with tachometer output can be detected. This kind of fan generates pulses while spinning (two pulses per revolution).*

1.5.3 Temperature Inputs

Up to three temperatures can be monitored. An on-board sensor (Temperature Sensor 1) detects the card's ambient temperature. The other two external sensors (Sensor 2 and Sensor 3) can be mounted on a system chassis where temperature needs to be monitored.

1.5.4 Power Supply Monitoring

The MIC-3920/MIC-3921 detects a "power good" and a "power fan" signal for monitoring the power supply. "Power good" and "Power fan" are TTL signals provided by most switching power supplies.

Note: *Only power supplies with "power good" or/and "power fan" outputs can be detected.*

1.5.5 Relay Outputs

There are three relays on the MIC-3920/MIC-3921. The status of the relays can be programmed by users to activate external devices correspondent with the alarm level. These relays can be set as normal close or normal open.

1.5.6 Serial Port

This serial port enables the MIC-3920/MIC-3921 to communicate with external devices. Users can set it to be RS-232 or RS-485 by using a jumper. Set the serial port as RS-485, and one remote computer can monitor the internal condition of the CompactPCI system in real time.

It can also be set as RS-232 for connecting to other devices, such as a modem (external modem required). Using a modem, an alarm signal can be transmitted to thousands of miles away.

1.5.7 Audible Alarm Output

Three different sounds corresponding with three alarm levels (critical, major or minor) can be enabled to notify nearby users.

1.5.8 On-Board Battery Backup

In case of serious system power failure, the on-board battery ensures that monitoring and alarm output functions can be normally performed.

1.5.9 Connecting to the system

The MIC-3920/MIC-3921 is packaged with one 20-pin cable and one 6-pin cable. Users need to properly connect these two cables to Advantech's CompactPCI system. Please refer to Section 2.3.2.2.

1.6 Software Support

The MIC-3920/MIC-3921 ships with a powerful and easy-to-use software utility to minimize the time for system integration. The PC Sentry software utility can run under Windows 95/98/NT 4.0, allowing the system host to communicate with one or more alarm modules through the serial port for configuration, alarm level setting, real-time status display, alarm event log, etc. For more detailed information, please refer to the PC Sentry manual.

1.7 Front Panel LEDs and Keypad

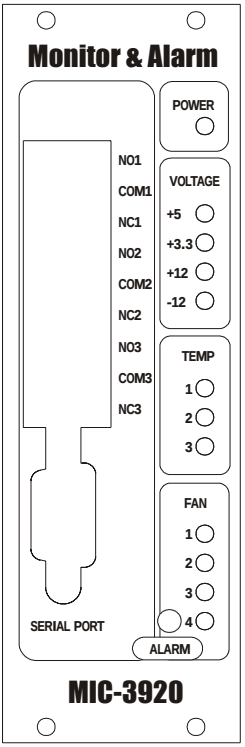


Figure 1-2: MIC-3920 front panel

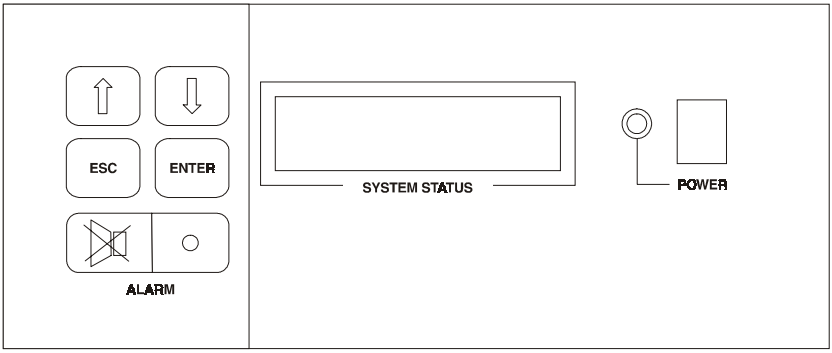


Figure 1-3: MIC-3921 front panel

Table 1-1: MIC-3921 front panel button function

Button	Funciton
⇧	Scroll up
⇩	Scroll down
ESC	Escape
ENTER	Confirmation
	Audible alarm stop

CHAPTER 2

Installation

2.1 Safety Precautions

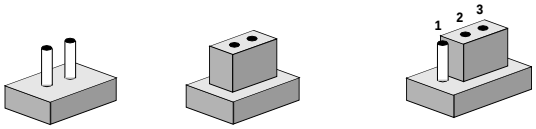
Follow these simple precautions to protect yourself from harm and the products from damage.

1. To avoid electrical shock, always disconnect the power from your chassis before you work on it. Don't touch any components on the module or other cards while the system power is on.
2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.
3. Always ground yourself to remove any static charge before you touch the module. Be particularly careful not to touch the chip connectors. Modern integrated electronic devices are extremely sensitive to static electrical discharges and fields. Keep the module in its antistatic packaging when it is not installed in the system, and place it on a static dissipative mat when you are working with it. Wear a grounding wrist strap for continuous protection.

2.2 Jumper Settings

This section tells how to set the jumpers to configure the module.

You can configure your module to match the needs of your application by setting jumpers. A jumper is the simplest kind of electrical switch. It consists of two metal pins and a small metal cap (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the cap. To "open" a jumper you remove the cap. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you connect either pins 1 and 2 or 2 and 3.



Open **Closed** **Closed 2-3**

The jumper settings are schematically depicted in this manual as follows:

Open **Closed** **Closed 2-3**

You may find a pair of needle-nose pliers useful for setting the jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

2.3 Hardware Installation

2.3.1 Jumper Locations

Table 2-1 lists the function of each jumper. Please refer to Figure 2-1 for an illustration of each jumper location. If the MIC-3920/MIC-3921 is integrated in Advantech's CompactPCI system in a factory, it is not necessary to reconfigure the jumpers. The default jumper setting is illustrated in Figure 2-1.

Table 2-1: MIC-3920/MIC-3921 jumpers

Number	Function
JP1, JP3, JP4	RS-232/RS-485 selection
JP2	Battery enable/disable

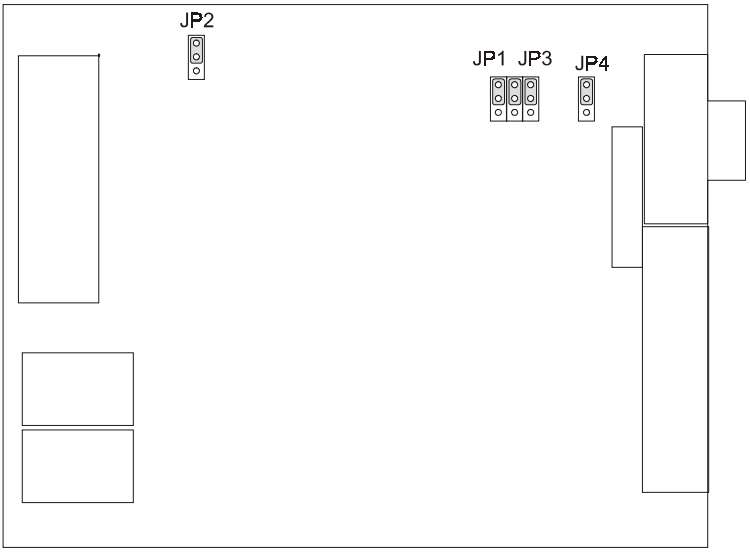


Figure 2-1: Jumper locations

2.3.1.1 Serial Port Mode (JP1, JP3, JP4)

These three jumpers are used to select serial port (CN1) mode between RS-232 and RS-485. Table 2-2 shows the jumper settings. Please note that users need to set this serial port as RS-232 mode when they would like to connect the MIC-3920/MIC-3921 to a modem.

Table 2-2: COM 2 mode

COM 2	JP1	JP3	JP4
RS-232			
RS-485			

2.3.1.2 Battery Backup Enable/Disable(JP2)

This jumper is used to enable or disable the backup battery. The MIC-3920/MIC-3921 will remain functional whether this jumper is set as enable or disable but the backup battery function will only work when the jumper is set as enable. The battery will be charged only when the system power is on. Table 2-3 shows the jumper settings.

Table 2-3: Backup battery mode

COM 2	JP2
Enable	
Disable	

2.3.2 Connector Locations

On-board connectors are linked to external devices. Table 2-4 lists the function of each connector and Figure 2-2 illustrates each connector location.

Table 2-4: MIC-3920/MIC-3921 connectors

Number	Function
CN1	Serial port connector
CN2	Sense input of voltages, fans and power good signals
CN3	Display interface
CN4	Temperature input 1
CN5	Temperature input 2
CN6	Relay output terminals

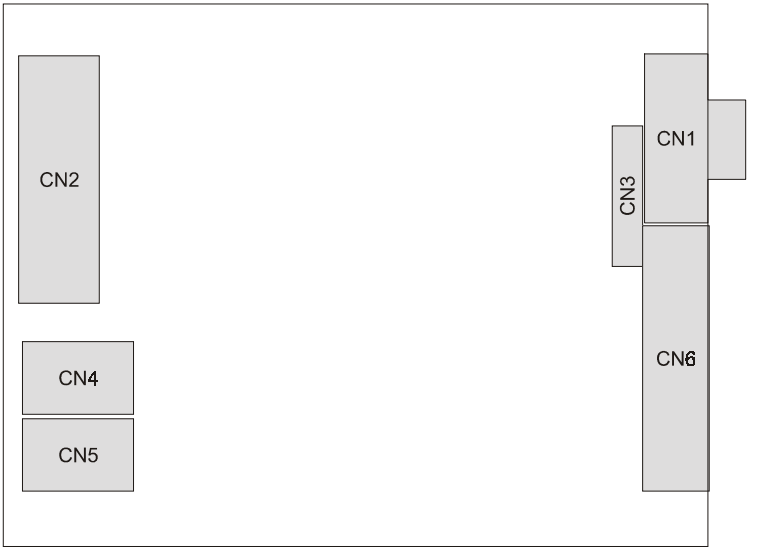


Figure 2-2: Connector locations

2.3.2.1 Serial port (CN1)

The MIC-3920/MIC-3921 provides a serial port that can be set as RS-232 or RS-485. To ensure correct communication through the serial port, make sure that the baud rate and the board ID is set properly. The factory default baud rate is 9600 bps, and the board ID is 01. If users are confused with the current baud rate and board ID of the MIC-3920/MIC-3921, press the **ALARM** button for 8 seconds, and the baud rate and board ID will be restored to their default values.

This serial port can be set as RS-232 or RS-485 by setting jumper JP1, JP3, and JP4. Users can set this serial port as RS-232 and connect the MIC-3920/MIC-3921 to a PC's COM port through the RS-232 cable for data transmission. Users can set this serial port as RS-485 as well; however, the MIC-3920/MIC-3921 will not send any message unless requested by the bus master. Each device in the RS-485 bus must be assigned a unique ID number.

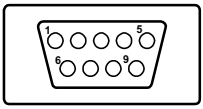
Note: *1. When the serial port is set as RS-232, Tx and Rx pins on CN1 should be connected to Rx and Tx pins on the COM port on the PC, respectively.*

2. When the serial port is set as RS-485, the DATA+ and DATA- pins on CN1 should be connected to DATA+ and DATA- pins on RS-485 bus wires, respectively.

The MIC-3920/MIC-3921 also provides the capability of sending out messages for remote notification. Users can connect a modem to the serial port, set the CN1 as RS-232 on jumpers, and choose **Serial Port ==> Set Port ==> Link to Modem** from the PC Sentry utility or from the front panel display window (MIC-3921). The MIC-3920/MIC-3921 then can connect to a remote host computer through the modem. If there is an alarm event, the MIC-3920/MIC-3921 will dial the assigned telephone number automatically to send an alarm message to the remote host compouter. Users can store the telephone number to the MIC-3920/MIC-3921 using the PC Sentry utility or from the front panel display (MIC-3921). The MIC-3920/MIC-3921 stops sending messages if the line is busy or if there is a connection failure.

Note: *1. One external modem which supports standard AT commands is required.*

2. The modem must be set on "auto answer" mode.



CN1

Table 2-5: CN1 pin assignment

Pin	Signal
1	CD/DATA -
2	Rx/DATA +
3	Tx
4	DTR
5	GND
6	DSR
7	N/C
8	N/C
9	N/C

2.3.2.2 Voltage, Fan and Power Supply Inputs (CN2)

The CN2 connector of MIC-3920/MIC-3921 is connected to the CompactPCI backplane through a 20-pin to 20-pin cable. Through this connector, the backplane voltages (+3.3 V, +5 V, -5 V, +12 V, -12 V), fan speeds, power good signal and power fan signal can be monitored. Power good is a +5V TTL signal indicating the normal condition of the power supply. The signal is provided by most industrial grade switching power supplies.

If the MIC-3920/MIC-3921 is integrated with Advantech's CompactPCI system in a factory, the cables have been properly connected from the MIC-3920/MIC-3921 to the backplane of the system. However, if users purchase the MIC-3920/MIC-3921 spearately from Advantech's CompactPCI enclosure, please read the instructions in the following paragraph to connect the cables.

The MIC-3920/MIC-3921 is packaged with one 20-pin cable and one 6-pin cable. Please connect one end of the 20-pin cable to the CN2 connector on the MIC-3920/MIC-3921. There should be a 20-pin alarm module connector on the backplane of Advantech's CompactPCI system. Connect the other end of the 20-pin cable to that connector on the backplane. The 6-pin cable is used to transmit fan signals from the fan backplane to the system backplane. Connect one end of the 6-pin cable to the 6-pin connector on the fan backplane, and connect the other end to the 6-pin connector on the backplane of the system. It should be very easy to find the correct connectors on both backplanes. If there are any questions, please refer to the backplane manuals.

Note: *The MIC-3920/MIC-3921 can only detect fans with tachometer output. This kind of fan generates two pulses per-revolution.*

Table 2-6: CN2 pin assignment

Pin	Signal	Pin	Signal
1	VCC	11	N/C
2	VCC	12	BP SD
3	+3.3 V	13	N/C
4	-12 V	14	BP SC
5	+12 V	15	PWRGD
6	CPU RST	16	PWRFAN
7	GND	17	FAN 3
8	GND	18	FAN 4
9	PSON	19	FAN 1
10	-5 V	20	FAN 2

2.3.2.3 Temperature Sensors (CN4, CN5)

The MIC-3920/MIC-3921 measures three temperatures: Temperature 1, Temperature 2, and Temperature 3. Temperature 1 is located on the control board. It measures the ambient temperature of the MIC-3920/ MIC-3921. There are two temperature sensors with cables shipped with the MIC-3920/MIC-3921. One is dark gray, and the other one is white. They can be plugged into either CN4 or CN5 to monitor external temperatures. Regardless of which connector they are plugged into, the dark gray cable always measures Temperature 2, and the white one always measures Temperature 3.

2.3.2.4 Relay Output (CN6)

Three relay outputs are available on the screw terminals CN6. The relays can be activated by minor, major and critical alarm events, respectively. Refer to chapter 3 for a detailed description. Table 2-7 lists the pin assignments of CN6.

Table 2-7: CN6 pin assignment

Pin	Funciton
NO1	Critical relay NO
COM1	Critical relay COM
NC1	Critical relay NC
NO2	Major relay NO
COM2	Major relay COM
NC2	Major relay NC
NO3	Minor relay NO
COM3	Minor relay COM
NC3	Minor relay NC

CHAPTER 3

Function Description

3.1 Alarm Level

The MIC-3920/MIC-3921 allows users to set the alarm level of each sense input as disabled (not monitored), minor, major or critical. When a fault is detected, the MIC-3920/MIC-3921 activates the alarm output in accordance with the alarm level. The functions of these alarm levels are as follows:

Disabled: No alarm output is activated
Minor: Set relay output, audible alarm, and send-out-message as minor
Major: Set relay output, audible alarm, and send-out-message as major
Critical: Set relay output, audible alarm, and send-out-message as critical

3.2 Alarm Output

The MIC-3920/MIC-3921 has several types of alarm output to notify the users that an abnormal condition has been detected. These alarm ouput types include audible alarm signals, message display or LED indication, relay output, and messages in ASCII code that may be sent out via the serial port.

3.2.1 Relay Output

The MIC-3920/MIC-3921 provides relay output terminals (CN6) for users to configure individual applications. Users can set the three types of relay output (critical, major, and minor) to be enabled or disabled respectively. For example, if the minor relay option is set as enabled, any minor alarm event which happens will activate the minor relay output. However, if the **Minor Relay** option is set as disabled, the **Minor Relay** output will not be activated even if any minor alarm event happens. Users can set the three types of relay output through the PC Sentry utility or from the front panel display (MIC-3921).

Note: *Users can also set the relays to be independent of the alarms using the PC Sentry software utility.*

3.2.2 Audible Alarm

The MIC-3920/MIC-3921 has three different acoustic signals, representing the three alarm levels (disabled level is not included). The three acoustic signals are as follows:

Critical: 0.2 second beep duration with 0.2 second interval
Major: 0.4 second beep duration with 0.6 second interval
Minor: 1 second beep duration with 1 second interval

To shut off the sound, the user can press the **ALARM** button. The buzzer will be activated until the next alarm condition is detected. If users do not want the buzzer to be activated at all, please set the **Alarm Sound** option as disabled.

3.2.3 Alarm Messages Output via Serial Port

If the serial port of the MIC-3920/MIC-3921 is set as RS-232 or is connected to a modem, it spontaneously sends out messages in ASCII when a fault is detected. If the serial port is set as RS-485, the alarm message will not be sent until it is requested by an RS-485 master device, such as a host computer. Please refer to Chapter 4 and Appendix A for command set format and register format if users would like to write their own programs under RS-485 mode.

When the serial port is set as modem or RS-232 mode, the alarm message will be sent out in the following format:

@<TIME>-<SYSTEM ID>-<ALARM TYPE>-<MONITOR CONDITION>

Examples.:

@1998-01-25 08:15-SYSTEM 2-CRITICAL ALARM-BACKPLANE -12V FAILED

@1998-01-25 09:05-SYSTEM 2-CRITICAL ALARM-BACKPLANE -12V OK

@1998-02-01 13:08-ALPHA SYSTEM-MAJOR ALARM-FAN 1 FAILED

@1998-02-01 14:30-ALPHA SYSTEM-MAJOR ALARM-FAN 1 OK

@1998-02-02 15:10-SYSTEM 2-MAJOR ALARM-TEMP SENSE 2

FAILED 63

@1998-02-02 15:30-SYSTEM 2-MAJOR ALARM-TEMP SENSE 2 OK 54

Description:

<TIME>: System date and time when the message is sent.

<SYSTEM ID>: System ID named by user.

<ALARM TYPE>: Three alarm levels described in section 3.1

<MONITOR CONDITION>:

1: BACKPLANE +3.3V OK

2: BACKPLANE +3.3V FAILED

3: BACKPLANE +5V OK

4: BACKPLANE +5V FAILED

5: BACKPLANE +12V OK

6: BACKPLANE +12V FAILED

7: BACKPLANE -12V OK

8: BACKPLANE -12V FAILED

9: TEMP SENSOR 1 OK XX

10: TEMP SENSOR 1 FAILED XX

11: TEMP SENSOR 2 OK XX

12: TEMP SENSOR 2 FAILED XX

13: TEMP SENSOR 3 OK XX

14: TEMP SENSOR 3 FAILED XX

XX: Temperature in degree Celsius

15: FAN 1 OK

16: FAN 1 FAILED

17: FAN 2 OK

18: FAN 2 FAILED

19: FAN 3 OK

20: FAN 3 FAILED

21: FAN 4 OK

22: FAN 4 FAILED

23: POWER SUPPLY OK

24: POWER SUPPLY FAILED

3.3 Power Supply Monitoring

When the MIC-3920/MIC-3921 detects the power good signal, it will determine the condition of the power supply. Users can assign the alarm level of the power good signal by using the PC Sentry utility, the front panel display (MIC-3921), or by writing values to register 44H and 43H through the serial port. Please set the correct trigger level so that the alarm module can work appropriately. The status of each input is available in register 1EH. Please refer to Appendix A for details of registers and the meaning of the values.

3.4 Backplane Voltage Monitoring

The alarm level of the four voltages used on the backplane (+3.3 V, +5 V, +12 V, -12 V) can be set by the PC Sentry utility, front panel display (MIC-3921), or by writing values to register 40H and 41H through the serial port if users would like to write a program by themselves . Users can get the current value and set high/low alarm limits of each input by reading or writing to registers 10H~16H, 20H~26H and 30H~36H. Please refer to Appendix A for the details of registers and meaning of the values.

3.5 Temperature and Fan Monitoring

The alarm level of the four fan monitoring inputs and temperature monitoring inputs can be set using the PC Sentry utility, front panel display (MIC-3921), or by writing values to register 41H~43H through the serial port. Users can get current values and set high/low alarm limits for each input by reading or writing to registers 17H~1CH, 27H~2CH and 37H~3CH. Please refer to Appendix A for details of registers and meaning of the values. Please notice that the MIC-3920/ MIC-3921 can monitor four fans at the same time. Fan Sensor 1, Fan Sensor 2 and Fan Sensor 4 are designed for low-speed fans and Fan Sensor 3 is designed for a high-speed fan. Do not use the high-speed Fan Sensor to monitor a low-speed fan, vice versa. If the fan speed exceeds the Fan Sensor range, the sensor will not be able to detect the true speed and a warning message will appear.

The MIC-3920/MIC-3921 provides two wire sensors. Please attach these two wire sensors to the appropriate positions in the enclosure in order to detect the temperature fluctuation. It is advised to attach these two sensors to where heat was produced the most or where components are vulnerable to temperature fluctuation.

CHAPTER 4

Programming

4.1 Introduction

The MIC-3920/MIC-3921 is shipped with the easy-to-use PC Sentry software utility which can operate under Windows 95/98/NT 4.0 operating systems. For most users, however, programming is not necessary since the PC Sentry utility present most of the functions in a user-friendly interface.

However, the MIC-3920/3921 can be controlled through its serial port, either in RS-232, RS-485 or modem mode, and users may need to program it. The following is necessary information for user programming.

4.2 Syntax of Command and Response

The format of command and response is shown as follows:

[delimiter character][address][command][data][carriage return]

Every command begins with a delimiter character. There are two valid characters: "$" and "!".

$ is the delimiter character for command to the alarm module.
! is the delimiter character for response from the alarm module.

The delimiter character is followed by a two-character address (hexadecimal) that specifies the board ID address. The alarm module responds only to the command which specifies its board address. The actual two-character command follows the address. Depending on the command, an optional data segment follows the command string. Every command is terminated by a carriage return (cr).

The following convention is applied to the description of the command set in this section:

- bb is MIC-3920/MIC-3921 board ID address from 00 to FF
- rr is register address (hexadecimal) of MIC-3920/MIC-3921. Refer to Appendix B for details.
- dd(00 ~ FF) is hexadecimal value of data to be written to or read from the register in MIC-3920/MIC-3921
- (cr) is carriage return, ASCII code is 0DH

$bbRrr(cr)

Description Reads data from register rr

Response **!bbRrrdd(cr)**

Example:

$01R17(cr)	Reads alarm module ID 01register 17H (Temp Sense 1 current value)
!01R1720(cr)	Alarm module ID 01 responds current Temp Sense 1 is 20H(32 degrees)

$bbWrrdd(cr)

Description Writes data to register rr

Response **!bbWrrdd(cr)**

Example:

$01W2720(cr)	Writes 20H to alarm module ID 01 register 27H (Set Temp Sense 1 high alarm value to be 32 degrees)
!01W2720(cr)	Alarm module ID 01 responds to confirm the write command

$bbA(cr)

Description Switch off current Alarm event

Response **!bbAOK(cr)**

$bb%(cr)

Description Reset alarm module by software

$bbHV(cr)

Description Read hardware version

Response **!bbHVn...n(cr)**

Example:

$01HV(cr) Read hardware version of alarm module ID 01

!01HVMIC-3920 HW Rev.A1

Alarm module ID 01 responds that its hardware version is MIC-3920/MIC-3921 version A1

$bbFV(cr)

Description Read firmware version

Response **!bbFVn...n(cr)**

Example:

$01FV(cr) Reads firmware version of alarm module ID 01

!bbFVMIC-3920 FW Ver.1.0

Alarm module ID 01 responds that its firmware version is MIC-3920 version 1.0

$bbCR(cr)

Description Read current time of alarm module

Response **!bbCRyyyy-mm-dd hh-mm(cr)**

Example:

$01CR(cr) Read current time of alarm module ID 01

!01CR1999-09-01 08:00(cr)

Alarm module ID 01 responds with current time

$bbCWyyyy-mm-dd hh-mm(cr)

Description Writes system time to alarm module

Response **!bbCWyyyy-mm-dd hh-mm(cr)**

Example:

$01CW1997-12-01 15:00(cr)

$bbIR(cr)

Description Reads System ID code

Response **!bbIRn...n(cr)**

Example:

$01IR(cr)	User reads current system ID code from alarm module ID 01
!01IRSYSTEM 1(cr)	Alarm module responds that current system ID is SYSTEM 1

Note: The minus sign "–" is not allowed to be used in system ID.

$bbIWn...n(cr)

Description Write System ID code

Response **!bbIWn...n(cr)**

Example:

$01IWALPHA SYSTEM(cr)	Sets new system ID code as ALPHA SYSTEM
!01IWALPHA SYSTEM(cr)	" Alarm module ID 01 responds to confirm the system ID setting command

Note:The length of n...n must be less then 14 characters

$bbTR(cr)

Description Reads current telephone number setting

Response **!bbTRn...n(cr)**

Example:

$01TR(cr)	User reads current telephone number setting
!01TR0,22184567(cr)	Alarm module responds that current telephone number is 0,221784567

$bbTWn...n(cr)

Description Write telephone number

Response **!bbTWn...n(cr)**

Example:

$01TW22184567(cr)	User sets new telephone number as 22184567
!01TW22184567(cr)	Alarm module responds to confirm the telephone number setting command

Note:The length of n...n must be less then 14 characters

APPENDIX A

Register Format

Register	Bit	Value	Description	Default	Remark
00H	**Reserved for internal use**				
01H	**Board ID**				
		00H	Configuration Mode	01H	
		01H~FFH	Valid Board ID Values		
02H	**Serial port baud rate setting**				
		01	1200 bps	04H	
		02	2400 bps		
		03	4800 bps		
		04	9600 bps		
		05	19200 bps		
03H	**System configuration**				
	0	0	minor relay disable	00H	
		1	minor relay enable		
	1	0	major relay disable		
		1	major relay enable		
	2	0	critical relay disable		
		1	critical relay enable		
	3		N/A		
	4	0	set serial port as RS-232/ RS-485		
		1	set serial port as RS-232 for modem connection		
	5		N/A		
	6	0	Alarm sound disable		
		1	Alarm sound enable		
	7		N/A		

Register	Bit	Value	Description	Default	Remark
04H	**Configuration of power good (PG) and isolated digital inputs (DI)**				
	0-1		N/A	00H	
	2	0	PG1 low (0) as alarm, high (1) as normal		
		1	PG1 low (0) as normal, high (1) as alarm		
	3-7		N/A		
12H			Current value of Ext. +3.3 V		The values (0~255) in these registers map to voltage 0~4.08 V. User can calculate the voltage according to the following formula: voltage value = [value in register] / 256 * 4.08 V
22H			High alarm value of +3.3 V	FFH	
32H			Low alarm value of Ext. +3.3 V	00H	

Register	Bit	Value	Description	Default	Remark
13H			Current value of system +5 V		The values (0~255) in these registers map to voltage 0~6.85 V.User can calculate the voltage according to the following formula: Voltage value = [value in register] / 256 * 6.85 V
23H			High alarm value of system +5 V	FFH	
33H			Low alarm value of system +5 V	00H	
14H			Current value of system +12 V		The values (0~255) in these registers map to voltage 0~16.32 V. User can calculate the voltage according to the following formula: Voltage value = [value in register] / 256 * 16.32 V
24H			High alarm value of system +12 V	FFH	
34H			Low alarm value of system +12 V	00H	
17H			Current value of temperature sensor 1		The values 0~127 in these registers map to temperatures from 0~127 degrees Celsius. The minus temperature (-1 ~ -128 degrees Celsius) is expressed with two complements, i.e. FFH = -1°C, FEH= -2°C, ..., *80H: Temperature read fail
27H			High alarm value of temperature sensor 1	3CH	
37H			Low alarm value of temperature sensor 1	00H	
18H			Current value of temperature sensor 2		
28H			High alarm value of temperature sensor 2	7DH	
38H			Low alarm value of temperature sensor 2	E2H	
19H			Current value of temperature sensor 3		
29H			High alarm value of temperature sensor 3	7DH	
39H			Low alarm value of temperature sensor 3	E2H	

Register	Bit	Value	Description	Default	Remark
1AH			Current value of fan sensor 1		User can use these values to calculate fan speed: Fan speed = 1350000 / [value in register] / 8 RPM 00: fan detect error
2AH			High alarm value of fan sensor 1	11H	
3AH			Low alarm value of fan sensor 1	F1H	
1BH			Current value of fan sensor 2		
2BH			High alarm value of fan sensor 2	11H	
3BH			Low alarm value of fan sensor 2	F1H	
1CH			Current value of fan sensor 3		User can use these values to calculate fan speed: Fan speed = 1350000 / [value in register] / 2 RPM 00: fan detect error
2CH			High alarm value of fan sensor 3	11H	
3CH			Low alarm value of fan sensor 3	F1H	
2EH			Current value of fan sensor 4		User can use these values to calculate fan speed: Fan speed = 1350000 / [value in register] / 8 RPM 00: fan detect error
2DH			High alarm value of fan sensor 4	11H	
3DH			Low alarm value of fan sensor 4	F1H	

Register	Bit	Value	Description	Default	Remark
1FH	**Relay output and PC reset output**				
	0		Relay output 1	00H	0 : OFF 1 : ON
	1		Relay output 2		
	2		Relay output 3		
	3		N/A		
	4-7		N/A		
40H~44H: Alarm level setting register					
40H	0-3		N/A	00H	2 bits are used to set the alarm level of each sense input. Write following value into correspondent bit to assign alarm level in case abnormal condition is sensed. 00 : disable 01 : minor alarm 10 : major alarm 11 : critical alarm
	5,4		System +3.3 V		
	7,6		System +5V		
41H	1,0		System +12V	00H	
	3,2		System -12V		
	5,4		N/A		
	7,6		Temperature sensor 1		
42H	1,0		Temperature sensor 2	00H	
	3,2		Temperature sensor 3		
	5,4		Fan sensor 1		
	7,6		Fan sensor 2		
43H	1,0		Fan sensor 3	00H	
	2-7		N/A		
44H	1,0		Power Good input	00H	
	2-5		N/A		
	7,6		Fan sensor 4		

Register	Bit	Value	Description	Default	Remark
45H~47H: Alarm status					
45H	0-1		N/A		The register is read-only. 0: Normal 1: Alarm
	2		System +3.3 V		
	3		System +5 V		
	4		System +12 V		
	5		System -12 V		
	6		System -5 V		
	7		Temperature sensor 1		
46H	0		Temperature sensor 2		
	1		Temperature sensor 3		
	2		Fan sensor 1		
	3		Fan sensor 2		
	4		Fan sensor 3		
	5-7		N/A		
47H	0		Power Good input		
	1		N/A		
	2		N/A		
	3		Fan sensor 4		
	4-7		N/A		

Register	Bit	Value	Description	Default	Remark
50H			System ID	53H ('S')	The register is read-only. 0: Normal 1: Alarm
51H			System ID	79H ('y')	
52H			System ID	73H ('s')	
53H			System ID	74H ('t')	
54H			System ID	65H ('e')	
55H			System ID	6DH ('m')	
56H			System ID	20H (' ')	
57H			System ID	31H ('1')	
58H			System ID	2DH ('-')	
59H ~ 5FH			System ID	00H	
60H			Telephone number	30H	
61H			Telephone number	30H	
62H			Telephone number	30H	
63H			Telephone number	0DH ('\r')	
64H ~ 6FH			Telephone number	00H	

APPENDIX B

MIC-3921 Control Panel Display

B.1 Operation Introduction

The MIC-3921 provides a front panel display and a control keypad for message display and user configuration. The system status of the CompactPCI system will be shown on the display window. Users can manipulate the MIC-3921 through the front control keypad. Any change made from the front control keypad has the same effect as changes made by the PC Sentry utility.

The power switch on the front panel controls the power of the backplane. If the switch of the ATX power supply is on, pressing the MIC-3921's power switch will turn on the system or shut off the entire system. The up-arrow icon ⇧ and the down-arrow icon ⇩ on the front control keypad allow users to scroll up and down in the MIC-3921 configuration setup menu. The **ENTER** icon ENTER represents OK and the **ESC** icon ESC stands for escape. When users make changes of the settings and/or would like to go to the lower level of the menu, they need to press **ENTER** to confirm it. If users press **ESC**, the system won't save any changes made and will go back to a higher level of the menu. When an alarm is detected and the buzzer release warning sounds, users may press the **ALARM** button ALARM to stop the audible alarm. Please refer to Table1-1.

The following sections describe the functions of each setting in the menu.

B.2 Main Menu

The first level of the MIC-3921 menu is the **"ADVANTECH ALARM SYSTEM"**. Press **ENTER** here and users will get on the main menu level and will be ready to start to setup the MIC-3921. The following sections explain the functions of each setting.

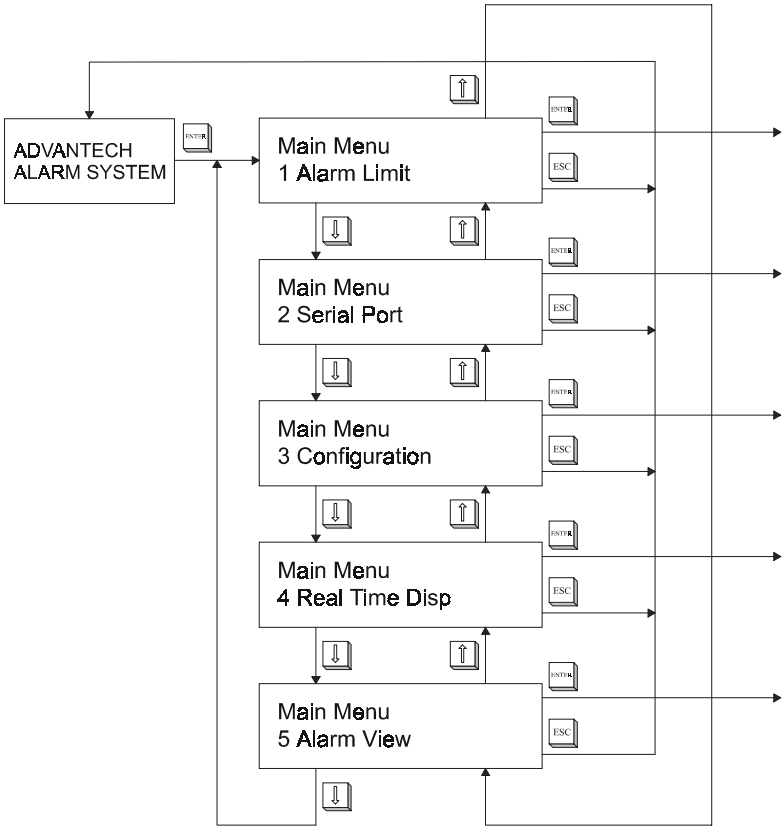


Figure B-1: Main menu structure

B.3 Alarm Limit Menu

The **Alarm Limit** menu gives users the capability to choose the alarm level and determines the value of the high alarm and the low alarm of each sense input. Users can set each sense input's alarm level as critical, major, minor, or disabled. The high alarm and low alarm of each sensing input means the upper limit value and the lower limit value of each sensing input. If the MIC-3921 detects that the sense input exceeds the high alarm value or is lower than the low alarm value, the corresponding alarm ouput will be activated. Please refer to chapter 3 for more information on this topic.

When the display shows **Alarm Limit**, press **ENTER** and 14 alarm limit settings will appear, from **Voltage 3.3 V** to **Power Fan**.

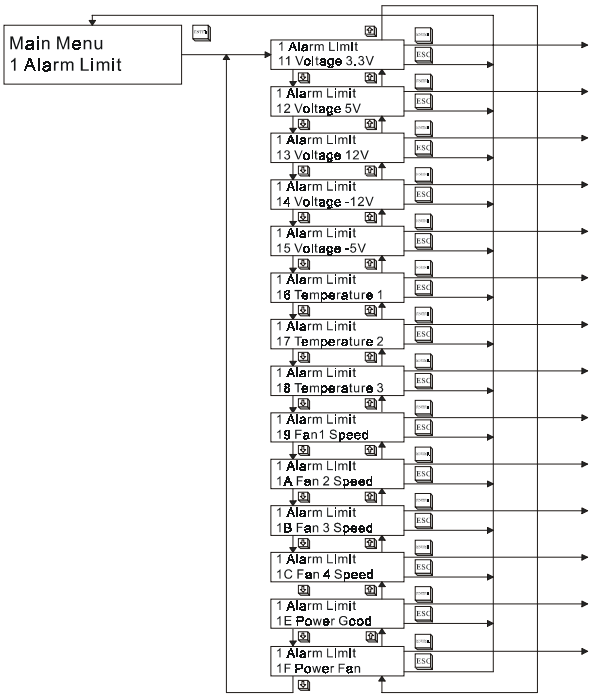
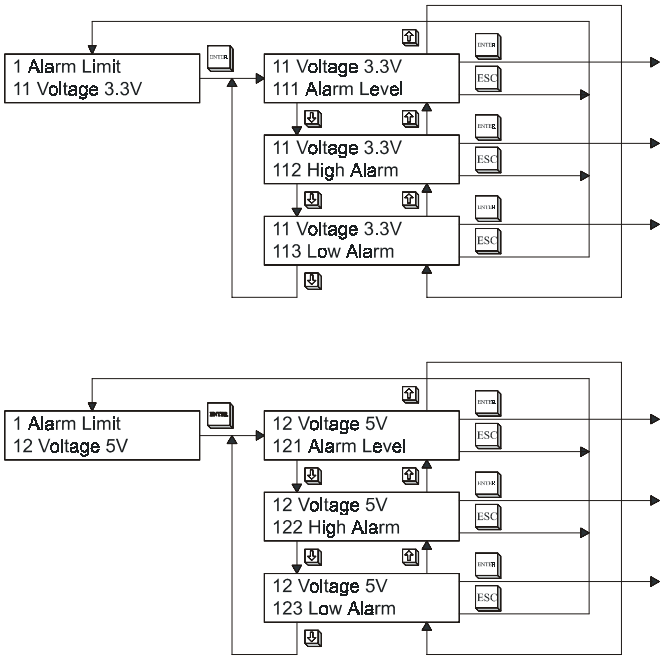


Figure B-2: Alarm limit menu structure

B.3.1 Voltage 3.3 V ~ Voltage -5 V

The alarm limit of **Voltage 3.3 V**, **Voltage 5 V**, **Voltage 12 V**, **Voltage -12 V**, and **Voltage -5 V** allow users to set the limit of the voltage used in the backplane. Users can set the **Alarm Level** as critical, major, minor, or disabled. This setting will affect the alarm output once a fault is detected. Please refer to Figure B-4 for more details. The **High Alarm** and **Low Alarm** are the upper and the lower limit values of the backplane voltages. Please see Figure B-5 for more information on this topic.



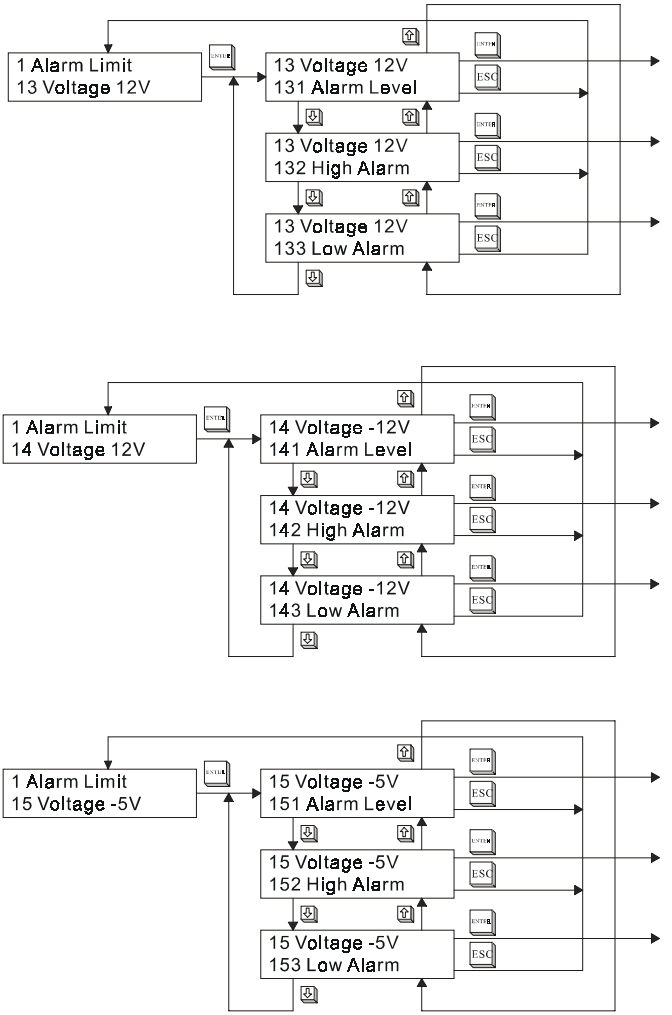


Figure B-3: Voltage limit menu structure

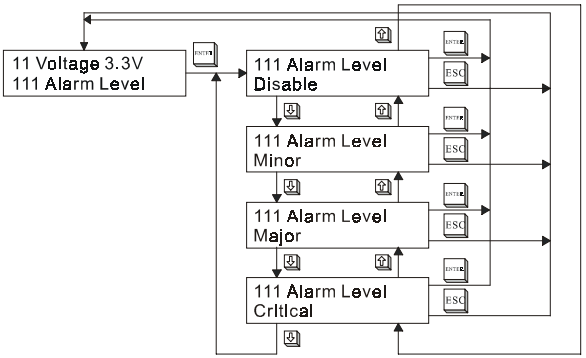


Figure B-4: Alarm level menu structure

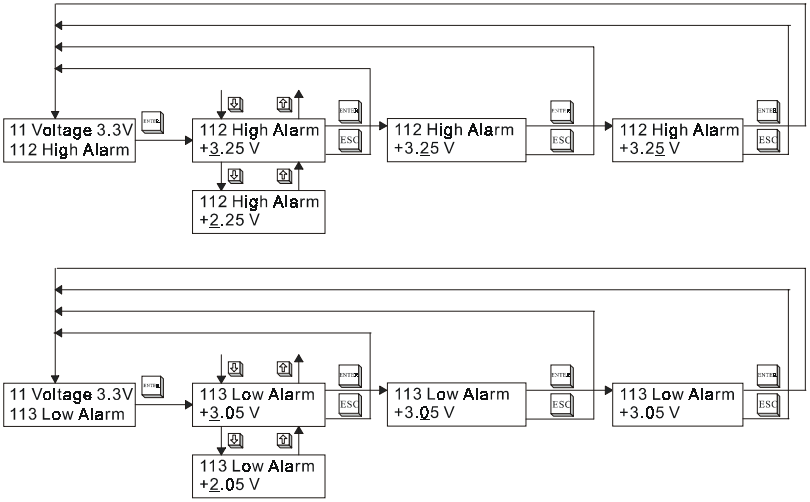


Figure B-5: High alarm and low alarm menu structure

B.3.2 Temperature 1 ~ Temperature 3

The alarm limit of **Temperature 1** allows users to set the limit of the MIC-3921 ambient temperature. The alarm limit of **Temperature 2** and **Temperature 3** allow users to set the limit of the system's temperature; however, the temperature limits may need to change if the two sensor wires are attached to different places other than the factory default. Users can set the **Alarm Level** as critical, major, minor, or disabled. This setting will affect the alarm output once a fault is detected. The **High Alarm** and **Low Alarm** are the upper and lower limit values of the system's temperature.

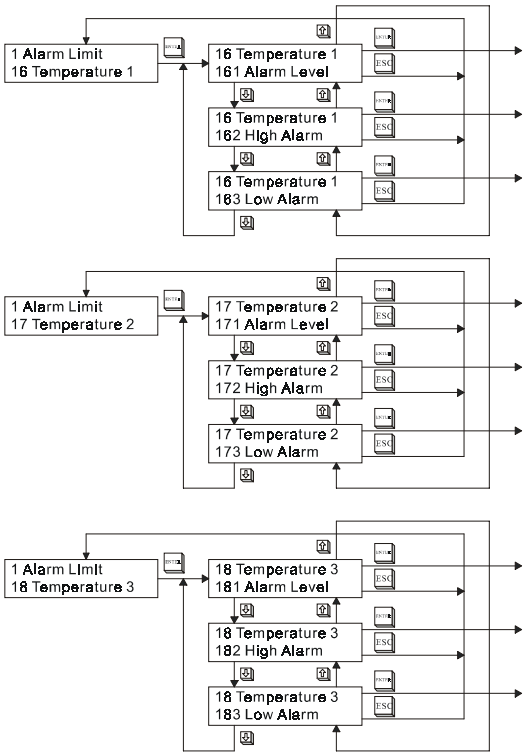


Figure B-6: Temperature limit menu structure

B.3.3 Fan 1 Speed ~ Fan 4 Speed

The alarm limit of **Fan 1 Speed**, **Fan 2 Speed**, and **Fan 4 Speed** allow users to set the limit of three low-speed fans in the system. The alarm limit of **Fan 3 Speed** allows users to set the limit of a high-speed fan in the system. Users can set the **Alarm Level** as critical, major, minor, or disabled. This setting will affect the alarm output once a fault is detected. The **High Alarm** and **Low Alarm** are the upper and lower limit values of the fan speeds.

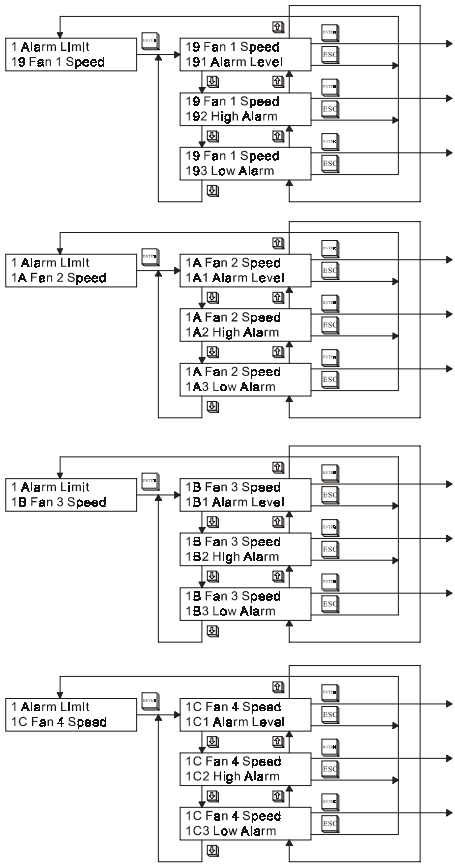


Figure B-7: Fan speed limit menu structure

B.3.4 Power Good and Power Fan

If the power supply used in the CompactPCI system provides power good and/or power fan signals, the alarm limit of the **Power Good** and **Power Fan** allow users to set the alarm level and trigger (whether it is TTL high or TTL low when failure occurs). Users can set the **Alarm Level** as critical, major, minor, or disabled. This setting will affect the alarm output once a fault is detected. The **Trigger** option allows users to set the alarm trigger level as TTL high or TTL low. This setting depends on the power supply's power good signal and power fan signal. Please refer to Figure B-9 for more detailed information.

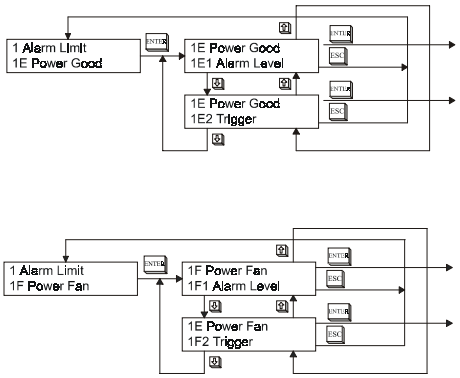


Figure B-8: Power supply status limit menu structure

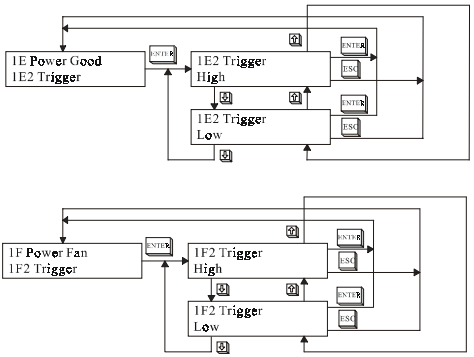


Figure B-9: Trigger setting menu structure

B.4 Serial Port Menu

The MIC-3921 provides a serial port and users can set the serial port as RS-232 or RS-485. Users can connect a modem to the MIC-3921 through this serial port as well.

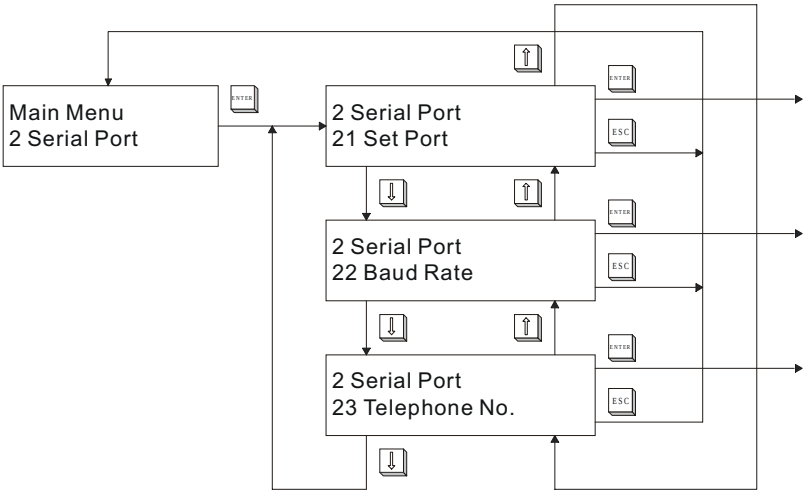


Figure B-10: Baud rate menu structure

B.4.1 Set Port

If users would like to connect the MIC-3921 to a modem, press **ENTER** on **Set Port** and choose **Link to Modem**. Otherwise, choose **RS-232/ RS-485**.

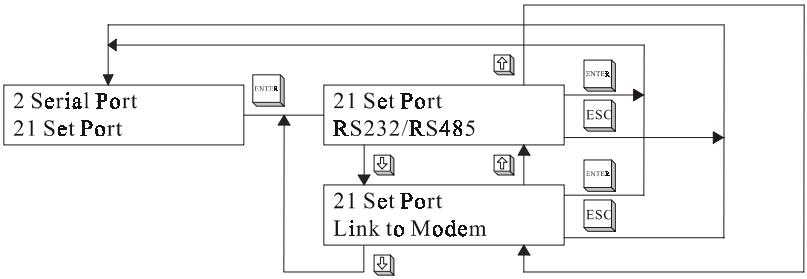


Figure B-11: Set port menu structure

B.4.2 Baud Rate

Users can choose an appropriate baud rate under this option. Press **ENTER** on **Baud Rate** and use the up and down arrows to choose between different baud rates. Press **ENTER** to confirm the baud rate value users have chosen.

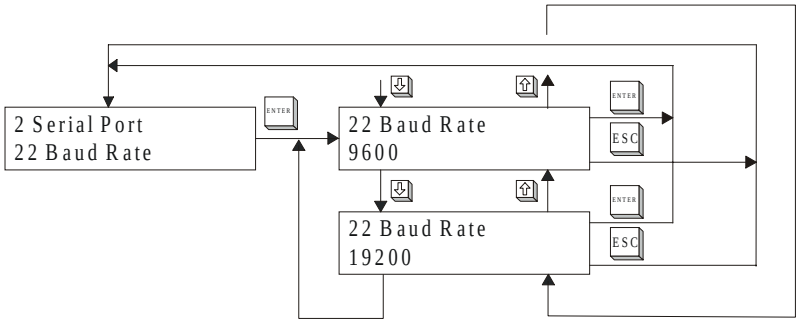


Figure B-12: Baud rate menu structure

B.4.3 Telephone No.

Users can store an assigned telephone number in the MIC-3921. The modem connected to the MIC-3921 will dial this telephone number when activated. Press **ENTER** on **Telephone No.** This will allow users to input a telephone number here. Remember to press **ENTER** after users input each digit. The up and down arrows are used to scroll from numbers 0 to 9.

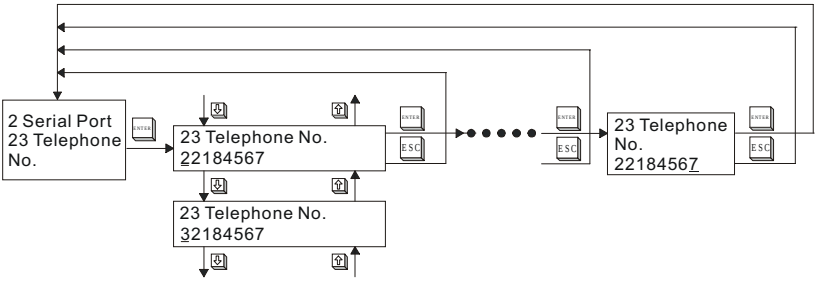


Figure B-13: Telephone number menu structure

B.5 Configuration Menu

The **Configuration** option is used to setup the MIC-3921. Users can enable or disable the audible alarm signal when a fault is detected. The MIC-3921's front display panel will continuously display the current system status if users set the **Status Disp** as enable. If the MIC-3921's relay output terminal is connected to devices such as LEDs, buzzers, etc, enable the **Minor**, **Major**, and/or **Critical Relay** options and each will activate the connected devices once minor, major, and/or critical faults happen.

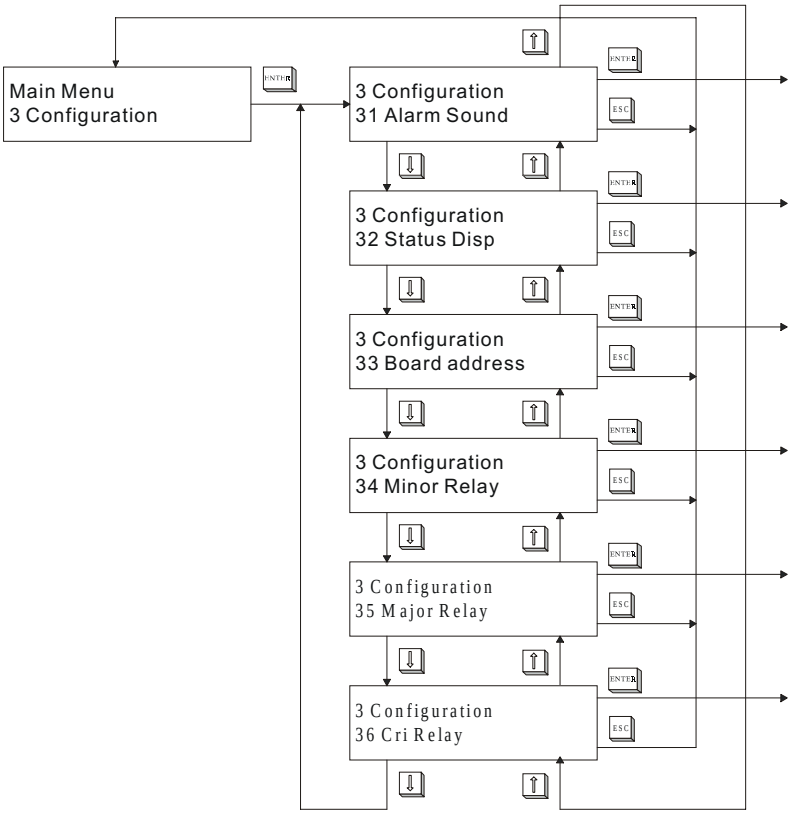


Figure B-14: Configuration menu structure

B.5.1 Alarm Sound

The **Alarm Sound** option controls the buzzer of the MIC-3921. Enabling/Disabling this option will activate/deactivate the buzzer when a fault is detected.

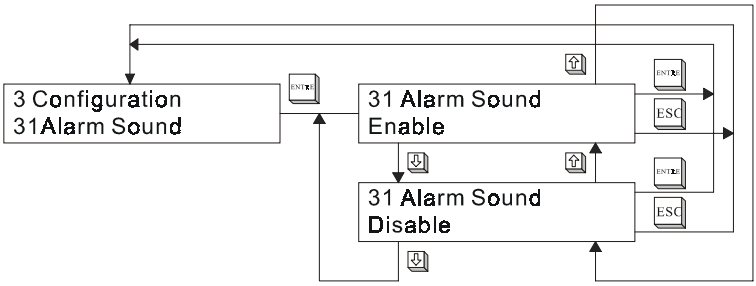


Figure B-15: Alarm sound setting menu structure

B.5.2 Status Display

The **Status Display** option allows users to set the MIC-3921's front panel display on status rolling mode or fixed mode. When enabling this option, the MIC-3921's front display window will continuously display the current status of the system, concerning voltages, temperatures, fan speeds, etc.

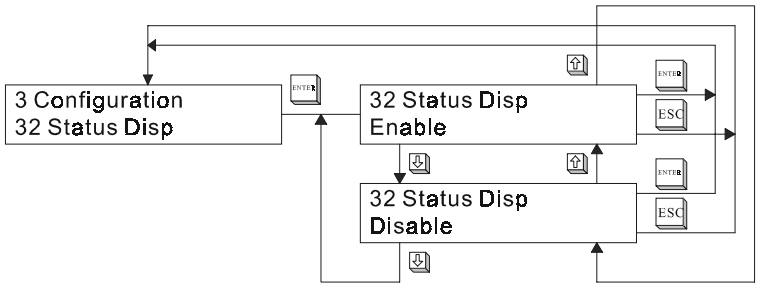


Figure B-16: Status display setting menu structure

B.5.3 Board Address

The **Board Address** setting allows users to set the board ID. Press **ENTER** at the **Board Address** setting and users can begin to input the board ID. Use the up and down arrows to choose digits between 0 to F, and press **ENTER** to confirm users' selection.

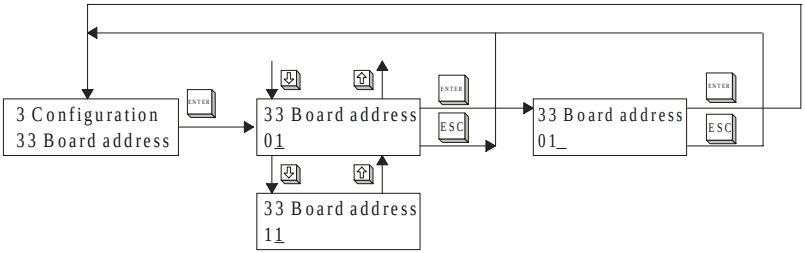


Figure B-17: Board address setting menu structure

B.5.4 Minor Relay

The **Minor Relay** setting allows users to activate/deactivate the relay output when a minor fault occurs. When enabling the **Minor Relay** setting, the sense input's **Alarm Level** is set as **Minor** and will activate its relay output if a fault is detected.

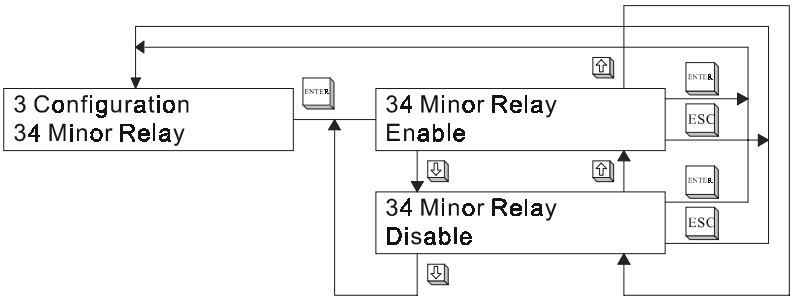


Figure B-18: Minor relay setting menu structure

B.5.5 Major Relay

The **Major Relay** setting allows users to activate/deactivate the relay output when a major fault occurs. When enabling the **Major Relay** setting, the sense input's **Alarm Level** is set as **Major** and will activate its relay output if a fault is detected.

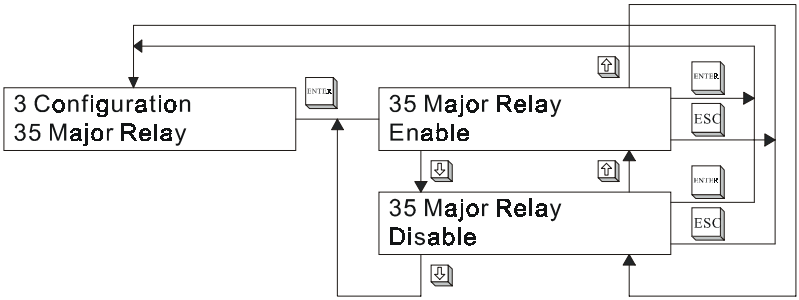


Figure B-19: Major relay setting menu structure

B.5.6 Critical Relay

The **Critical Relay** setting allows users to activate/deactivate the relay output when a critical fault occurs. When enabling the **Critical Relay** setting, the sense input's **Alarm Level** is set as **Critical** and will activate its relay output if a fault is detected.

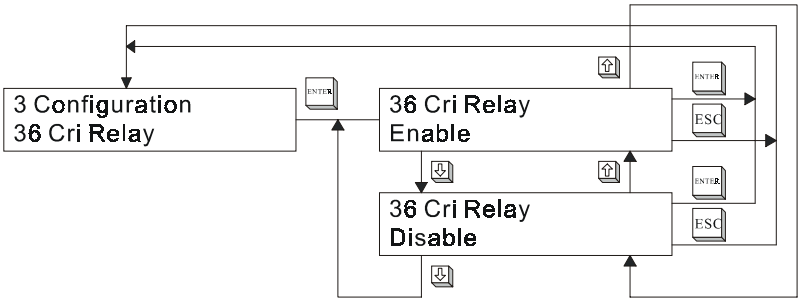


Figure B-20: Critical relay setting menu structure

B.6 Real Time Display Menu

This menu shows the current status of each sense input. Each sense input reports its current value or the status of the system and displays these here on the menu as shown below.

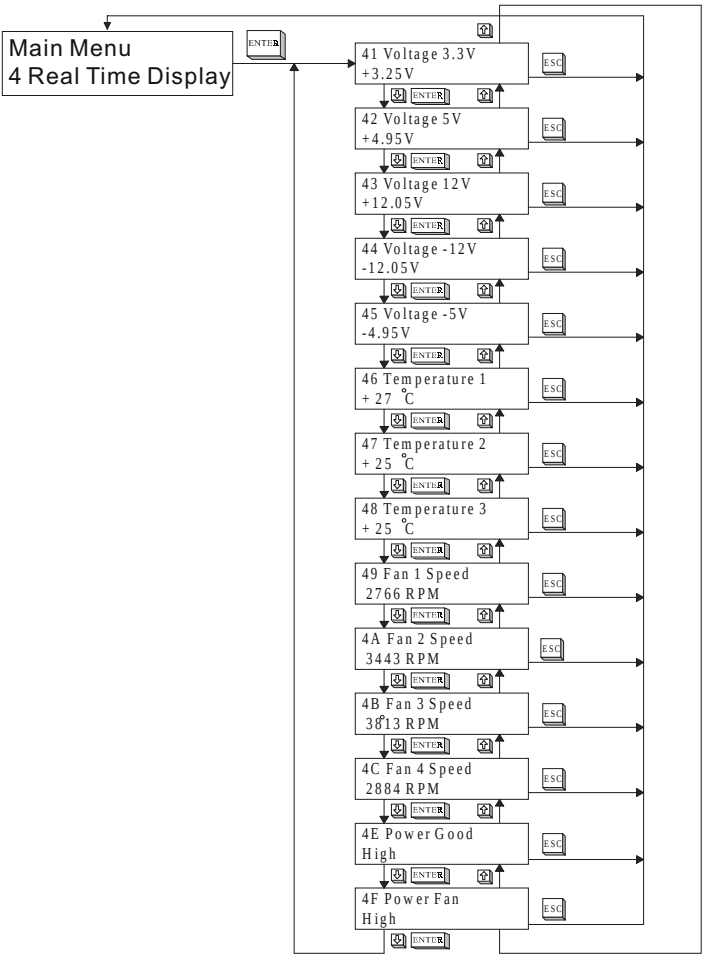


Figure B-21: Real time display menu structure

B.7 Alarm View Menu

This menu shows all the alarms which have currently occurred in the system. Alarm ***xx*** of ***yy*** means this alarm is the ***xx***th of the total of ***yy*** alarms.

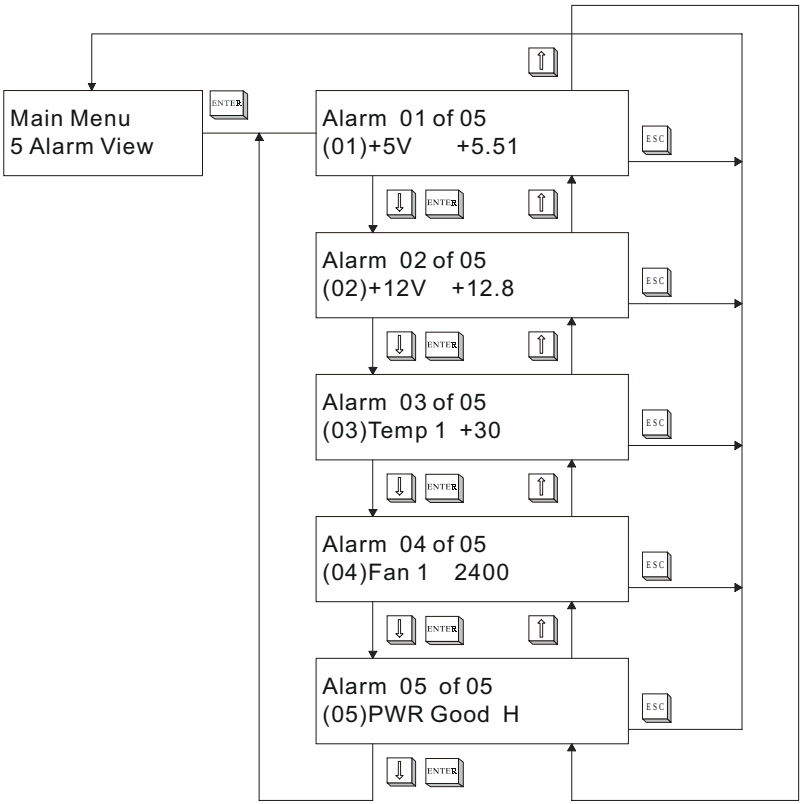


Figure B-22: Alarm view menu structure