ROCKY - 418

486 DX4-100 SBC

Version 3.0

User Manual

Version 3.1

August 20, 2003

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Chapter 1. Introduction

Welcome to the ROCKY-418 486 DX4-100 Single Board Computer (Version 3.0). The ROCKY-418 is an ISA with PC/104 form factor board, which comes equipped with advanced high-performance chipset ACC Maple. It is designed for the system manufacturers, integrators, or VARs that want to provide all the performance, reliability, and quality at a reasonable price.

All advanced high performance super I/O functions are in the ROCKY-418. And the built-in PC/104 expansion bus let customers easily install over thousands of PC/104 modules from hundreds' vendors in the world. The ROCKY-418 has external power connector that allows it to connect to power supply directly making it very suitable for your standalone applications.

In addition, the ROCKY-418 provides two 72-pin SIMM (Single In-line Memory Module) sockets to install max. 32MB memory (single-sided RAM).

1.1 Specifications

The ROCKY - 418 DX4-100 Single Board Computer provides the following specifications:

- **System:**
  - ✓ **CPU** : ACC Maple, includes 486 DX4-100 CPU (internal 8KB Cache)
  - ✓ **Real Time Clock and battery backup** : ST M4T28 Time Keeper (Lithium Battery) for data retention up to ten years.

- **System Memory:** Provides two 72-pin SIMM sockets, support up to 32MB DRAM

- **Input/Output:**

  - ✓ **IDE hard disk drive interface** : Supports up to two IDE hard disk drives and can be disabled through BIOS Setup.

  - ✓ **Floppy disk drive interface** : Supports two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives and can be disabled by BIOS Setup.

  - ✓ **Two high speed serial ports :** NS16C550 compatible UARTs with send/receive 16-byte FIFOs, data rates are independently programmable from 115.2K baud down to 50 baud. Modem control circuitry. RS-232 or RS-422/485 on the COM2.

  - ✓ **Multi-mode Parallel Port** :

    1. Standard mode - IBM PC/XT, PC/AT, PS/2 compatible bi-directional parallel port.

    2. Enhanced mode - Enhanced parallel port (EPP) compatible with IEEE 1284 specification.

    3. High speed mode - Microsoft and Hewlett Packard extended capabilities port (ECP), compatible with IEEE 1248 specification.

- **Industrial Features** :

  - ✓ **Watch-dog timer** : Can be set to 1, 2, 10, 20, 110 or 220 seconds per period. Reset or NMI is generated when CPU does not periodically trigger the timer. Your program uses hex 043 and 443 to control the watch-dog and generate a system reset.

- ✓ **PC/104 expansion bus** : A 64-pin and 40-pin, industrial embedded-PC bus standard.

  - ✓ **External power connector** : 8-pin male connector (Molex 6410 series compatible)

  - ✓ **Keyboard connector** : A 5-pin header on board and 6-pin mini-DIN keyboard connector is located on the mounting bracket.

- ● **General** :

  - ✓ **Power Consumption** : max. +5V @ 2.5A (32MB RAM)

  - ✓ **Operating Temperature** : 0° ~ 60° C (CPU needs Cooler)

  - ✓ **Humidity** : 5% ~ 95%, non-condense

  - ✓ **Dimension**: 180mm(W) x 122mm(L), standard AT form factor

1.2 Package Contents

In addition to this *User's Manual*, the ROCKY-418 package includes the following items:

- ● ROCKY-418 486 DX4-100 Single Board Computer
- ● Printer Cable
- ● FDD/HDD Cable Sets

If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.

Chapter 2. Installation

This chapter describes how to install the ROCKY-418. The unpacking information that you should be careful with is described and the layout of ROCKY-418 is shown. The jumpers and switches setting for the ROCKY-418's configuration, such as RS422/485 selection, system clock setting, and watch dog timer setting …etc. are also included.

2.1 Unpacking Precautions

Some components on ROCKY-418 SBC are very sensitive to static electric charges and can be damaged by a sudden rush of power. To protect it from unintended damage, be sure to follow these precautions:

● Ground yourself to remove any static charge before touching your ROCKY-418 SBC. You can do it by using a grounded wrist strap at all times or by frequently touching any conducting materials that is connected to the ground.

● Handle your ROCKY-418 SBC by its edges. Don't touch IC chips, leads or circuitry if not necessary.

● Do not plug any connector or jumper while the power is on.

2.2 ROCKY-418's Layout and Dimensions
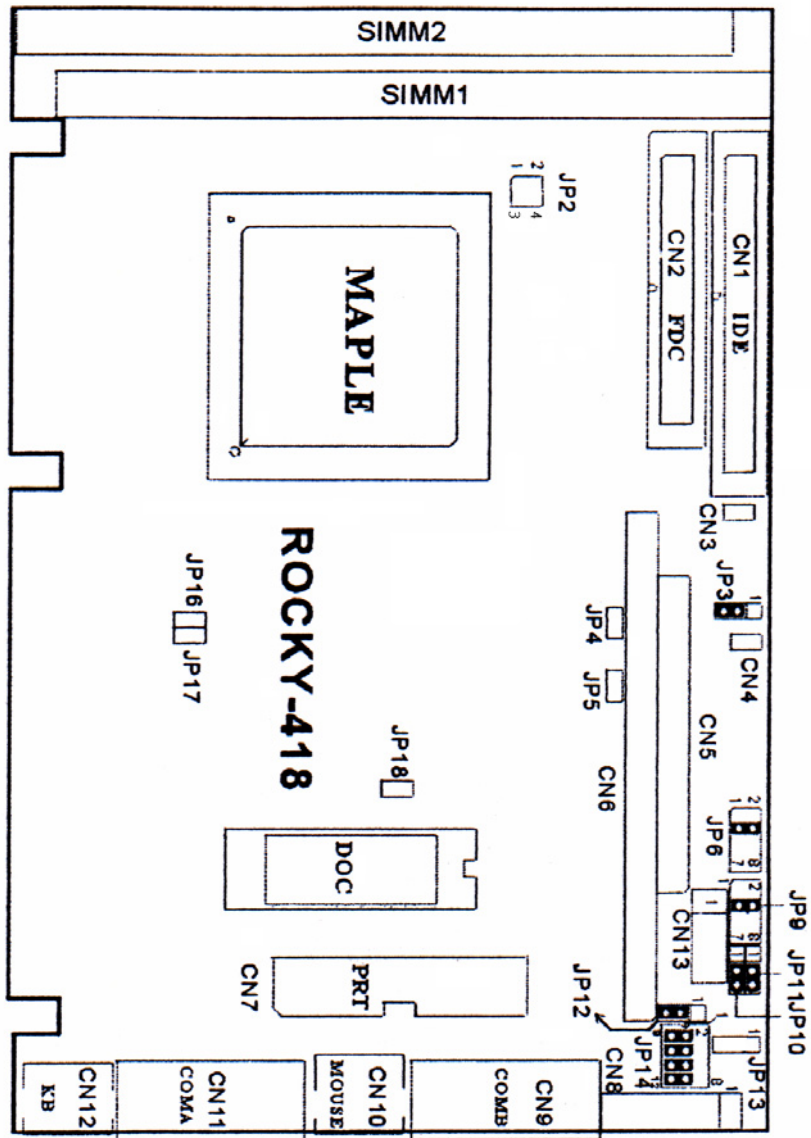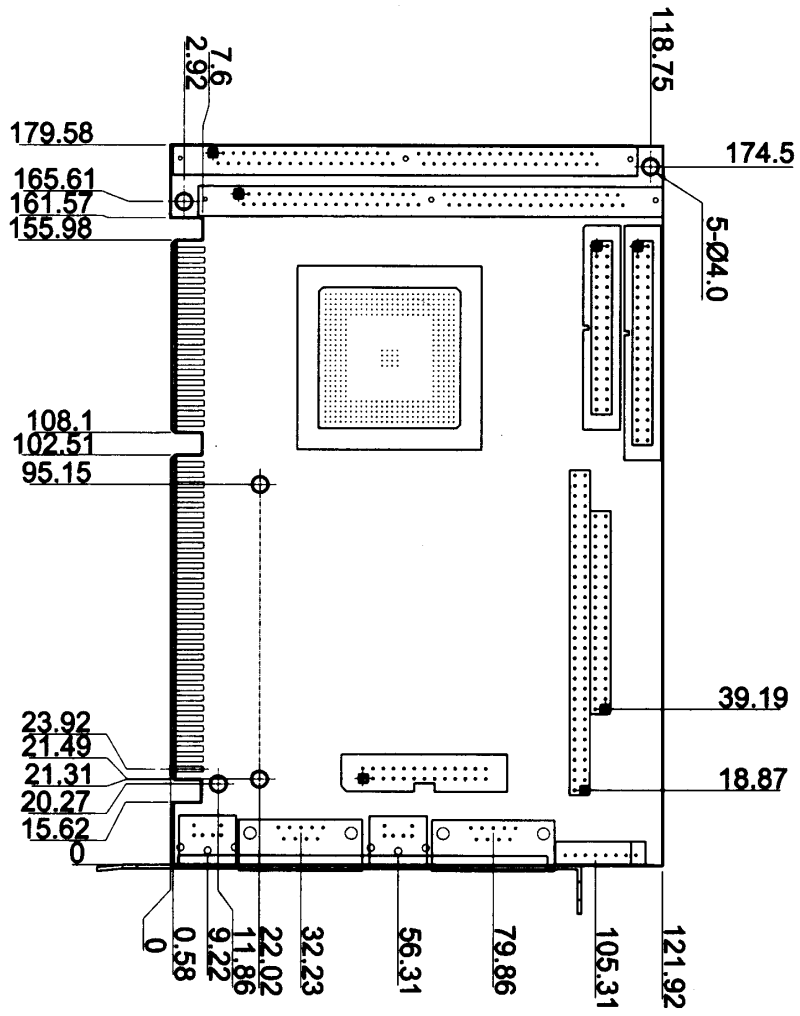
2.3 CPU Operation Speed Setting

The system clock is generated by the ICS650, and the different CPU clock frequency can be selected through JP2 and shown as shown in the following table:

- **CPU SPEED SETTING**:

JP2	1-2	3-4
75MHz	ON	ON
100MHz	**OFF**	**OFF**

2.3 Watch-Dog Timer

The Watch-Dog 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 Watch-Dog Timer is disable by reading port 843H. The Watch-Dog Timer time-out period can be set to 1, 2, 10, 20, 110 or 220 sec.

- **JP3 : Watch-Dog Timer Type Setting**

JP3	DESCRIPTION
1-2	NMI
2-3	**RESET**
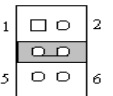
- **JP6 : WDT TIME-OUT PERIOD**

JP6	1-2	3-4	5-6	7-8
1sec	OFF	OFF	ON	OFF
2sec	OFF	OFF	ON	ON
10sec	**OFF**	**ON**	**OFF**	**OFF**
20sec	OFF	ON	OFF	ON
110sec	ON	OFF	OFF	OFF
220sec	ON	OFF	OFF	ON

2.4   DiskOnChip™ Flash Disk

The DOC (MD-2200-xMB) is 32-pin DIP package. It is software compatible to hard disk and DOS. Customer doesn't need to install any extra software utility. "Plug and play" function is not only easy to use but also reliable.

● JP9 : DiskOnChip™ Memory Address Setting

	1-2	CE000
	3-4	**D6000**
	5-6	DE000

2.5   COM2 RS-232,RS-422 or RS-485 setting

The COM2 (CN9) can be set as RS-232,RS-422,or RS-485 mode by the JP10, JP11 or JP14.

● JP10,11,14: RS-232/422/485 setting

COM2 Mode	JP11	JP10	JP14
RS-232	**Don't care**	**2-3**	**1-9 , 3-10 5-11 , 7-12**
RS-422	2-3	1-2	1-2 , 3-4 5-6 , 7-8
RS-485	1-2	1-2	1-2 , 3-4 5-6 , 7-8

Note : IRQ3 and IRQ4 are dedicated to be used for two Serial Ports application

2.6   Free IRQ Setting

COM1 and COM2 will use IRQ3 and IRQ4, respectively, when in use. However, the IRQ3 and IRQ4 can be released by JP16 and JP17 setting.

● **JP16 :Free IRQ3 Setting**

OFF	Enable COM2
ON	Disable COM2 (BIOS) IRQ3 Release

● **JP17 :Free IRQ4 Setting**

OFF	Enable COM1
ON	Disable COM1 (BIOS) IRQ4 Release

2.7 Clear CMOS Setup

If you forget the CMOS password, you can clear or reset it by closing the JP18 for about 3 seconds. After the password has been cleared from your CMOS, set it back to normal operation mode by opening it.

● **JP18 : CLEAR CMOS Setup**

OFF	Normal Operation
ON	CLEAR CMOS

2.8   COM2 RI pin setting

The CN9/COM2 RI pin (pin 9) can be set as RI, +5V or +12V mode.

● **JP12/13 :COM2 RI pin setting**

COMB CN9 Pin 9	JP12	JP13
RI	2-3	Don't Care
+5V	1-2	2-3
+12V	1-2	1-2

Chapter 3. Connection

This chapter describes how to connect peripherals, switches and indicators to the ROCKY-418 board. You can access most of the connectors from the top of the board while it is installed in the chassis.

3.1 Floppy Disk Drive Connector

ROCKY-418 board comes equipped with a 34-pin daisy-chain driver connector cable. The detailed pin assignment of the connector is specified as following table:

- **CN2 : FDC CONNECTOR**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
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	D4IRECTION#
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 IDE Disk Drive Connector

You can attach two IDE (Integrated Device Electronics) hard disk drives to the ROCKY-418 internal controller. The board comes equipped with a 40-pin flat-cable connector. The detailed pin assignment of the connector is specified in the following table:

● **CN1: IDE Interface Connector**

PIN NO.	DESCRIPTION	PIN NO.	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	IDE CHRDY	28	BALE
29	N/C	30	GROUND
31	IRQ14	32	IOCS16
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND

3.3   Parallel Port

This port is usually connected to a printer, The ROCKY-418 includes an on-board parallel port, accessed through a 26-pin flat-cable connector CN7. The detailed pin assignment of the connector is specified in the following table:

● **CN7 : Parallel Port Connector**

PIN NO.	DESCRIPTION	PIN NO.	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	LPT SELECT LN#	18	GROUND
19	GROUND	20	GROUND
21	GROUND	22	GROUND
23	GROUND	24	GROUND
25	GROUND	26	N/C

3.4   Serial Ports

The ROCKY-418 offers two high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports. These ports let you connect to serial devices or a communication network. Two DB-9 connectors are provides by the ROCKY-418 The detailed pin assignment of the connectors are specified in the following tables:

● **CN11 : Serial Port Connector (Port1)**

PIN NO.	DESCRIPTION	
1	DATA CARRIER DETECT	(DCD)
2	RECEIVE DATA	(RXD)
3	TRANSMIT DATA	(TXD)
4	DATA TERMINAL READY	(DTR)
5	GROUND	(GND)
6	DATA SET READY	(DSR)
7	REQUEST TO SEND	(RTS)
8	CLEAR TO SEND	(CTS)
9	RING INDICATOR	(RI)
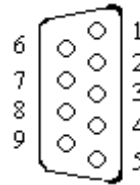
● **CN9 : Serial Port Connector (Port2)**
      RS-232 or RS-422/485

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD/TX2-	6	DSR/RX2+
2	RX/TX2+	7	RTS/RX2-
3	TX	8	CTS
4	DTR	9	RI/+5V/+12V
5	GND	10	N/C

Note:
● *RS-485 Control Programming*
   The RTS signal is used to control/enable the RS485 output driver. It must be set to 1 for sending data and 0 for receiving data. Please refer to the below table for this function.

RTS	1	0
RS485 driver	output	input

3.5   Keyboard / PS2 Mouse Connector

The ROCKY-418 provides two keyboard connectors and one PS/2 mouse connector. A 5-pin header connector CN13 supports passive backplane applications. Another one is a 6-pin Mini-DIN connector CN12 on the board mounting bracket for single board computer applications. The detailed pin assignment of the connector is specified in the following table:

● **CN13 : 5-pin Header Keyboard Connector**

PIN NO.	DESCRIPTION
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	N/C
4	GROUND
5	+5V

● **CN12 : 6-pin Mini-DIN Keyboard Connector**

PIN NO.	DESCRIPTION
1	KEYBOARD DATA
2	N/C
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	N/C
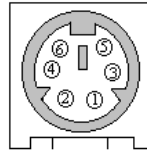
● **CN10 : 6-pin PS/2 Mouse Connector**

PIN NO.	DESCRIPTION
1	MOUSE CLOCK
2	N/C
3	MOUSE DATA
4	GND
5	+5V
6	N/C
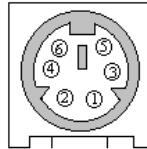
3.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board. These features are completely optional so please install them if you need them. The detailed pin assignment of the connectors is specified in the following tables:

● **CN4 : RESET Button Connector**

PIN NO.	DESCRIPTION
1	EXTERNAL RESET
2	GROUND

● **CN3 : IDE HD LED Connector**

PIN-NO	DESCRIPTION
1	HDD ACTIVE#
2	+5V

● **JP4 : POWER LED Connector**

PIN NO.	DESCRIPTION
1	GROUND
2	+5V

3.7 External Power Connector

The ROCKY-418 has an on-board external power connector CN8. You can connect power directly to the CPU board for some single-board-computer (without passive backplane) application.

● **CN8 : EXTERNAL POWER CONNECTOR**

PIN NO.	DESCRIPTION
1	+5V
2	+12V
3	-12V
4	GND
5	GND
6	-5V
7	+12V
8	+5V

3.8 External Speaker

The ROCKY-418 has its own buzzer, you also can connect it to a external speaker through JP5 connector.

● **JP5 : SPEAKER**

PIN NO.	DESCRIPTION
1	+5V
2	SPEAKER SIGNAL

3.9   PC/104 Connection Bus

The ROCKY-418's PC/104 expansion bus let you attach any kind of PC/104 modules. The PC/104 bus has already become an industrial embedded PC bus standard, so you could easily install over thousands of PC/104 modules from hundreds of venders worldwide.

● CN5 : PC/104-40 CONNECTOR

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	21	GROUND
2	MCS16#	22	SBHE#
3	IOCS16#	23	LA23
4	IRQ10	24	LA22
5	IRQ11	25	LA21
6	IRQ12	26	LA20
7	IRQ15	27	LA19
8	IRQ14	28	LA18
9	DACK0#	29	LA17
10	DRQ0	30	MEMR#
11	DACK5#	31	MEMW#
12	DRQ5	32	SD8
13	DACK6#	33	SD9
14	DRQ6	34	SD10
15	DACK7#	35	SD11
16	DRQ7	36	SD12
17	VCC	37	SD13
18	MASTER#	38	SD14
19	GROUND	39	SD15
20	GROUND	40	GROUND

● CN6 : PC/104-60 CONNECTOR

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	IOCHCK#	33	GROUND
2	SD7	34	IRSTDRV
3	SD6	35	VCC
4	SD5	36	IRQ9
5	SD4	37	-5V
6	SD3	38	DRQ2
7	SD2	39	-12V
8	SD1	40	ZWS#

9	SD0	41	+12V
10	IOCHRDY	42	GROUND
11	AEN	43	SMEMW#
12	LA19	44	SMEMR#
13	LA18	45	IOW#
14	LA17	46	IOR#
15	SA16	47	DACK3#
16	SA15	48	DRQ3
17	SA14	49	DACK1#
18	SA13	50	DRQ1
19	SA12	51	REFRESH#
20	SA11	52	SYSCLK
21	SA10	53	IRQ7
22	SA9	54	N/C
23	SA8	55	IRQ5
24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	DACK2
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	VCC
30	SA1	62	OSC
31	SA0	63	GROUND
32	GROUND	64	GROUND

NOTE : ROCKY-418 allows directly plug in PC/104 module, it doesn't need PC/104 Connection Kit.

Chapter 4. AMI BIOS Setup

The ROCKY-418 uses AMI BIOS for system configuration, and the AMI BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options which may be selected to fit end-user requirements. This chapter is written to assist you in the proper usage of these features.

4.1   Getting Start

When the system is powered on, 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. The following screen will be displayed at this time.

```
┌─────────────────────────────────────────────────────────┐
│            AMIBIOS HIFLEX SETUP UTILITY - VERSION 1.20    │
│         (C)1998 American Megatrends, Inc. All Rights Reserved │
├─────────────────────────────────────────────────────────┤
│                                                           │
│                    Standard CMOS Setup                    │
│                    Advanced CMOS Setup                    │
│                   Advanced Chipset Setup                  │
│                      Peripheral Setup                     │
│                   Auto-Detect Hard Disks                  │
│                    Change User Password                   │
│                  Change Supervisor Password               │
│            Auto Configuration with Optimal Settings       │
│           Auto Configuration with Fail Safe Settings      │
│                    Save Settings and Exit                 │
│                     Exit Without Saving                   │
│                                                           │
│                                                           │
├─────────────────────────────────────────────────────────┤
│     Standard CMOS setup for changing time, date, hard disk type, etc. │
│           ESC:Exit  ↑↓:Sel  F2/F3:Color  F10:Save & Exit  │
└─────────────────────────────────────────────────────────┘
```

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 setting. Please refer to the following screen for this setup

```
                    AMIBIOS SETUP - STANDARD CMOS SETUP
              (C)1998 American Megatrends, Inc. All Rights Reserved

Date (mm/dd/yyyy): Mon Jan 26,1999            Base Memory: 0 KB
Time (hh/mm/ss)  : 13:28:24                   Extd Memory: 0 MB

Floppy Drive A:    1.44 MB 3½
Floppy Drive B:    Not Installed
                                                   LBA  Blk  PIO  32Bit
             Type             Size  Cyln  Head WPcom Sec Mode Mode Mode Mode
Pri Master : Auto                                                    On
Pri Slave  : Auto                                                    On
Sec Master : Auto                                                    On
Sec Slave  : Auto                                                    On

Boot Sector Virus Protection     Disabled

Month:  Jan - Dec                             ESC:Exit  ↑↓:Sel
  Day:    01 - 31                             PgUp/PgDn:Modify
 Year: 1901 - 2099                            F2/F3:Color
```

- **To set the Date**, for example, press either the arrow or <Enter> button on your keyboard to select one of the fields (Months, Date or Year) then press either <PgUp> or <PgDn> to set it to the current Months, Date and Year. Do the same steps for Time setting.

- **For IDE hard disk drive setup**, please check the following possible setup procedure:
  1. Use the Auto setting for detection during boot-up.
  2. Use the Auto-Detect Hard Disk option in the main menu; the computer will automatically detect the HDD specifications.
  3. Manually enter the specifications by yourself from the "User" option.

4.3   Advanced CMOS Setup

This Advanced CMOS Setup is designed for tuning the best performance of the ROCKY-418 board. As for normal operation customers don't have to change any default setting. The default setting is pre-set for most reliable operation.

The following screen will be displayed if you select Advanced CMOS Setup:

```
               AMIBIOS SETUP - ADVANCED CMOS SETUP
            (C)1998 American Megatrends, Inc. All Rights Reserved

Quick Boot                  Enabled        Available Options:
1st Boot Device             Floppy            Disabled
2nd Boot Device             IDE-0          ▶ Enabled
3rd Boot Device             CDROM
Try Other Boot Devices      Yes
Floppy Access Control       Read-Write
Hard Disk Access Control    Read-Write
S.M.A.R.T. for Hard Disks   Disabled
BootUp Num-Lock             On
Floppy Drive Swap           Disabled
PS/2 Mouse Support          Enabled
System Keyboard             Absent
Primary Display             Absent
Password Check              Setup
Boot To OS/2                No
System BIOS Cacheable       Enabled
C000,16k Shadow             Enabled
C800,16k Shadow             Disabled    ESC:Exit  ↑↓:Sel
D000,16k Shadow             Disabled    PgUp/PgDn:Modify
D800,16k Shadow             Disabled    F2/F3:Color
```

You can change the value of each options by using <PgUp> and <PgDn> key. The available values are shown on the right screen.

- **Quick Boot** > *Enabled*: this will enable the BIOS to boot quickly when you turn on your computer. The BIOS will only check the first 1MB of the system memory.
- **Quick Boot** > *Disabled:* the BIOS will test all system memory when it boots up. It will spend about 40 seconds until it receives a Ready signal from the HDD. It will also wait for you to press the <Del> key or not.
- **1st, 2nd, 3rd Boot Device** > to define the sequence of boot drives after the routines check up completes. If the 1st Boot Device fails, the BIOS will attempt to boot from

the 2nd or the 3rd device. The Optimal and Fail-Safe default settings are C:,A:,CDROM.

- **Try Other Boot Devices** > the BIOS will try to boot from any other available device in the system if the 1st, 2nd and 3rd device fails to boot.
- **Floppy Access Control** > to define the read/write access which is set when booting from a floppy drive.
- **Hard Disk Access Control** > to define the read/write access which is set when booting from a HDD.
- **S.M.A.R.T. for Hard Disks** > to allow BIOS to use the **S**ystem **Ma**nagement and **R**eporting **T**echnologies protocol for reporting server system information on a network
- **BootUp Num-Lock** > to turn on/off the Num-Lock option on a enhanced keyboard when you boot. If you turn it off, the arrow keys on the numeric keypad can be used just as the other set of arrow keys on the keyboard and vice versa.
- **Floppy Drive Swap >** this function enables you to swap the floppy disk drives via software or without moving the hardware.
- **PS/2 Mouse Support** > to testify whether or not a PS/2 mouse is supported.
- **System Keyboard** > to configure the keyboard. If you set it Absent, BIOS will not report keyboard errors.
- **Primary Display** > to define the type of display monitor of the system. The Absent option is for network file servers.
- **Password Check** > to define if a password is necessary or not for access to the BIOS setup.
- **Boot to OS/2** > if you run the OS/2 operating system, this option must be set to yes. It means you permit BIOS to run properly if OS/2 or any other OS that does not support Plug and Play is found in your computer.
- **System BIOS Cacheable** > to define whether or not the memory segment FOOOH can be read from or written to cache memory. Setting it Enabled will give faster execution in your system.
- **XXXX, 16k Shadow** > ROM Shadow is a technique in which BIOS code is copied from slower ROM to faster RAM. If you enable it then the BIOS will be executed from the RAM. Each option allows 16KB segment to be shadowed to the RAM.

4.4 Advanced Chipset Setup

```
                    AMIBIOS SETUP - ADVANCED CHIPSET SETUP
              (C)1998 American Megatrends, Inc. All Rights Reserved

 AT Bus Clock                      Automatic        Available Options:
 RAS Precharge Time                2T              ▶ Automatic
 RAS to CAS Read Cycle Delay       2T                14.318MHz
 RAS to CAS Write Cycle Delay      2T                CLKSRC/5
 CAS Precharge Read Time           1T                CLKSRC/3
 CAS Precharge Write Time          1T                CLKSRC/2.5
 CAS Width in Read Cycle           2T                CLKSRC/1.5
 CAS Width in Write Cycle          1T                CLKSRC/1(00)
                                                     CLKSRC/4
                                                     CLKSRC/2
                                                     24MHz




                                                   ESC:Exit  ↑↓:Sel
                                                   PgUp/PgDn:Modify
                                                   F2/F3:Color
```

- **AT Bus Clock >** to specify the timing for AT Bus. Optimal Setting: Automatic.
- **RAS Precharge Time >** this option specifies the length of time for Row Address Strobe to precharge.
- **RAS to CAS Read Cycle Delay >** to specify the relative read cycle delay between row and column address strobe.
- **RAS to CAS Write Cycle Delay >** to specify the relative write cycle delay between row and columns address strobe.
- **CAS Precharge Read Time >** to specify the Precharge Read Time for Column Address Strobe.
- **CAS Precharge Write Time >** to specify the write time for Column Address Strobe Precharge.

4.5   Peripheral Setup

```
                    AMIBIOS SETUP - PERIPHERAL SETUP
              (C)1998 American Megatrends, Inc. All Rights Reserved

 OnBoard IDE                      Primary         Available Options:
 OnBoard FDC                      Auto              Disabled
 OnBoard Serial Port1             3F8h/COM1       ▶ Primary
 OnBoard Serial Port2             2F8h/COM2         Secondary
 OnBoard Parallel Port            378h
   Parallel Port Mode             SPP/BPP
   Parallel Port IRQ              7
   Parallel Port DMA Channel      3




                                                 ESC:Exit  ↑↓:Sel
                                                 PgUp/PgDn:Modify
                                                 F2/F3:Color
```

- **Onboard IDE >** to define which on-board IDE controller channel(s) to be used. Available options are: Primary, Secondary, Both and Disabled.
- **Onboard FDC >** to enable the FDC on your board. If you set it Auto, the BIOS will decide if the FDC should be enabled, automatically).
- **Onboard Serial Port 1 (/2) >** to specify the I/O port address of the serial port 1(/2). If you set it Auto, the BIOS will decide the correct I/O port address, automatically.
- **Onboard Parallel Port >** to specify the I/O port address of the parallel port.
- **Parallel Port Mode >** to specify the mode of parallel port.
- **Parallel Port IRQ >** to assign certain IRQ to the parallel port.
- **Parallel Port DMA Channel >** available only if the parallel port mode is ECP.

4.6   Auto-Detect Hard Disks

This option detects the parameters of an IDE hard disk drive (HDD sector, cylinder, head, etc) automatically and will put the parameters into the Standard CMOS Setup screen. Up to 4 IDE drives can be detected and the parameters will be listed in the box. Press <Y> if you accept these parameters. Press <N> to skip the next IDE drives.

Note: *If your IDE HDD was formatted in previous older system, incorrect parameters may be detected. In this case, you need to enter the correct parameters manually or low-level format the disk.*

4.7   Change Supervisor / User Password

```
            AMIBIOS HIFLEX SETUP UTILITY - VERSION 1.20
            (C)1998 American Megatrends, Inc. All Rights Reserved

                         Standard CMOS Setup
                         Advanced CMOS Setup
                        Advanced Chipset Setup
                          Peripheral Setup
                        Auto-Detect Hard Disks

            Enter new supervisor password:              s

                         Exit Without Saving




                      Change the supervisor password
              ESC:Exit  ↑↓:Sel  F2/F3:Color  F10:Save & Exit
```
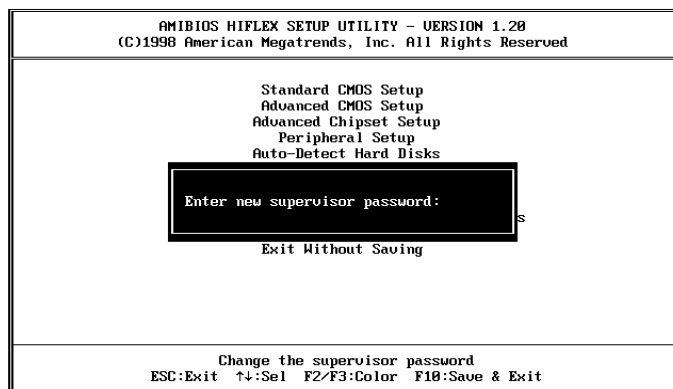
This option sets a password that is used to protect your system and Setup Utility. Supervisor Password has higher priority than User Password. Once you setup the password, the system will always ask you to key-in password every time you enter the BIOS SETUP. If you enter the BIOS SETUP with Supervisor Password, you can access every setup option on the main menu but with User Password you can only choose three setup options (USER PASSWORD, SAVE SETTING AND EXIT and EXIT WITHOUT SAVING). To disable these passwords, enter the
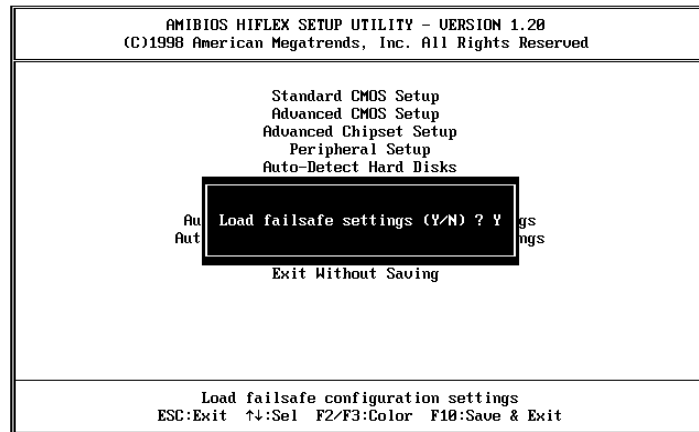
BIOS SETUP menu with Supervisor Password and then just press the <Enter> key instead of entering a new password when the 'Enter Password' prompt pop-up.

4.8 Auto Configuration with Optimal Settings

```
         AMIBIOS HIFLEX SETUP UTILITY - VERSION 1.20
         (C)1998 American Megatrends, Inc. All Rights Reserved

                    Standard CMOS Setup
                    Advanced CMOS Setup
                   Advanced Chipset Setup
                      Peripheral Setup
                   Auto-Detect Hard Disks

          Load high performance settings (Y/N) ? Y

                    Exit Without Saving



         Load configuration settings giving highest performance
           ESC:Exit  ↑↓:Sel  F2/F3:Color  F10:Save & Exit
```

This option lets you load the *Optimal* default settings. These settings are *best-case values* which will provide the best performance. Whenever your CMOS RAM is damaged, this Optimal settings will be loaded automatically.

4.9 Auto Configuration with Fail Save Settings

```
AMIBIOS HIFLEX SETUP UTILITY - VERSION 1.20
(C)1998 American Megatrends, Inc. All Rights Reserved

                    Standard CMOS Setup
                    Advanced CMOS Setup
                   Advanced Chipset Setup
                      Peripheral Setup
                   Auto-Detect Hard Disks

          Au ┌─────────────────────────────┐ gs
          Aut│ Load failsafe settings (Y/N) ? Y │ ngs
             └─────────────────────────────┘

                    Exit Without Saving




                Load failsafe configuration settings
         ESC:Exit  ↑↓:Sel  F2/F3:Color  F10:Save & Exit
```

This option lets you load the *Fail Safe* default settings when something happens to your computer so that it cannot boot normally. These settings are not the most optimal settings but are the most stable settings.

4.10 Save Settings and Exit

Select this option when you finish setting all the parameters and want to save them into the CMOS. Just simply press <Enter> key and all the configuration changes will be saved.

4.11 Exit Without Saving

Select this option if you want to exit the Setup without saving the changes that you made. Just simply press <Enter> key and you will exit the BIOS SETUP without saving the changes.

Appendix B. I/O Information

I/O Address Map

I/O Address Range	Description
000-01F	DMA Controller #1
020-021	Interrupt Controller #1, Master
040-05F	8254 Timer
060-06F	8042 (Keyboard Controller)
070-07F	Real Time Clock, NMI Mask
080-09F	DMA Page Register
0A0-0BF	Interrupt Controller #2
0C0-0DF	DMA Controller #2
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F2	Core Logic Programming Configuration
0F8-0FF	Math Coprocessor
1F0-1F8	Fixed Disk
200-207	Game I/O
278-27F	Parallel Printer Port 2 (LPT3)
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
300-31F	Prototype Card
360-36F	Reserved
378-37F	Parallel Printer Port 1 (LPT2)
3B0-3BF	Monochrome Display and Printer Adapter (LPT1)
3C0-3CF	Reserved
3D0-3DF	Color/Graphics Monitor Adapter
3E8-3EF	Serial Port 3
3F0-3F7	Diskette Controller
3F8-3FF	Serial Port 1
443	Watchdog Timer Enable
843 or 043	Watchdog Timer Disable

1st MB Memory Address Map

Memory Address	Description
00000-9FFFF	System Memory
A0000-BFFFF	VGA Buffer
C0000-C7FFF	VGA BIOS
*D6000-DDFFF	DOC 2000
F0000-FFFFF	System BIOS
1000000-	Extend BIOS

* Default Setting

IRQ Mapping Chart

IRQ0	System Timer	IRQ8	RTC Clock
IRQ1	Keyboard	IRQ9	Unused
IRQ2	Cascade to IRQ Controller	IRQ10	Unused
IRQ3	COM2/COM4	IRQ11	Unused
IRQ4	COM1/COM3	IRQ12	PS/2 Mouse
IRQ5	Unused	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Unused

DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Floppy Disk (8-bit transfer)
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

Appendix C. Watch-Dog Timer

The Watch-Dog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that caused the CPU to crash. This condition may be caused 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 Watch-Dog Timer is controlled by two I/O ports.

| 443 (hex) | Read | Enable the refresh the Watch-Dog Timer. |
| 843 (hex) | Read | Disable the Watch-Dog Timer. |

To enable the Watch-Dog 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 JP3. To ensure that this reset condition does not occur, the Watch-Dog Timer must be periodically refreshed by reading the same I/O port 433H. This must be done within the time out period that is selected by jumper JP6.

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 Watch-Dog Timer, otherwise the system will reset.