

Diversified Technology Incorporated

ESP3520B

EISA / PCXI Dual Pentium Computer Board

Configuration Guide

Rev 1.0

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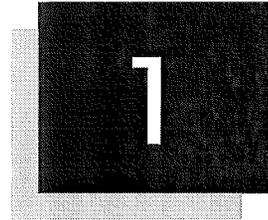
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Product Overview

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ESP3520B Configuration Guide

1.0 General Overview

The ESP3520B is one of the first dual processor Pentium based passive backplane CPU boards in the industry. Fully compatible with the EISA/PCXI passive backplane standard for EISA CPUs, the ESP3520B provides outstanding performance by use of Intel's Neptune 3.3 volt chipset.

Intel Pentium processors are supported at speeds of 75MHz, 90MHz, 100MHz, 120MHz, 133MHz, 150MHz, and 166MHz. Upgrading the ESP3520B from one processor speed to another is a relatively minor procedure. However, the board must be returned to DTI to properly adjust the clock speed for the upgraded processor.

In addition to the cache onboard the 3.3 volt Pentium processors, the ESP3520B provides 0KB, 256KB, or 512KB of secondary writeback cache. This cache operates synchronously to the Pentiums in what is known as "synchronous burst" mode, providing the utmost in performance. This secondary cache is shared between the two processors. The ESP3520B supports from 2MB to 256MB of system DRAM in four sockets, utilizing 256KB, 512KB, 1MB, 2MB, 4MB, 8MB or 16MB "by 36" SIMM modules.

The ability to use two Pentium processors on a single board is the ESP3520B's most exciting feature. The ESP3520B provides all the circuitry to coordinate the two processors, fully complying with the multiprocessor specification (MPspec) version 1.1. This assures that all MPspec compliant operating systems, such as Windows NT, SCO Unix MPX and OS/2 for SMP will function without modification or expensive "ports" to particular hardware.

The ESP3520B also includes a sophisticated system environment monitor. The monitor provides moment-to-moment feedback on system conditions such as voltage, system ambient temperature, external fan speed, switch closure inputs, and individual CPU temperatures. The monitor provides six different methods of reporting errors when the system environment exceeds user defined limits. An interrupt to the system can be generated, one of five general purpose outputs can be activated or communication through a serial port connection can be achieved to describe the environment failure. The system monitor also has modem dial out/in capabilities for monitoring the system status from a remote location. A programmable system watchdog timer is also available in the system monitor.

The following sections will provide an overview of the various features of the ESP3520B and describe how the user may configure these features.

1.1 Cache

The ESP3520B is available with 0KB, 256KB, or 512KB of secondary cache. The cache is designed as a burst writeback architecture. An option is available in the ROM Utility to turn off the secondary cache.

1.2 Onboard Memory

There are four 36 bit wide SIMM sockets on the ESP3520B. From 2MB to 256MB of DRAM may be installed in these sockets using 256K x 36, 512K x 36, 1M X 36, 2M x 36, 4M x 36, 8M x 36, or 16M x 36 SIMMs. All onboard memory must have an access time of 70 nanoseconds or less. Memory must be installed in pairs of matched SIMMS.

1.3 Dual CPU Processing

Multiprocessing is the most advanced feature of the ESP3520B. The ability to support two Pentium class processors allows multi-tasking operating systems such as OS/2 for SMP, UNIX and Windows NT to divide their tasks among two processors. Advanced applications which can multi-thread, such as Oracle and Intergraph's VeriBest CAD software, can take direct advantage of multiple processors by dividing the application's work load between multiple sub-tasks, or threads, and dividing these threads between the two processors.

The ESP3520B can be configured to run with either single or dual Pentium processors. In the dual processor mode, both processors operate independently, sharing system resources as peers. This is also known as symmetrical multiprocessing, or SMP. This means that neither processor is dedicated to a particular function, such as one processor handling interrupts while another handles bus I/O. In the ESP3520B, either processor can perform any system action, or receive interrupts. In order to accomplish this, in dual processor mode the /AT compatible 8259 interrupt controller is disabled, and its function is taken over by a different interrupt controller known as APIC, or Advanced Peripheral Interrupt Controller.

The Intel APIC controller is a standard feature of all MPspec multiprocessing systems. It provides coordination of interrupt handling between the two processors. While the vast majority of software packages will not be disturbed by the substitution of the APIC functions for the more mundane 8259, some hardware test utility programs which test for the 8259 will report erratic results or failures. This is a normal aspect of MPspec computers, and will only occur in the dual processor mode.

1.4 System Environmental Monitor

The ESP3520B features an independent 16 bit microcontroller used for monitoring the system environment. This controller monitors bus voltages, ambient board temperature, the approximate temperatures of the two CPU's, and the RPS of external system fans if they are equipped with strobe outputs. The nominal values for these measurements and the allowable tolerances are programmable by the user's software or by a utility program provided. Inputs which violate their programmed tolerances cause an alarm interrupt to the system. The measurement values are also available to the user's software.

Another function of the environment monitor is to provide a watchdog timer for the system. This watchdog timer is highly flexible, and causes a system reset upon expiration.

See Appendix A for a full description of the system monitor.

1.5 Keyboard and Mouse Ports

The ESP3520B provides connectors on the rear bracket for PS/2 style keyboards and pointing devices. Alternate connectors are also provided on the top edge of the board. /AT and /XT style keyboards can be used through an adapter cable available from DTI.

The power and ground for the keyboard and mouse ports are filtered on the ESP3520B, and the power is fused for protection.

1.6 Reset, Keyboard Lock, Power Indicator, and Speaker Ports

A normally open, momentary contact switch can be connected to the ESP3520B to be used as a hardware reset. The switch connection is pulled up and debounced on the ESP3520B.

A normally open switch can be connected to the ESP3520B to lock out the keyboard. A keylock type switch can be used to prevent unauthorized usage of the ESP3520B.

Power ON indication is provided by the ESP3520B. Current is supplied from a five volt source through a 240 ohm resistor. Typically, an LED is connected to this output.

An /AT compatible speaker port is provided on the ESP3520B. The five volt supply for the speaker is fused for short circuit protection.

1.7 EISA Bus

The ESP3520B expansion bus is fully EISA compatible. The bus clock runs at 8 MHz. The DMA channels can operate in 8 and 16 bit modes with ISA and EISA slaves and masters and in 32 bit mode with EISA slaves and masters. The ESP3520B also supports EISA Type "C" DMA burst cycles. This allows bus throughput to approach 33 megabytes per second.

The ESP3520B supports up to eight EISA bus master expansion cards.

1.8 Backplane Requirements

The ESP3520B is a CPU slotcard, thus it requires a passive backplane for expansion purposes. The ESP3520B is designed to be fully compatible with the PCXI EISA Passive Backplane Standard. This allows the ESP3520B to function in any PCXI compatible backplane. DTI manufactures several PCXI EISA backplanes with various numbers of expansion slots.

Configuration Information

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- 2.2 Mouse Installation
- 2.3 Display Type Selection
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- 2.8 EISA Bus Priority Configuration
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2.0 Memory Configuration

The ESP3520B has four SIMM sockets, labeled 'BANK 0' and 'BANK 1'. These sockets can hold single or double density 36 bit wide SIMM modules. The SIMMs must have an access time of 70 nanoseconds or faster. Each bank must have 2 SIMMS of the same size. However, each bank is independent of the other bank. Bank 0 must be populated before Bank 1.

2.1 Keyboard Type Selection

The ESP3520B can be used with PS/2, /AT, or /XT types of keyboards. Jumper E2 must be installed if an /XT type keyboard will be used. For PS/2 and /AT type keyboards, Jumper E2 must be removed.

2.2 Mouse Installation

If a PS/2 style mouse is detected, the ESP3520B will automatically enable the mouse interrupt (IRQ 12). If a non-PS/2 mouse (i.e., serial or bus mouse) is used, or if no mouse is used, IRQ12 will be free for other hardware to use.

2.3 Display Type Selection

Jumper E4 is used to select the type of video adapter connected to the ESP3520B. Remove E4 if a monochrome adapter is the primary video adapter in the system. Install E4 if a CGA adapter is the primary adapter.

For systems using an EGA or a VGA display adapter, Jumper E4 selects the mode that the system will power up in. If Jumper E4 is not installed, the system will power up in a monochrome video mode. This is useful if a monochrome display is connected to the video adapter. Jumper E4 being installed causes the system to power up in a color display mode.

2.4 System Environment Monitor Configuration

The system environment monitor can be configured to generate an interrupt to report an alarm condition to the user's software or to the demo utility provided. Two interrupts (IRQ10 and IRQ11) are jumper selectable with IRQ10 being the default. If multiple monitored items are configured for interrupt generation, it will be the responsibility of the user's software to determine the source of the failure. This can be achieved by reading the status registers of the system monitor. Refer to Appendix A for a description of these status registers. If interrupt alarming is not enabled, then the jumper E1 should be configured for no interrupts.

NOTE: If an interrupt is enabled it can not be shared with other devices. This means that it is the responsibility of the user to select an interrupt that is not being used by another device. Two devices configured for the same interrupt can result in neither device functioning properly.

2.5 FLASH BIOS Power

The ESP3520B supports an onboard reprogrammable FLASH BIOS. This allows BIOS updates in the field by using a floppy disk. In order to program standard FLASH parts, 12 volts must be provided during the programming phase. The ESP3520B provides its own FLASH programming voltages, controlled by software. In order to protect the FLASH from being reprogrammed or if an EPROM is used instead of a 12 volt FLASH part, a jumper has been provided to override the software control and prevent the application of 12 volts to the BIOS.

2.6 Bracket Ground Connection

The metal bracket on the ESP3520B can be disconnected from the CPU ground plane. This allows the CPU ground to be isolated from the chassis ground. Removing jumper E6 will separate the bracket from the CPU ground.

2.7 System Monitor Serial Port Mode

The ESP3520B's system monitor has the ability to communicate with other computer systems, by means of a dedicated serial port. Jumper E7 sets the mode of the system monitor's RS232 port, either 'DCE' to connect to another computer or 'DTE' to connect to a modem. IBM/AT serial ports are 'DTE' mode ports. The ability to change to 'DCE' mode allows the user to connect the ESP3520B to another CPU without a 'null modem' cable.

NOTE: The system monitor uses RTS/CTS hardware handshaking.

2.8 EISA Bus Priority Configuration

Jumper E11 allows the user to select which devices he wishes to have priority over the EISA bus. If the jumper is placed on pins 1-2 of the 3 pin header, then the CPU can acquire the bus during DMA and EISA master cycles. This gives the CPU priority on the bus, but can reduce throughput of EISA master devices. For highest EISA bus transfer rates during EISA master cycles the jumper should be moved to position 2-3. This inhibits the CPU from acquiring the EISA bus during DMA or EISA master cycles.

NOTE: If jumper E11 is set to position 2-3, then the user must **DISABLE** the 'CPU to PCI Write Buffers' inside the ROM Utilities under the Chipset Control option.

2.9 Cache Size Selection

Jumpers E12 and E13 are used to select between three cache sizes which are available. These jumpers are set by DTI and should not be changed by the customer. To change cache size, the CPU board must be sent back to DTI to have the desired cache chips installed.

Quick Reference

- 3.0 Peripheral Connector Pinouts
- 3.1 Connector Pinouts

3.0 Peripheral Connector Pinout

J1,J2 - HEAT SINK POWER	
PIN	SIGNAL
1	FUSED +12V
2	GND

J3 - KEYLOCK PORT	
PIN	SIGNAL
1	FUSED +12V
2	GND
3	GND
4	KEYLOCK
5	GND

J4 - SPEAKER PORT	
PIN	SIGNAL
1	SPEAKER DATA
2	N/C
3	GND
4	+5 VOLTS

J5 - RESET	
PIN	SIGNAL
1	RESET
2	GND

J6 - SYSTEM ENVIRONMENT MONITOR FAN INPUTS			
SIGNAL	PIN	PIN	SIGNAL
FAN 1	1	2	FAN 2
FAN 3	3	4	FAN 4
FAN 5	5	6	FAN 6
FAN 7	7	8	FAN 8
GENERAL PURPOSE OUTPUT 0	9	10	GENERAL PURPOSE OUTPUT 1
GENERAL PURPOSE OUTPUT 2	11	12	GENERAL PURPOSE OUTPUT 3
5 VOLTS	13	14	GND

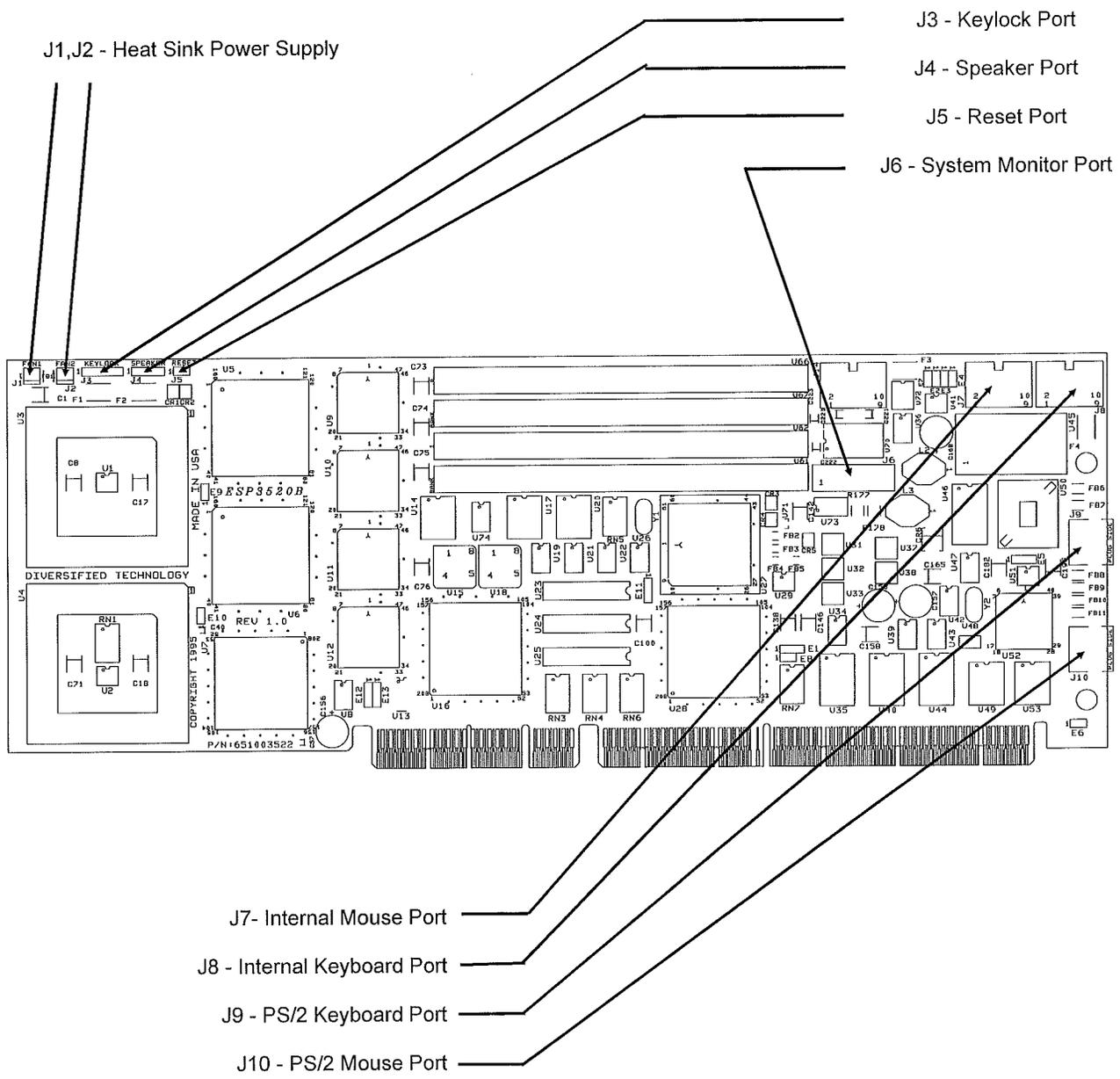
J7 - INTERNAL MOUSE PORT			
SIGNAL	PIN	PIN	SIGNAL
+5 VOLTS	1	2	DATA
CLOCK	3	4	N/C
GND	5	6	N/C
N/C	7	8	N/C
N/C	9	10	+5 VOLTS

J8 - INTERNAL KEYBOARD PORT			
SIGNAL	PIN	PIN	SIGNAL
+5 VOLTS	1	2	DATA
CLOCK	3	4	N/C
GND	5	6	N/C
N/C	7	8	N/C
N/C	9	10	+5 VOLTS

J9 - PS/2 KEYBOARD PORT	
PIN	SIGNAL
1	DATA
2	N/C
3	GND
4	+5 VOLTS
5	CLOCK
6	GND

J10 - PS/2 MOUSE PORT	
PIN	SIGNAL
1	DATA
2	N/C
3	GND
4	+5 VOLTS
5	CLOCK
6	GND

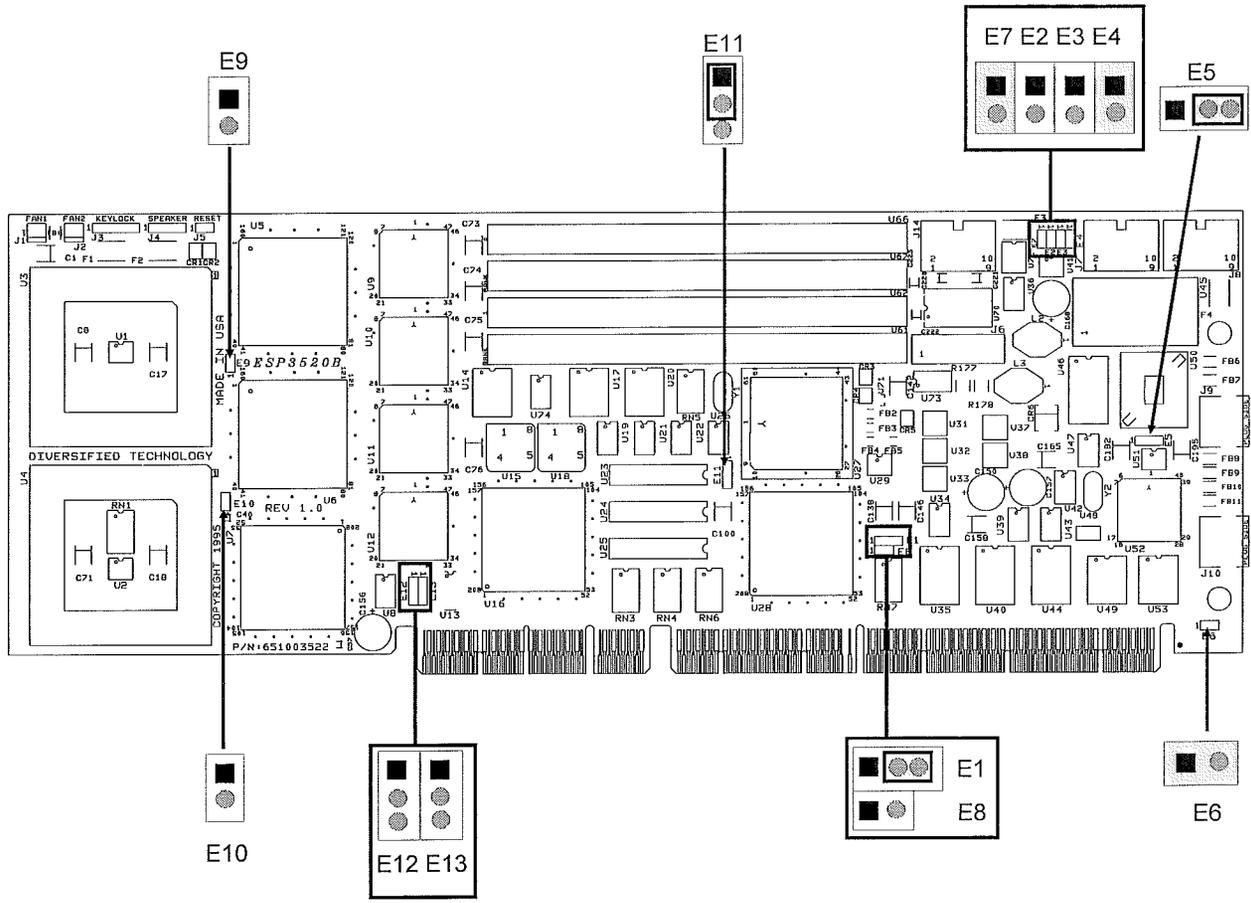
Connector Locations



3.1 Jumper Settings

Jumper	Position	Function
E1	OFF	No Monitor Interrupt
	1-2	IRQ11 - Monitor Interrupt
	*2-3	IRQ12 - Monitor Interrupt
E2	ON	/XT Keyboard
	*OFF	PS/2 or /AT Keyboard
E3	ON	Manufacturing Test
	*OFF	Normal Mode
E4	*ON	Color Display
	OFF	Monochrome Display
E5	1-2	Disable Flash Programming
	*2-3	Enable Flash Programming
E6	*ON	CPU Bracket Grounded
	OFF	Bracket Not Grounded
E7	*ON	Monitor Serial Port Connected To Modem
	OFF	Monitor Serial Port Connected To CPU
E8, E9, E10	RESERVED	
E11	*1-2	CPU Takes Priority On EISA Bus
	2-3	EISA Master Takes Priority On EISA Bus EISA Bus Throughput Increased
E12, E13	2-3 2-3	No Secondary Cache
	2-3 1-2	256K Secondary Cache
	1-2 1-2	512K Secondary Cache

Jumper Locations



ROM Utilities

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4.0 Features

- Automatic IDE Hard Disk Detection and Configuration
- Automatic Mouse Detection
- ROM Based Utilities
- Help Windows
- Security
- Thermal Management
- System Monitoring Functions

DTI BIOS

The DTI BIOS Software supports all of the IBM /AT standard functions, EISA standard functions, PCI standard functions, and several DTI specific functions and features. Features of the DTI BIOS include built-in utilities, security, and help windows.

Upon initial execution, the DTI BIOS checks for valid entries in the System Monitor parameter table stored in the BIOS ROM. If valid, the System Monitor Unit ID and Modem Dial String are programmed into the System Monitor. This allows the System Monitor to call a remote site if errors occur during the BIOS power-on-self-test (POST). The POST consists of a battery of tests which check and initialize the various functions of the system. Each POST test has an associated unique code number which is written to the System Monitor and to a diagnostic port. This enables systems connected through serial linkage to monitor the status of the POST tests. After the video initialization portion of the POST is complete, the BIOS will display DTI sign-on messages in the upper left corner of the screen. Throughout the POST, a message will be displayed at the bottom of the screen describing a key stroke that can be used to gain access to the ROM Utilities. As the POST executes various tasks, error messages will be displayed for any failures that occur. The user will be prompted to press the <F1> key before the BIOS initiates the boot sequence if errors are detected. At the conclusion of the POST, the BIOS will check to see if the security feature has been enabled. If enabled, the user will be prompted to enter the BOOT PASSWORD before proceeding. One of the last things that the BIOS does is to send an error report to the System Monitor. Any errors that occur during the POST or in the booting process are included in this report.

The POST also verifies that the EISA configuration is valid and that the correct boards are installed in each expansion slot. If the EISA configuration is not correct, the POST will indicate an error. The EISA Configuration Utility provided with the ESP3520B must be executed to correctly setup the EISA configuration RAM. Refer to Section 5 for complete details on usage of the EISA Configuration Utility. The BIOS also has a built-in feature which allows the entire EISA Configuration RAM to be invalidated. To activate this feature, press and hold down the INSERT key on power up.

The BIOS automatically looks for the presence of a mouse and, if found, enables the mouse support in the BIOS. Otherwise, mouse support is disabled. The status of the mouse is displayed on the SYSTEM SUMMARY screen.

The BIOS also has a built-in mechanism for monitoring the temperature of the Pentium CPU(s) installed. The THERMAL Manager monitors two temperature sensors which reside under each Pentium processor. If either CPU sensor reports a temperature which exceeds the specified limit, the CPU(s) speed will automatically be decreased. When the temperature of all CPUs installed falls below the specified limit, the CPUs will be returned to full speed. Four CPU throttle settings and the corresponding CPU speed settings are user configurable.

The ROM Utilities are provided for the user to have easy access to all of the necessary utilities to setup and configure the ESP3520B. One of the features of the ROM Utilities is its ability to sense the presence of IDE Hard Disk Drives and automatically configure the hard drive parameters in the HARD DISK SETUP Utility. The ROM Utilities are accessible during the POST as long as the following string is displayed.

PRESS < F2 > TO ENTER SETUP

Access to the ROM Utilities will not take place until after the POST. This might cause a short delay from the time the <F2> is pressed until the utilities are actually entered. However, the following message will be displayed during the waiting period.

ENTERING SETUP . . .

Many configuration options within the ROM Utilities have HELP information available. Pressing <F1> while an option is highlighted will invoke a pop-up window with a brief description of the option if help is available.

Another feature of the DTI BIOS is its ability to provide optional password protection to prevent unauthorized access to system boot, and to the ROM Utilities.

SYSTEM MONITOR ERROR REPORTING

As the BIOS executes tests during the POST a record of the errors that occur is accumulated. These are typically non-critical errors. The errors and a brief description of their cause is listed below.

DISK_ERROR	: Hard drive controller failure or boot failure
KYBD_ERROR	: Keyboard failed (stuck key or no keyboard installed)
EISAR_ERROR	: EISA Configuration NVRAM checksum error
EISAC_ERROR	: EISA Slot Configuration error
POS_ERROR	: POST Timeout error
CMOS_ERROR	: CMOS Checksum Invalid
TIMER_ERROR	: Timer error
RTC_ERROR	: Real Time Clock Failed
CONFIG_ERROR	: System configuration differs from CMOS configuration
OPROM_ERROR	: Option ROM Error
COP_ERROR	: Math Coprocessor error
DISKETTE_ERROR	: Floppy drive error or boot failure
BOOT_ERROR	: Boot failure
CACHE_ERROR	: Error occurred configuring the secondary cache
IO_ERROR	: An I/O address conflict exists
OTHER_ERROR	: Other error

The DISK_ERROR and DISKETTE_ERROR flags can be set in two different places in the POST. During the drive controller and interface tests the BIOS will set these bits to indicated drive errors. After the POST is completed, the BIOS boot sequence is executed and if an error occurs reading from the boot source the BOOT_ERROR flag and the flag for the drive that failed is set. The boot sequence selection in the ROM Utilities is used in defining the meaning of the DISK_ERROR and DISKETTE_ERROR flags. If the boot sequence is set for A:\ then C:\, the DISKETTE_ERROR flag will be set if no floppy diskette is in the drive or if the diskette is blank. The BOOT_ERROR flag will not be set unless C:\ is also non-bootable. For a boot sequence of C:\ then A:\, the DISK_ERROR flag will be set if no hard drive is installed.

4.1 ROM Utilities

The ROM Utilities consist of various easy-to-use utilities required in the configuration of the ESP3520B. The function of each utility is briefly described in the table below. Battery backed CMOS RAM is used to store the configuration/setup parameters selected in the ROM Utilities. On power-up the CMOS RAM parameters are used to configure the system. If the CMOS RAM is corrupt, default parameters stored in ROM are used to configure the system. If no errors occurred during the POST, the System Configuration Summary Screen will be displayed, else, ROM Utility configuration errors detected during the POST will be displayed and the default values loaded. As each utility is selected using the arrow keys, the contents of the utility will be displayed. This allows the user to view the current settings of each utility without having to actually execute the utility. To execute a specific utility, either press the function key associated with the utility or move the highlighted bar onto the utility and press < ENTER >.

ROM UTILITIES	
SYSTEM SUMMARY	Displays various information about the system installed
SYSTEM SETUP	Used to configure the time/date, floppy drive types, and the video type
HARD DISK SETUP	Used to configure the hard drive types
BIOS OPTIONS	Used to setup various BIOS features
SECURITY/VIRUS	Used to enable password protection, change current password, and enable system maintenance reminders
MEMORY SHADOW	Allows selection of shadow RAM in 16K blocks
CHIPSET CONTROL	Used to configure timing parameters related to the chipset.
THERMAL MANAGER	Allows configuration CPU throttle temperature and speed settings
SYSTEM MONITOR	Used to setup monitoring functions
PCI SETUP	Used to configure PCI interrupts
LOAD FROM ROM	Used to load BIOS ROM defaults into CMOS
LOAD FROM CMOS	Used to re-load the values which were in CMOS when the ROM Utilities were entered
SAVE TO CMOS	Used to save the current configuration to CMOS

4.2 System Summary

The SYSTEM CONFIGURATION SUMMARY utility provides valuable information about the system resources installed. The information supplied can also be useful in preventing I/O conflicts when installing adapter cards.

SYSTEM CONFIGURATION SUMMARY																																																	
<p>F1-SYSTEM SUMMARY</p> <p>F2-SYSTEM SETUP</p> <p>F3-HARD DISK SETUP</p> <p>F4-BIOS OPTIONS</p> <p>F5-SECURITY / VIRUS</p> <p>F6-MISC. CONFIG</p> <p>F7-LOAD FROM ROM</p> <p>F8-LOAD FROM CMOS</p> <p>F9-SAVE TO CMOS</p>	<p style="text-align: center;">Diversified Technology, Inc. - ESP3520B</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">CPU 90MHz</td> <td style="width: 33%;">: Pentium</td> <td style="width: 33%;">Diskette A</td> <td style="width: 33%;">: 1.44 MB, 3½"</td> </tr> <tr> <td>Coproc.</td> <td>: Internal</td> <td>Diskette B</td> <td>: None</td> </tr> <tr> <td>System RAM</td> <td>: 640 KB</td> <td>Hard Disk0</td> <td>: None</td> </tr> <tr> <td>Ext. RAM</td> <td>: 7168 KB</td> <td>Hard Disk1</td> <td>: None</td> </tr> <tr> <td>Shadow RAM</td> <td>: 384 KB</td> <td>COM Ports</td> <td>: 3F8 2F8</td> </tr> <tr> <td>Cache RAM</td> <td>: 512 KB</td> <td>LPT Ports</td> <td>: 3BC</td> </tr> <tr> <td>Display</td> <td>: EGA / VGA</td> <td>PS/2 Mouse</td> <td>: Installed</td> </tr> <tr> <td>Volts (+5)</td> <td>: + 5.01v</td> <td>Volts (-5)</td> <td>: - 5.00v</td> </tr> <tr> <td>(+12)</td> <td>: + 12.00v</td> <td>(-12)</td> <td>: - 11.98v</td> </tr> <tr> <td>(CPU)</td> <td>: + 4.98v</td> <td>CPU1 Temp</td> <td>: + 40.0°C</td> </tr> <tr> <td>Sys. Temp</td> <td>: + 27.0°C</td> <td>CPU2 Temp</td> <td>: + 38.5°C</td> </tr> <tr> <td>System ROM</td> <td>: F921 - FFFF</td> <td>BIOS Date</td> <td>: 09/14/94</td> </tr> </table> <p style="text-align: center;">F (KEY) Select / Execute, ↓↑: Select, ENTER: Execute ESC: Exit and Reboot</p>	CPU 90MHz	: Pentium	Diskette A	: 1.44 MB, 3½"	Coproc.	: Internal	Diskette B	: None	System RAM	: 640 KB	Hard Disk0	: None	Ext. RAM	: 7168 KB	Hard Disk1	: None	Shadow RAM	: 384 KB	COM Ports	: 3F8 2F8	Cache RAM	: 512 KB	LPT Ports	: 3BC	Display	: EGA / VGA	PS/2 Mouse	: Installed	Volts (+5)	: + 5.01v	Volts (-5)	: - 5.00v	(+12)	: + 12.00v	(-12)	: - 11.98v	(CPU)	: + 4.98v	CPU1 Temp	: + 40.0°C	Sys. Temp	: + 27.0°C	CPU2 Temp	: + 38.5°C	System ROM	: F921 - FFFF	BIOS Date	: 09/14/94
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ESP3520B Configuration Guide

Description of SYSTEM CONFIGURATION SUMMARY DISPLAY

- CPU: Displays the type and speed of processor installed.
- COPROCESSOR: Displays the type of math coprocessor installed.
- SYSTEM RAM: Displays the amount of installed system RAM up to 640 Kilobytes.
- EXTENDED RAM: Displays the amount of installed extended RAM beyond 1024 Kilobytes.
- SHADOW RAM: Displays the amount of available RAM between 640 and 1024 Kilobytes.
- CACHE RAM: Displays the amount of installed external cache RAM.
- DISPLAY: Displays the installed video type.
- VOLTS: Displays the current status of the system voltage sources.
- SYSTEM ROM: Displays the memory segment address range occupied by the System BIOS.
- DISKETTE A: Displays the media type of the first floppy drive.
- DISKETTE B: Displays the media type of the second floppy drive.
- HARD DISK 0: Displays the drive type of the first hard drive.
- HARD DISK 1: Displays the drive type of the second hard drive.
- COM PORTS: Displays the I/O addresses of all installed serial ports.
- LPT PORTS: Displays the I/O addresses of all installed parallel ports.
- PS/2 MOUSE: Displays whether or not a mouse was detected by the BIOS during POST tests.
- TEMPERATURE: Displays the current temperature in the area occupied by the ESP3520B and the temperature under each Pentium processor installed.
- BIOS DATE: Displays the date on which the ESP3520B BIOS was generated.

4.3 System Setup

The SYSTEM SETUP CONFIGURATION Utility is used to configure the system time/date, type of floppy disk drives installed, and type of video controller installed. The amount of memory installed will automatically be determined and displayed.

SYSTEM SETUP CONFIGURATION SUMMARY																	
<p>F1-SYSTEM SUMMARY</p> <p>F2-SYSTEM SETUP</p> <p>F3-HARD DISK SETUP</p> <p>F4-BIOS OPTIONS</p> <p>F5-SECURITY / VIRUS</p> <p>F6-MISC. CONFIG</p> <p>F7-LOAD FROM ROM</p> <p>F8-LOAD FROM CMOS</p> <p>F9-SAVE TO CMOS</p>	<table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;">System Time:</td> <td style="padding: 2px;">16:12:15</td> </tr> <tr> <td style="padding: 2px;">System Date:</td> <td style="padding: 2px;">09/14/1994</td> </tr> <tr> <td style="padding: 2px;">Video System:</td> <td style="padding: 2px;">EGA / VGA</td> </tr> <tr> <td style="padding: 2px;">System Memory:</td> <td style="padding: 2px;">640 KB</td> </tr> <tr> <td style="padding: 2px;">Extended Memory:</td> <td style="padding: 2px;">7168 KB</td> </tr> <tr> <td style="padding: 2px;">Compatibility Mode:</td> <td style="padding: 2px;">Disabled</td> </tr> <tr> <td style="padding: 2px;">Diskette Drive A:</td> <td style="padding: 2px;">1.44 MB, 3½"</td> </tr> <tr> <td style="padding: 2px;">Diskette Drive B:</td> <td style="padding: 2px;">Not Installed</td> </tr> </table>	System Time:	16:12:15	System Date:	09/14/1994	Video System:	EGA / VGA	System Memory:	640 KB	Extended Memory:	7168 KB	Compatibility Mode:	Disabled	Diskette Drive A:	1.44 MB, 3½"	Diskette Drive B:	Not Installed
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Description of SYSTEM SETUP OPTIONS

- **SYSTEM TIME:** To enter a new time, type in the new time as HOUR:MINUTE:SECONDS and then press <ENTER>. The time is displayed in 24 hour format; therefore, AM hours range from 0 through 11 and the PM hours range from 12 through 23. Invalid times cannot be entered.
- **SYSTEM DATE:** New dates are selected by typing in the new date as MONTH/DAY/YEAR and then pressing <ENTER>. If one of the parameters is out of range, the new date will not be entered.
- **VIDEO:** Mono, Color 80, and VGA/EGA video types are supported and are selected using the arrow keys.
- **COMPATIBILITY MODE:** This function changes the way in which the BIOS INT15 function 88h handles returning the amount of extended memory installed. The original IBM/AT BIOS did not provide a mechanism for reporting more than 64MB of DRAM. The maximum value returned by the BIOS INT15 function 88h was 0FFFFh which represents 64MB. When systems started supporting more than 64MB of DRAM, BIOS vendors did not have a standard way in which to report DRAM configurations over 64MB. This was not a problem for Unix based operating systems since Unix does not use the BIOS to determine the amount of DRAM installed. Windows NT and OS/2 which do use the BIOS, required a common way to determine the entire amount of DRAM installed. Enabling this functionality required that a new INT15 function be added to the BIOS that would report the amount of extended memory in 64K increments and modify INT15 function 88h. When COMPATIBILITY MODE is ENABLED the INT15 function 88h acts normally if less than 64MB of DRAM is installed and returns the amount of Extended Memory installed in 1K increments. If more than 64MB of DRAM is installed, INT15 function 88h returns 15MB of Extended Memory. The new INT15 function E801h is then used to return the memory between 16MB and 4GB in 64 KB blocks. Windows NT and OS/2 use the COMPATIBILITY MODE to determine the amount of Extended Memory installed.
- **FLOPPY DISKS:** Drive types 360k, 720k, 1.2M, 1.44M, and 2.88M are supported and are selected using the arrow keys. A 'NOT INSTALLED' option is also available for diskless workstations. No floppy error messages will be displayed if 'NOT INSTALLED' is selected.

4.4 Hard Drive Setup

The HARD DRIVE CONFIGURATION Utility is used to configure the hard drives installed in the system. The following page describes the configuration options.

HARD DRIVE CONFIGURATION SUMMARY																																
F1-SYSTEM SUMMARY																																
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Description of HARD DRIVE CONFIGURATION UTILITY

The configuration options described below work identically for HARD DRIVE 0 and HARD DRIVE 1.

- **AUTOTYPE:** Use the up/down arrow keys to position the highlight bar onto this option and then press <F5> to automatically detect hard drive parameters for the selected drive. If a hard disk is detected, the new parameters will be displayed using the USER hard disk type.
- **TYPE:** Use the left/right arrow keys to scroll among the available hard drive types. There are forty-five predefined drive types and one USER type. If the USER type is selected, the hard drive parameters must be configured manually. Select each parameter in turn by using the up/down arrow keys. Available options may be typed in by numerical input from the user or the left/right arrow keys may be used scroll through the options. The USER type may be configured differently for HARD DRIVE 0 and HARD DRIVE 1.
- **LBA MODE:** Logical Block Access uses 28-bit addressing of the hard disk instead of CHS (Cylinder/Head/Sector) addressing.
- **32 BIT I/O:** This option supports 32-bit data transfers on Local Bus and PCI drives.
- **MULTI-SECTOR XFERS:** This option allows disk accesses in blocks of multiple sectors (2, 4, 8, or 16).

Note: If the Hard Drive is autotyped, the BIOS will determine the correct settings for LBA mode, 32 Bit I/O, and Multi-Sectors Xfers.

4.5 BIOS Options

The BIOS OPTIONS CONFIGURATION Utility provides various features which affect performance and speed of the system. Below is the BIOS OPTIONS screen with the default parameters displayed. To change the BIOS OPTIONS settings, use the arrow keys to select and scroll the available parameters.

BIOS OPTIONS CONFIGURATION SUMMARY																											
<p>F1-SYSTEM SUMMARY</p> <p>F2-SYSTEM SETUP</p> <p>F3-HARD DISK SETUP</p> <p>F4-BIOS OPTIONS</p> <p>F5-SECURITY / VIRUS</p> <p>F6-MISC. CONFIG</p> <p>F7-LOAD FROM ROM</p> <p>F8-LOAD FROM CMOS</p> <p>F9-SAVE TO CMOS</p>	<p>BIOS OPTIONS</p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;">Disk drive boot sequence:</td> <td style="padding: 2px;">A: then C:</td> </tr> <tr> <td style="padding: 2px;">System summary screen at boot:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Display SETUP prompt during POST:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Pause on POST errors:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Floppy seek:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Primary Cache:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Secondary Cache:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Cache Video BIOS area:</td> <td style="padding: 2px;">Disabled</td> </tr> <tr> <td style="padding: 2px;">Gate A20 at Boot:</td> <td style="padding: 2px;">Normal</td> </tr> </table> <p>KEYBOARD OPTIONS</p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;">Key click:</td> <td style="padding: 2px;">Disabled</td> </tr> <tr> <td style="padding: 2px;">Keyboard typematic rate:</td> <td style="padding: 2px;">30/sec</td> </tr> <tr> <td style="padding: 2px;">Keyboard typematic delay:</td> <td style="padding: 2px;">1/2 secretary</td> </tr> <tr> <td style="padding: 2px;">Numlock:</td> <td style="padding: 2px;">Auto</td> </tr> </table>	Disk drive boot sequence:	A: then C:	System summary screen at boot:	Enabled	Display SETUP prompt during POST:	Enabled	Pause on POST errors:	Enabled	Floppy seek:	Enabled	Primary Cache:	Enabled	Secondary Cache:	Enabled	Cache Video BIOS area:	Disabled	Gate A20 at Boot:	Normal	Key click:	Disabled	Keyboard typematic rate:	30/sec	Keyboard typematic delay:	1/2 secretary	Numlock:	Auto
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ESP3520B Configuration Guide

Description of BIOS OPTIONS

- **DISK DRIVE BOOT SEQUENCE:** The boot sequence refers to the order in which the BIOS tries to boot from the drives installed. If the BIOS is unsuccessful in booting from the first drive in the sequence, the BIOS attempts to boot from the second drive. The possible boot drives are A: (first installed floppy) or C: (first installed hard disk). Use the arrow keys to select boot sequence selections.
- **SYSTEM SUMMARY SCREEN AT BOOT:** When this option is ENABLED, the SYSTEM CONFIGURATION SUMMARY window will be displayed while the system is booting up.
- **DISPLAY SETUP PROMPT DURING POST:** When this option is ENABLED, the prompt 'Press <F2> to enter SETUP ' will be displayed during the POST.
- **PAUSE ON POST ERRORS:** This option determines whether the POST will pause and wait for user input when an error occurs. Select between ENABLED or DISABLED using the arrow keys.
- **FLOPPY SEEK:** During the POST, the BIOS tests the floppy drives to verify that the installed drives are functional and match the drive types selected in the CMOS SETUP. This option has been provided to allow the user to significantly speed up the boot process by disabling the test. The available options ENABLED and DISABLED are selectable using the arrow keys.
- **PRIMARY CACHE:** The internal cache of the Pentium processor(s) is referred to as primary cache. This cache should be left on for optimum performance.
- **SECONDARY CACHE:** The secondary cache is used to cache data transferred between system memory and the processor. The secondary cache significantly improves system performance. The available options are ENABLED or DISABLED.
- **CACHE VIDEO BIOS AREA:** This option will cache the video BIOS. Some applications may not work in this configuration. It will improve video performance with applications that use the video BIOS .
- **GATE A20 AT BOOT:** This option enables A20 just before the boot process begins. This option does not affect DOS, but may be required for some UNIX Operating Systems.

DESCRIPTION OF KEYBOARD OPTIONS

- **KEY CLICK:** When this option is ENABLED, the system speaker will make a clicking noise when each keyboard key is pressed. Use the arrow keys to select ENABLED or DISABLED.
 - **KEYBOARD TYPEMATIC RATE:** The Typematic rate refers to the speed at which keystrokes are repeated when a key is pressed for a period of time. In other words, as a key is pressed and held down on the keyboard, the key will be displayed on the screen then there will be a noticeable pause (typematic delay) before the key pressed is repeated multiple times on the screen (typematic rate). The available options for the typematic rate are 2, 6, 10, 13.3, 18.5, 21.8, 26.7, and 30 chars/sec. Use the arrow keys to set the typematic rate.
 - **KEYBOARD TYPEMATIC DELAY:** The typematic delay is the length of time from the key being pressed to the beginning of the typematic rate. The available options for the typematic delay are $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1 sec. Use the arrow keys to set the typematic delay.
 - **NUMLOCK:** NUMLOCK is a key on the keyboard which selects the function of the keypad on the right-hand side of the keyboard. The keypad serves two functions, one being a numerical keypad and the other being a cursor control keypad. If the NUMLOCK LED above the NUMLOCK key is ON, the keypad is in numerical mode. The NUMLOCK ON AT BOOT option allows the user to choose the function of the keypad after the system boots. The available options, ENABLED and DISABLED, are selectable using the arrow keys.
-

4.6 Security / Virus

The SECURITY AND ANTI-VIRUS CONFIGURATION UTILITY allows several system security features and reminders to be enabled. Two levels of password security are available, Supervisor and User, which can be used to limit access to certain system resources. Each password consists of up to eight alpha-numeric characters and is stored in CMOS RAM. Other options include the ability to safeguard against reformatting the hard drive, and display screens during boot that remind the user to perform system backups or virus checks. The available options are described fully on the following pages

SECURITY AND ANTI-VIRUS CONFIGURATION SUMMARY																							
F1-SYSTEM SUMMARY																							
F2-SYSTEM SETUP																							
F3-HARD DISK SETUP																							
F4-BIOS OPTIONS																							
F5-SECURITY / VIRUS	<table> <tr> <td>Supervisor Password is</td> <td>Disabled</td> </tr> <tr> <td>User Password is</td> <td>Disabled</td> </tr> <tr> <td>Set Supervisor Password</td> <td>Press <F5></td> </tr> <tr> <td>Set User Password</td> <td>Press <F5></td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>Password on boot:</td> <td>Disabled</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>Diskette access:</td> <td>User</td> </tr> <tr> <td>Fixed disk boot sector:</td> <td>Normal</td> </tr> <tr> <td>System backup reminder:</td> <td>Disabled</td> </tr> <tr> <td>Virus check reminder:</td> <td>Disabled</td> </tr> </table>	Supervisor Password is	Disabled	User Password is	Disabled	Set Supervisor Password	Press <F5>	Set User Password	Press <F5>			Password on boot:	Disabled			Diskette access:	User	Fixed disk boot sector:	Normal	System backup reminder:	Disabled	Virus check reminder:	Disabled
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ESP3520B Configuration Guide

Description of SECURITY / ANTI-VIRUS OPTIONS

The first two lines of the SECURITY / ANTI-VIRUS screen indicate which password levels have been enabled. It is possible to have 1) both Supervisor and User passwords disabled, 2) Supervisor enabled and User Disabled, or 3) both passwords enabled. In Supervisor mode, all ROM utilities configuration options are accessible by the user. This is the default mode of operation when the ROM utilities are accessed with no passwords enabled. After creating a Supervisor password, the only way to run the ROM utilities in Supervisor mode is to correctly enter the Supervisor password when prompted.

WARNING: Once a password is enabled and saved, it is impossible to re-enter the ROM utilities without entering the password. Be sure to save passwords in a safe place.

- **SET SUPERVISOR PASSWORD:** This utility allows the user to enable the Supervisor password. Moving the highlight bar to this option and pressing <F5> causes the following screen to appear.

SET PASSWORD

Enter New Password:

Re-Enter New Password:

The user is forced to enter the new password twice for verification. If the new password is accepted by the system, the following will appear. If the new password is not accepted, or ESC is pressed to abort password entry, the system will display a prompt describing what occurred.

NEW PASSWORD SAVED !

Press <SPACE> to continue. . .

- **SET USER PASSWORD:** User password entry works the same as Supervisor password entry. The User password may be modified in Supervisor or User mode.
- **PASSWORD ON BOOT:** If enabled, each time the system tries to boot the user will be required to enter a password. The available options, ENABLED or DISABLED, are selectable using the arrow keys. This option is accessible in Supervisor or User mode.
- **DISKETTE ACCESS:** This option determines the user level necessary to access the floppy diskette. Note that this option does not take effect unless 'Password on boot' is ENABLED. For example, if 'Password on boot' is ENABLED and Diskette access: is SUPERVISOR, then the Supervisor password must be entered at boot up in order to use the floppy drive. If Diskette access: is USER, then anyone may access the floppy drive. Use the arrow keys to select between USER or SUPERVISOR. This option is only accessible if the ROM utilities have been entered in Supervisor mode.

- **FIXED DISK BOOT SECTOR:** Setting this option to WRITE PROTECT will protect against accidentally reformatting the hard disk. This option is only accessible if the ROM utilities have been entered using the Supervisor password.
- **SYSTEM BACKUP REMINDER:** The available choices for this option are DISABLED, DAILY, WEEKLY, and MONTHLY. These selections cause a reminder window to appear on the user screen whenever the system boots up. If DAILY is selected, the reminder will appear every day when the system boots up. The WEEKLY and MONTHLY selections work similarly. An example of the reminder window is shown below. If <N> is pressed in response to the prompt, the reminder will appear every time the system is rebooted until the <Y> response is pressed.

System Backup Reminder

Have you performed your regularly
scheduled hard disk backup?

(Y)es (N)o

- **VIRUS CHECK REMINDER:** This selection works the same as the System Backup Reminder. An example of the Virus Check Reminder window is shown below.

Virus Check Reminder

Have you performed your regularly
scheduled virus check?

(Y)es (N)o

4.7 Memory Shadow

The MEMORY SHADOW CONFIGURATION Utility provides the user with the ability to selectively enable and disable shadow RAM from C000:0000h to D000:DFFFh. The shadow video BIOS option enables shadow RAM from C000:0000h to C000:7FFFh. RAM shadowing refers to the copying of the BIOS from the RAM. The MEMORY SHADOW CONFIGURATION UTILITY screen is shown below.

MEMORY SHADOW CONFIGURATION SUMMARY	
F1-MEMORY SHADOW	
F2-CHIPSET CONTROL	
F3-SYSTEM MONITOR	
F4-THERMAL MANAGER	
F5-PCI SETUP	
	SYSTEM SHADOW: Enabled VIDEO SHADOW: Enabled
	SHADOW MEMORY REGIONS
	C800-CBFF Disabled
	CC00-CFFF Disabled
	D000-D3FF Disabled
	D400-D7FF Disabled
	D800-DBFF Disabled
	DC00-DFFF Disabled
	F (KEY) Select / Execute, ↓↑: Select, ENTER: Execute ESC: Exit and Reboot
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4.8 Chipset Control

CHIPSET CONTROL CONFIGURATION SUMMARY																					
<p>F1-MEMORY SHADOW</p> <p>F2-CHIPSET CONTROL</p> <p>F3-SYSTEM MONITOR</p> <p>F4-THERMAL MANAGER</p> <p>F5-PCI SETUP</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Enable Slow DRAM Timing:</td> <td style="padding: 2px;">Yes</td> </tr> <tr> <td style="padding: 2px;">Parity Error Mask:</td> <td style="padding: 2px;">Disabled</td> </tr> <tr> <td style="padding: 2px;">CPU to PCI Write Buffers:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">PCI to DRAM Write Buffers:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">CPU to DRAM Write Buffers:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">PCI Memory Burst Cycles:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Master Latency Timer Value:</td> <td style="padding: 2px;">20</td> </tr> <tr> <td style="padding: 2px;">EISA to PCI Line Buffers:</td> <td style="padding: 2px;">Enabled</td> </tr> <tr> <td style="padding: 2px;">Reset Configuration Data:</td> <td style="padding: 2px;">No</td> </tr> <tr> <td style="padding: 2px;">Large Disk Access Mode:</td> <td style="padding: 2px;">DOS</td> </tr> </table>	Enable Slow DRAM Timing:	Yes	Parity Error Mask:	Disabled	CPU to PCI Write Buffers:	Enabled	PCI to DRAM Write Buffers:	Enabled	CPU to DRAM Write Buffers:	Enabled	PCI Memory Burst Cycles:	Enabled	Master Latency Timer Value:	20	EISA to PCI Line Buffers:	Enabled	Reset Configuration Data:	No	Large Disk Access Mode:	DOS
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<p>F (KEY) Select / Execute, ↓↑: Select, ENTER: Execute ESC: Exit and Reboot</p>																					
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ESP3520B Configuration Guide

Description of CHIPSET CONTROL Options

- **ENABLE SLOW DRAM TIMING:** This option allows DRAM access timing to be modified to insure operation with all manufacturers & sizes of DRAMs.
- **PARITY ERROR MASK:** This option allows parity errors to be generated. If enabled, parity errors are masked off and not generated. If disabled, parity errors are not masked and are generated.
- **CPU TO PCI WRITE BUFFERS:** This option enables the posting of Host-to-PCI write data in the posting buffers. If disabled, each CPU write does not complete until the PCI transaction completes. **NOTE:** If jumper E11 is set to position 2-3, allowing for greater throughput on the EISA bus during EISA Master and DMA cycles, then the CPU to PCI Write buffers must be disabled.
- **PCI TO DRAM WRITE BUFFERS:** This option enables PCI Burst memory write cycles for back-to-back sequential CPU memory write cycles to PCI.
- **CPU TO DRAM WRITE BUFFERS:** This option enables the posting of Host-to Main memory write data in the buffers. If disabled, each CPU write does not complete until the data is written to memory.
- **PCI MEMORY BURST CYCLES:** This option enables PCI Burst Memory Write Cycles for back-to-back sequential CPU Memory Write Cycles to PCI.
- **MASTER LATENCY TIMER VALUE:** This contains the value of the Master Timer Latency for use when the PCEB is a master on the PCI Bus.
- **EISA TO PCI LINE BUFFERS:** This option allows the EISA to PCI Line Buffers to be enabled. Unintended results can occur when using buffered mode for EISA accesses to PCI memory regions that contain memory mapped I/O devices.
- **RESET CONFIGURATION DATA:** This will clear the System Configuration Data from the NVRAM. EISA-PCI configuration data is stored in this data region.
- **LARGE DISK ACCESS MODE:** Select DOS if you have DOS. Select other if using another operating system.

4.9 System Monitor

The System Monitor on the ESP3520B was designed to identify and report system, environmental, and BIOS failures. Specific voltage ranges and temperature boundaries, the method of failure reporting, and the configuration of FAN inputs as SWITCH inputs are user configurable. The System Monitor Utility is provided to setup these user configurable items. Refer to Appendix A for a complete description of the System Monitor functions and its supported commands.

SYSTEM MONITOR CONFIGURATION SUMMARY			
<p>F1-MEMORY SHADOW</p> <p>F2-CHIPSET CONTROL</p> <p>F3-SYSTEM MONITOR</p> <p>F4-THERMAL MANAGER</p> <p>F5-PCI SETUP</p>	<p>COM Password <F5></p> <p>System Temp Lo: 0°C</p> <p>System Temp Hi: 60°C</p>	<p>Daisy Temp Lo: 0°C</p> <p>Daisy Temp Hi: 60°C</p> <p>Fan/Switch 0</p> <p>Mode: FAN</p> <p>Fan RPS (min.): 0</p> <p>Switch Polarity: ON</p>	<p>+5v Tolerance: 10%</p> <p>-5v Tolerance: 10%</p> <p>+12v Tolerance: 10%</p> <p>-12v Tolerance: 10%</p> <p>CPU Tolerance: 10%</p> <p>GP Output #0: N-Low</p> <p>GP Output #1: N-Low</p> <p>GP Output #2: N-Low</p> <p>GP Output #3: N-Low</p>
		<p>Delivery Select: FAN/SW1</p> <p>IRQ Alarm: OFF</p> <p>COM Alarm: OFF</p> <p>GPO0 Alarm: OFF</p> <p>GPO1 Alarm: OFF</p> <p>GPO2 Alarm: OFF</p> <p>GPO3 Alarm: OFF</p>	
<p>F (KEY) Select / Execute, ↓↑: Select, ENTER: Execute</p> <p>ESC: Exit and Reboot</p>			
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Description of SYSTEM MONITOR Options:

- **COM PASSWORD** : The system monitor has a serial port interface that is capable of communicating with remote sites. For serial port access security, a 3 character password can be programmed into the System Monitor. The monitor will request the password from the user the first time the serial port is accessed. Press F5 to enter a password.
- **SYSTEM TEMPERATURES** : The LO and HI system temperature options define the boundary within which the environmental temperature of the ESP3520B must remain. A System Temperature Alarm is generated if the temperature crosses either of these boundary conditions. The type of alarm generated is configured by the delivery selects.
- **VOLTAGE TOLERANCES** : The four system voltage sources (+/- 5v & +/- 12v) and the CPU voltage sources are monitored. Each voltage line has a programmable +/- percentage tolerance for alarm conditions. The alarm source which is configured by the delivery byte is common among all voltage lines. The default tolerance for all voltage lines is 10%.
- **GPO MODES** : Four programmable General Purpose Outputs (GPO) are provided through the System Monitor. They can be configured as alarm sources by each monitored item or they can be configured to always be turned ON. The four GPO mode options in the System Monitor Utility represent the master controls for GPO configuration. The GPO's can be configured as active HIGH or LOW outputs. If the GPO is set for F-LOW or F-HIGH, it will be forced to its active state. The N-LOW and N-HIGH options select the polarity of the output but allow the Delivery Select Alarms to activate them.
- **DAISY CHAIN TEMPERATURES** : The LO and HI Daisy Chain temperature options define the boundary within which the temperature status of all remote temperature sensors must remain. A Daisy Chain Alarm is generated if the temperature of any one of the remote sensors reports a temperature that is outside the limits of the boundary settings. The type of alarm generated is configured by the delivery selects. Programmable input #8 MUST be set for DAISY CHAIN to enable remote sensor monitoring.
- **FAN / SWITCH SELECTIONS** : The SYSTEM MONITOR has eight inputs that can be configured to monitor FAN rotational speeds. Seven of these inputs can also be configured to monitor the ON/OFF status of a switch. The eighth input is used to enable temperature monitoring of remote sensors. Each FAN monitor has a programmable RPS (revolutions per second) value that defines the least number of RPS allowed before an alarm is generated. Each SWITCH monitored has a polarity setting that defines which switch state (ON or OFF) should trigger an alarm. Use the arrow keys to select the FAN to configure and then setup the configuration as required. Each FAN has its own alarm source control byte.
- **DELIVERY SELECTS** : The SYSTEM MONITOR offers six different methods of notifying the user of a failure. They are an interrupt to the CPU (jumpered to either IRQ10 or IRQ11), setting one of four General Purpose Outputs, and reporting through the serial port. Each monitored item has its own set of alarm statuses. The alarm(s) used to report an error condition is determined by the monitored items DELIVERY byte. Use the arrow keys to select the monitored item and display its current DELIVERY byte settings.

4.10 Thermal Manager

The Thermal Manager is responsible for monitoring the temperature of the Pentium CPUs installed and preventing the CPUs from overheating. If the CPUs become too hot they will begin to malfunction and potentially become damaged. Given normal circumstances and adequate air flow, the temperature of the CPUs should remain within the normal operating ranges. The Thermal Manager allows four temperature break points to be set along with an associated CPU speed. If two processors are installed, it takes only one of the CPUs to reach the upper threshold for the speed of both processors to be decreased. When the throttle break point is reached, the next break point is used as the upper threshold limit. The speed will throttle back up when the temperature of both CPUs is less than the previous break point. For maximum protection against CPU overheating, set the fourth speed setting to the lowest setting. When a throttle break point is reached, the user can be alerted by one of five alarming methods. One of four General Purpose Outputs, or serial port remote communication can be enabled for reporting the CPU temperature failure.

THERMAL MANAGEMENT SUMMARY																									
<p>F1-MEMORY SHADOW</p> <p>F2-CHIPSET CONTROL</p> <p>F3-SYSTEM MONITOR</p> <p>F4-THERMAL MANAGER</p> <p>F5-PCI SETUP</p>	<p>Thermal Management: OFF</p> <p>CPU THROTTLE CONTROL</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">#1 Temp: 0°C</td> <td style="width: 30%;"></td> <td style="width: 40%;">THERMAL ALARM ENABLES</td> </tr> <tr> <td>Speed: 19/20</td> <td></td> <td>COM Alarm: OFF</td> </tr> <tr> <td>#2 Temp: 0°C</td> <td></td> <td>GPO0 Alarm: OFF</td> </tr> <tr> <td>Speed: 3/4</td> <td></td> <td>GPO1 Alarm: OFF</td> </tr> <tr> <td>#3 Temp: 0°C</td> <td></td> <td>GPO2 Alarm: OFF</td> </tr> <tr> <td>Speed: 1/2</td> <td></td> <td>GPO3 Alarm: OFF</td> </tr> <tr> <td>#4 Temp: 0°C</td> <td></td> <td></td> </tr> <tr> <td>Speed: 1/3</td> <td></td> <td></td> </tr> </table>	#1 Temp: 0°C		THERMAL ALARM ENABLES	Speed: 19/20		COM Alarm: OFF	#2 Temp: 0°C		GPO0 Alarm: OFF	Speed: 3/4		GPO1 Alarm: OFF	#3 Temp: 0°C		GPO2 Alarm: OFF	Speed: 1/2		GPO3 Alarm: OFF	#4 Temp: 0°C			Speed: 1/3		
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<p>(C) COPYRIGHT 1993-94, DIVERSIFIED TECHNOLOGY, INCORPORATED</p>																									

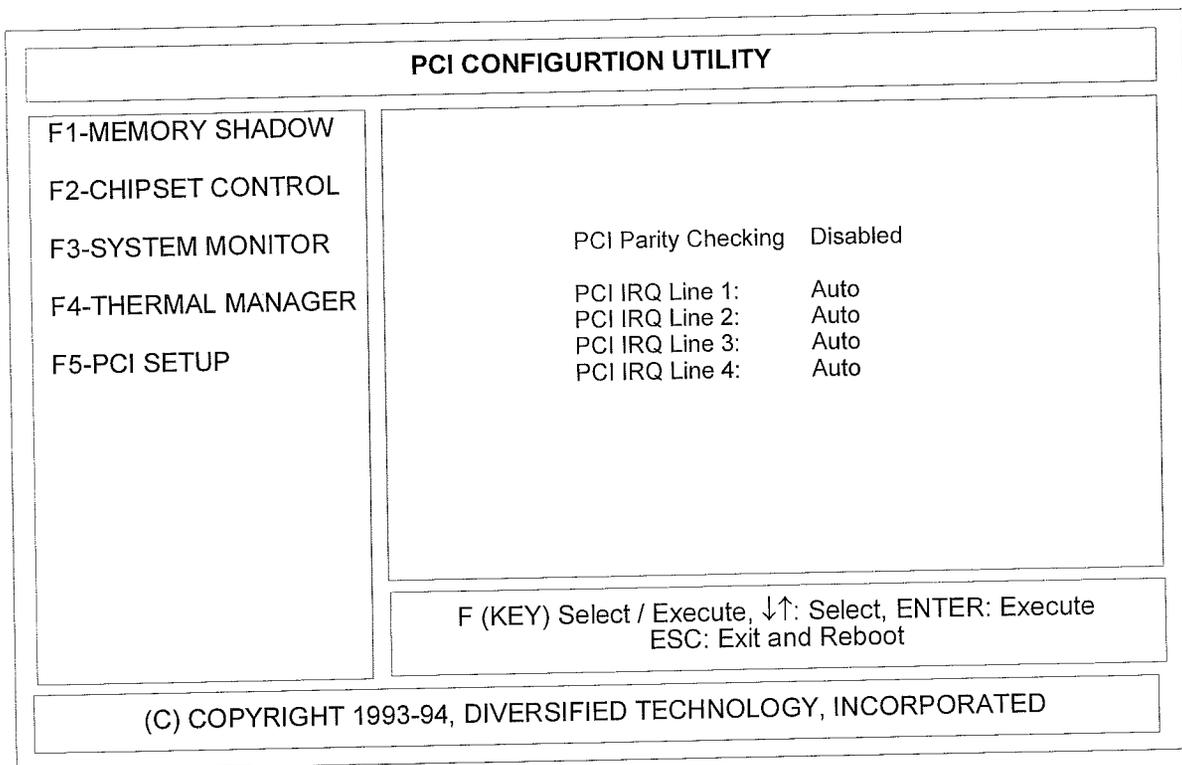
ESP3520B Configuration Guide

Description of THERMAL MANAGER Options:

- **THERMAL MANAGEMENT:** The Thermal Manager can be enabled or disabled by setting this option to ON or OFF.
- **TEMP:** The CPU throttle temperatures specify limits in degrees Celsius at which the CPU speed is reduced. Four limits are available to allow flexibility in speed reduction increments.
- **SPEED:** When the CPU throttle temperature is reached, the CPU speed will be reduced to the specified value. The available speed values are 19/20, 9/10, 3/4, 2/3, 1/2, 1/3, 1/4, and 1/8.
- **THERMAL ALARM ENABLES:** The Thermal Manager offers six different methods of alarming the user when the CPU speed changes. They are an interrupt to the CPU (jumped to either IRQ10 or IRQ11), setting one of four General Purpose Outputs, and reporting through the serial port (COM). If the COM alarm is enabled, the System Monitor will generate CPU temperature "out of bounds" and "back in bounds" messages as the CPU throttling occurs.

4.11 PCI Setup

The PCI setup utility allows to user to configure the PCI interface, and configure the slot specific PCI interrupts.



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Description of PCI SETUP Options

- **PCI PARITY CHECKING:** This option allows PCI parity error checking.
- **PCI INTERRUPTS:** This option allows the user to select the interrupt to be used by the PCI device(s) installed. The available options are IRQ 3, 4, 5, 6, 7, 8, 10, 11, 12, 14, 15, NONE, and AUTO.

NOTE: When selecting PCI Interrupts, keep in mind that the System Monitor defaults to using IRQ 10 and that the EISA Configuration Utility configures interrupts for the EISA Bus devices. Choose an interrupt that has not already been used.

4.12 Load From ROM

This utility is used to load CMOS with the default system configuration values. This can be useful when CMOS parameters have been modified and saved and the default values are desired for some reason. To begin this function press <F7> or move the highlight bar to the option and press <ENTER> . To load the defaults press <F5>. Press <ESC> to abort the function without loading the default values.

LOAD SETUP PARAMETER FROM ROM	
<p>F1-SYSTEM SUMMARY</p> <p>F2-SYSTEM SETUP</p> <p>F3-HARD DISK SETUP</p> <p>F4-BIOS OPTIONS</p> <p>F5-SECURITY / VIRUS</p> <p>F6-MISC. CONFIG</p> <p>F7-LOAD FROM ROM</p> <p>F8-LOAD FROM CMOS</p> <p>F9-SAVE TO CMOS</p>	<div style="border: 1px solid black; padding: 10px; text-align: center; margin: 10px auto; width: 80%;"> <p>This utility initializes configuration options with ROM based default values</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 10px;"> <p>F (KEY) Select / Execute, ↓↑: Select, ENTER: Execute ESC: Exit and Reboot</p> </div>
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4.13 Load From CMOS

This utility is used to re-initialize the ROM utilities items with the values that were stored in CMOS at the last system boot. This can be useful if CMOS parameters have been modified, but the user decides not to put those changes into effect. To begin this function press <F8> or move the highlight bar to the option and press <ENTER>. To load from CMOS press <F5>. Press <ESC> to abort the function without loading from CMOS. This option will only work if the most recent CMOS modifications have not already been saved using the SAVE TO CMOS function.

LOAD SETUP PARAMETER FROM CMOS RAM	
F1-SYSTEM SUMMARY F2-SYSTEM SETUP F3-HARD DISK SETUP F4-BIOS OPTIONS F5-SECURITY / VIRUS F6-MISC. CONFIG F7-LOAD FROM ROM F8-LOAD FROM CMOS F9-SAVE TO CMOS	<p>This utility re-initializes configuration options with The last values stored in CMOS</p>
F (KEY) Select / Execute, ↓↑: Select, ENTER: Execute ESC: Exit and Reboot	
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4.14 Save To CMOS

This utility is used to save the current ROM utilities configuration into CMOS. To begin this function move the highlight bar to the option and press <ENTER> or press <F9>. To save to CMOS press <F5>. Press <ESC> to abort the function without saving.

SAVE SETUP PARAMETER INTO CMOS RAM	
F1-SYSTEM SUMMARY F2-SYSTEM SETUP F3-HARD DISK SETUP F4-BIOS OPTIONS F5-SECURITY / VIRUS F6-MISC. CONFIG F7-LOAD FROM ROM F8-LOAD FROM CMOS F9-SAVE TO CMOS	<div style="border: 1px solid black; padding: 10px; text-align: center;">This utility stores the current ROM Utility Configuration into CMOS RAM</div> <p>F (KEY) Select / Execute, ↓↑: Select, ENTER: Execute ESC: Exit and Reboot</p>
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EISA Configuration Utility

- 5.0 Overview
- 5.1 When to Run the EISA Configuration Utility
- 5.2 Tips on Using the EISA Configuration Utility
- 5.3 Using the EISA Configuration Utility
- 5.4 Running the Configuration Utility
- 5.5 Configuring the Computer
- 5.6 ESP3520B EISA Configuration Options
- 5.7 Conclusion

5.0 Overview

As computers become more powerful and option boards proliferate the market, establishing a properly functioning system becomes more difficult. With the advent of the Extended Industry Standard Architecture (EISA) great minds conspired to remove the burden of system configuration from the user. The EISA Configuration Utility (ECU) was thus developed. The ECU, in conjunction with configuration files for each board, will automatically determine a conflict free system environment. This environment is stored in nonvolatile RAM on the system board and enabled each time the system is powered on or reset. The ECU for the ESP3520B has been licensed from Micro Computer Systems, Inc.

5.1 When To Run The Eisa Configuration Utility

The system board is responsible for knowing if it is properly configured. If the ESP3520B has not been configured, or the configuration has been changed, the message "PLEASE RUN THE EISA CONFIGURATION UTILITY" will be displayed during the POST. At this point the user should press the F1 key to continue and boot the system. The system will boot in ISA mode, no EISA expansion cards will be enabled. This prevents EISA cards from trying to use the same resources as other cards. After the ECU is executed properly, EISA cards will coexist in a non-conflicting environment allowing the system to boot in EISA mode.

5.2 Tips On Using The Eisa Configuration Utility

- If the ECU is copied to another floppy disk, the volume label of that disk must be "SYSTEMCFG"
- The ECU will execute faster if it is run from a hard drive. The volume name of the hard drive is unimportant.
- The ECU will execute much faster if "HIMEM.SYS" or another EMS or XMS driver is installed. To install "HIMEM.SYS", include the following line in the "CONFIG.SYS" file on the disk or diskette that the system is booted from:

```
device=himem.sys
```

- "HIMEM.SYS" is included with DOS. It must be on the disk or diskette being booted from.
- The following command line switches are available when running "SD.EXE" or "CF.EXE".

/A - Advanced mode: This allows hidden functions in the configuration files to be displayed.

/B - BIOS video output: This switch should be used with systems that have non-standard video displays. If this switch is not given, the ECU will use direct writes to video memory.

/F - Fast configuration mode: This allows the ECU to automatically configure the system without the user being involved.

/H - High resolution display mode: This switch sets the display mode to 43 lines for an EGA display and 50 lines for a VGA display. The default is to use 25 lines for all displays.

/K - Keyboard only mode: This will prevent the support of a mouse, even if one is present. This switch need not be used if there is not a mouse.

/M - Monochrome mode: This switch forces the use of monochrome display attributes. The default is to use color attributes unless the display is detected to be monochrome.

/N - Modeling mode: This allows a system configuration file (SCI file) to be opened. When the configuration is saved, only the file is updated. The configuration will not be stored in non-volatile memory.

5.3 Using The Eisa Configuration Utility

The following equipment is necessary to run the EISA Configuration Utility:

- 640 Kilobytes of RAM
- 1.2 or 1.44 Megabyte Disk Drive
- Mouse (Optional)
- Bootable DOS Diskette
- Configuration Utility Diskette
- EISA Configuration Files

The configuration utility diskette contains a configuration file for the ESP3520B. Also included with the ESP3520B is a disk with configuration files for assorted ISA expansion cards. Using configuration files for ISA cards is not necessary, but it can help to eliminate resource conflicts.

The ECU is easy to use; it is fully menu driven and help is available at any time. The keyboard or a mouse can be used to make selections. If the keyboard is used, the following keys control the action:

Tab or ↓ -	Move to the next field
Shift+Tab or ↑	Move to the previous field
↑ or ↓ -	Move between items in a list
Enter -	Make a selection
PgUp, PgDn, ↑, or ↓ -	Scroll the screen
Home -	Move to the beginning of a list
End -	Move to the end of a list
Ctrl+Home -	Move to the beginning of a menu
Ctrl+End -	Move to the end of a menu
ESC -	Activate the menu bar

The F1 key can be used to get online help during the configuration process.

If a mouse is being used, the mouse cursor will appear on the screen. The left mouse button is used to select what the cursor is pointing at.

5.4 Running The Configuration Utility

The following steps are executed to run the ECU:

- Boot the ESP3520B using a bootable DOS diskette
- Put the configuration diskette into drive A
- Type "SD" at the DOS prompt and press Enter

An EISA logo will be displayed after a few seconds. Press any key to clear the logo and proceed to the main menu. The main menu has selections to learn about configuring a computer, to configure the computer, to set the date or time, and to maintain the configuration files. Each menu selection is described below.

“Learn about configuring your computer”

This selection describes what needs to be done to configure a computer.

“Configure computer”

This selection takes the user to the configuration utility. This is used to add or remove boards and to control board functions.

“Set date”

This allows the user to set the system date.

“Set time”

This allows the user to set the system time.

“Maintain system configuration diskette”

This selection allows the user to copy configuration files for expansion boards to the configuration utility diskette. This is necessary for EISA expansion boards, and must be done before configuring the computer. The configuration file for the ESP3520B system board is already on the utility diskette.

“Exit from this utility”

This selection returns the user to the DOS prompt.

5.5 Configuring The Computer

Once the necessary configuration files have been copied to the configuration utility diskette the computer can be configured. After selecting “Configure computer” from the main menu, a menu presenting the “Steps in configuring your computer” will be displayed. The five steps in this menu can be done in any order. Once a step has been done a check will appear next to it. The check is for reference only, a checked step can be repeated if necessary.

“Step 1: Important EISA configuration information”

This step presents the user with more information about the ECU. It should be viewed the first time the ECU is used, but can be skipped.

“Step 2: Add or remove boards”

This step allows the user to tell the ECU that boards are being added or removed. The system will usually automatically find any EISA board that has been added. This step can be used to add ISA boards or to tell the system there is an EISA board before it is actually put in the system.

If a board is being taken out of the system, this step will allow the user to inform the system that the board no longer exists.

Step 2 also allows boards to be moved from one slot to another.

This step can be skipped if no boards are to be added or removed but the ECU is being run to change functions on existing boards.

"Step 3: View or edit details"

This step allows the user to change the functions of a board. This step should always be run to ensure that the desired functions of a board are enabled. For example, to use the floppy disk interface on some disk controller boards it must be enabled.

Step 3 also allows the user to select what resources a board will use. Resources consist of memory, interrupts, and DMA channels. Some boards will allow the user to determine exactly which resources to use, while others will automatically select what they need with no user input. Either way, the ECU will make certain that a resource conflict does not exist. If two board functions require the same resource and neither can share it, the ECU will disable one of the functions. If this happens, the user will be notified. The user may re-enable the disabled function, but must first change the conflicting resource in either function. The enabled function may be disabled if it is not wanted and the automatically disabled function can then be enabled.

An ISA card without a configuration file is completely unknown to the ECU. Resource conflicts between EISA cards and ISA cards can occur, causing system malfunctions. To prevent this, a generic ISA adapter configuration file is provided on the configuration utility diskette. This file allows the user to reserve certain resources for a board. This file can not control the resources for an ISA board; the user must know what the board needs. The generic ISA adapter file is only to prevent resource conflicts.

"Step 4: Examine required switches:"

Some boards (especially ISA boards) have switches and jumpers to configure system resources. This step allows the user to view switch and jumper settings for the selected configuration. The settings can also be printed, if desired. Switches and jumpers are shown in a graphical manner, with the factory default and the new settings given.

Step 4 should always be done when functions have been changed on boards with switches or jumpers. If the user attempts to exit the ECU (Step 5) without first viewing the switch and jumper settings, a warning will be given and the user will be returned to the menu of five steps. At this point the user can go back and view the switches or select Step 5 again and exit.

"Step 5: Save and exit"

This step allows the user to save the configuration and exit the ECU. The user can also return to the main menu, but the system configuration will not be saved. If the user does decide to save and exit, a message will appear telling the user to power down the system and do anything necessary (add boards, remove boards, or set switches or jumpers) or to press Enter to reboot. The next time the system is powered up or rebooted all slots should pass initialization and the system should boot in EISA mode.

If the user attempts to exit without first doing Step 4, a warning will be displayed and the user will be returned to the current menu. The user can go back and do Step 4 or try to exit again. The second time the ECU will allow the user to exit regardless of whether or not Step 4 has been done.

5.6 ESP3520B EISA Configuration Options

The ESP3520B provides memory sizing and control options through the EISA configuration utility. The configuration options in the "View or edit details" section for the ESP3520B appear similar to that shown below:

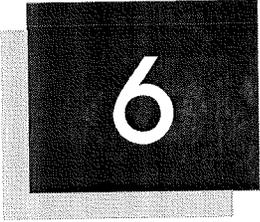
System Board Memory Functions

```
Base Memory.....640K
System BIOS
  Cacheability.....Non-Cacheable
Extended Memory from 1M-256M.....Press F6 to set memory size
Memory Space Gap Enable
  Memory Gap Start.....15 Meg
  Memory Gap Size.....Disabled
```

- Base Memory - This option defines the Base Memory size of the ESP3520B at 640K. The Base Memory size is not configurable.
- System BIOS Cacheability - The System BIOS is not cached by default. The performance gained by caching the system BIOS is negligible and has historically been the source of other system level problems. While there is no reason to anticipate any problem with caching the system BIOS, this option is set for Non-Cacheable.
- Extended Memory from 1M-256M - This option is used to configure the EISA memory size. Press F6 and then configure the Extended Memory blocks for the total memory installed on the board.
- Memory Space Gap Enable - This option allows onboard memory areas to be redirected to the EISA bus. For example, an EISA card requiring use of the memory space between 15 and 16 Meg can be used with an ESP3520B populated with 16 Meg of memory by configuring a 1 Meg Memory Gap starting at 15 Meg. Normally this option is Disabled in order to utilize all of the onboard memory. It should be noted that the Memory Gap Start must be a multiple of the Memory Gap Size. Otherwise, the Start address will be adjusted downward to the next multiple of the Size. For example, a 2 Meg Gap configured to start at 13 Meg would be physically configured between 12 and 14 Meg.

5.7 Conclusion

This has been a basic overview of how to configure an EISA system. The ECU is simple to use and guides the user through everything necessary to configure a non-conflicting system. There are more advanced features in the ECU, and the user should not be timid about trying to use them. Help is almost always available with the F1 key if the user should get stuck. The user should also keep in mind that the ECU will not allow a system to be configured in a conflicting manner. So if time allows, the user should experiment with the ECU and become familiar with it the first time it is used. This will make life easier in the future when things need to be changed.

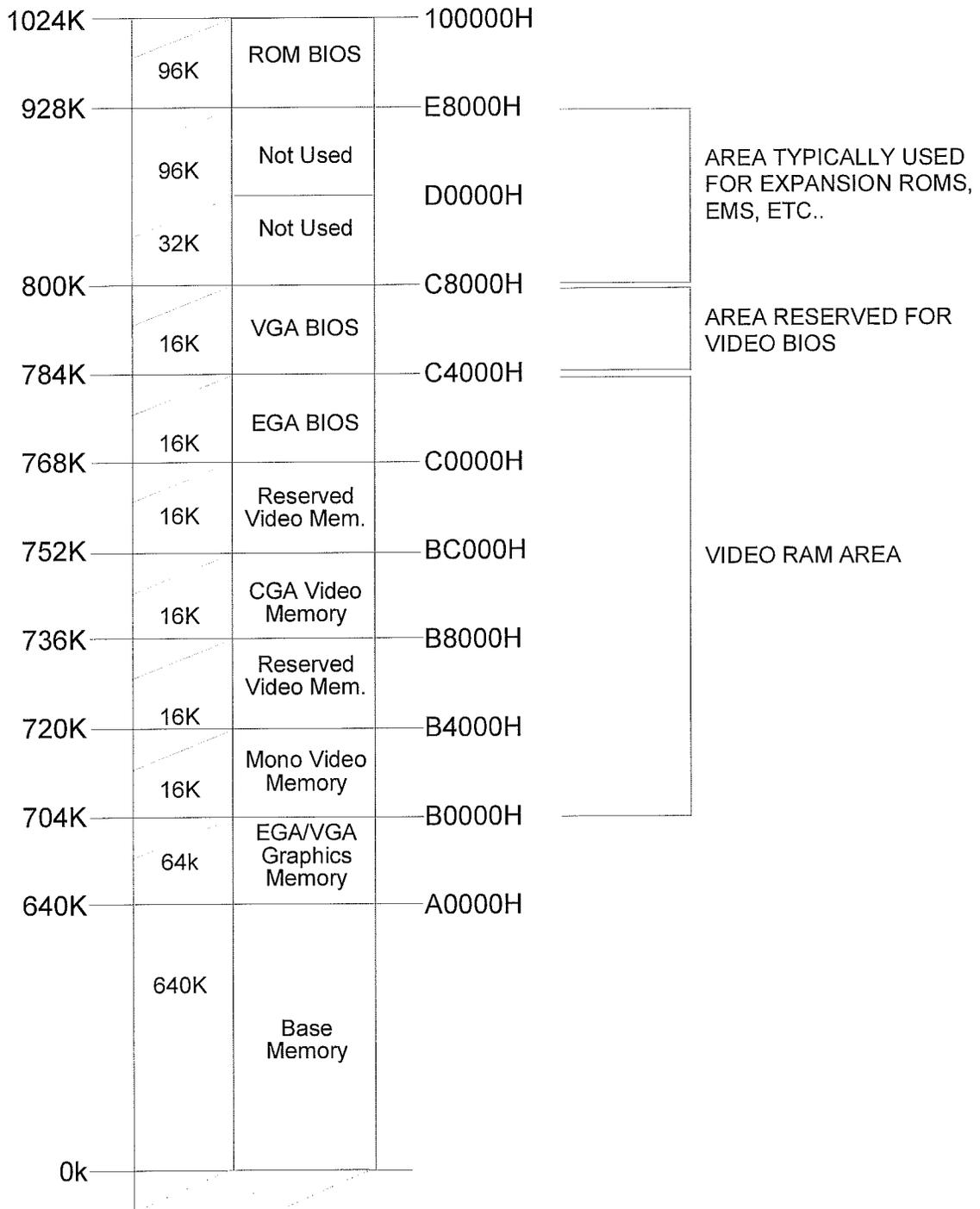


System Resource Maps

- 6.0 Memory Map
- 6.1 Interrupt Map
- 6.2 I/O Address Map

ESP3520B Configuration Guide

6.0 Memory Map



The areas from A0000H to BFFFFH are always non-cacheable

6.1 Interrupt Maps

NOT USED	FFH
RESERVED FOR BASIC	F1H
NOT USED	80H
SLAVE INTERRUPT CONTROLLER IRQ 8-15	78H
NOT USED	70H
NOT USED	68H
NOT USED	60H
RESERVED FOR BIOS	40H
RESERVED FOR DOS	20H
RESERVED FOR BIOS	10H
MASTER INTERRUPT CONTROLLER IRQ 0-7	08H
RESERVED	06H
PRINT SCREEN	05H
PENTIUM INTERRUPTS	00H

77H	PCI	15
	IDE	14
76H	COPROCESSOR	13
75H	MOUSE / PCI	12 Enabled if mouse installed
74H	PCI / MONITOR	11 Can be configured as the onboard system monitor interrupt
73H	PCI / MONITOR	10 Can be configured as the onboard system monitor interrupt
72H	PCI / VGA	9
71H	REAL TIME CLOCK	8
70H		

SLAVE INTERRUPT CONTROLLER

1FH	VIDEO CHARS PTR	Pointer to video graphics char
	DISKETTE PARAM PTR	Pointer to diskette parameters
1EH	VIDEO PARAMS PTR	Pointer to video init parameters
1DH	TIMER "TICK" LINK	Called on each timer tick
1CH	KEYBOARD BREAKS	Called when CTRL-BRK pressed
1BH	TIME OF DAY	Read / Set real time clock
1AH	BOOT STRAP	Boot loader routine
19H	BOOT FAILED	Executed if boot straps fails
18H	PRINTER BIOS	Printer BIOS functions
17H	KEYBOARD BIOS	Keyboard BIOS functions
16H	MISC. FUNCTIONS	Cassette BIOS and miscellaneous
15H	RS232 COMM	Serial port functions
14H	DISK / DISKETTE	Disk BIOS functions
13H	MEMORY SIZE	Returns memory size
12H	EQUIPMENT CHECK	Returns equipment list
11H	VIDEO BIOS	Video BIOS functions
10H		

BIOS INTERRUPTS

0FH	PCI	7 Optional PCI / Parallel Port
	FLOPPY	6 Used by floppy if enabled
0EH	PCI / LPT	5 Optional PCI / Parallel Port
0DH	COM 1 / COM 3	Used if COM Port 1 is enabled
0CH	COM 2 / COM 4	Used if COM Port 2 is enabled
0BH	SLAVE CONTROLLER	See 'NOTE 1'
0AH	KEYBOARD	1
09H	TIMER "TICK"	0
08H		

NOTE 1: IRQ 9 replaces IRQ12 on the I/O channel. The BIOS redirects IRQ9 to IRQ12 to allow hardware and software designed to use IRQ12 to operate properly without modification.

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6.2 I/O Address Map

		400H
2	SERIAL COM 1	3F8H
2	FLOPPY DISK CONTROLLER	3F0H
	UNUSED	3E0H
1	ENHANCED GRAPHICS	3D0H
2	COLOR GRAPHICS	3C0H
2	MDPA PRINTER PORT	3BCH
2	MONOCHROME ADAPTER	3B0H
	UNUSED	380H
1	PRIMARY PRINTER PORT	378H
2	UNUSED	300H
1	SERIAL COM 2	2F8H
	UNUSED	280H
1	ALTERNATE PRINTER PORT	278H
2	UNUSED	1F8H
1	FIXED DISK CONTROLLER	1F0H
2	UNUSED	134H
1	ENABLE +12V FOR BIOS FLASHING	134H
0	SYSTEM MONITOR	132H
0	UNUSED	100H
1	RESERVED FOR SYS BOARD I/O	000H
0		000H

	PCEB REGS	C300
0	UNUSED	C200
0	PCMC REGS	C100
0		C000
3	EISA I/O	C83H
0		C80H
3	EISA CONFIG PORTS	C54H
0	EISA CONFIG RAM	C00H
3		8FFH
0	EXTENDED EISA PORTS	800H
0		400H

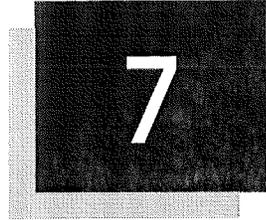
0- These I/O locations are reserved for ONBOARD functions and must not be used by expansion I/O cards.

1 - These I/O locations are unused and may be used by I/O cards.

2 - These I/O locations are unused but are typically used by the common expansion I/O cards.

3 - These I/O locations are undefined on the /AT BUS and should not be used.

Many ISA device I/O addresses are decoded using A0-A9 only. This causes reflection of the I/O devices to occur at I/O addresses above 400h for which A0-A9 correspond to the I/O addresses listed above.



Troubleshooting Guide

7.0 Troubleshooting

7.0 Troubleshooting

Statements within quotation marks are messages that are displayed on your screen. Statements not in quotation marks are problems, or problem areas that are encountered.

NO VIDEO

1. Verify that power is connected to the computer.
2. Verify that the monitor is ON and has power.
3. Verify that all the add-in cards are fully inserted into the /AT Bus Expansion Slot.
4. Remove all connectors from reset, battery, keylock and speaker ports. If the video works after removing the connectors, review the port connections in Section 3.
5. Verify that the monitor type is the same as the video card type being used (i.e., a monochrome monitor with a monochrome card or a color monitor with a CGA card, etc.).

ESP3520B APPEARS TO HAVE LOCKED UP (NO ACTION GENERATED BY PRESSING A KEY)

1. If an add-in video card is installed (e.g., MONO or CGA), verify that the primary monitor is connected. With the power OFF, remove the unused or secondary video card.
2. Make sure the SECONDARY CACHE is disabled if secondary cache is not installed.
3. If secondary cache is installed, turn it off.

PARITY PROBLEMS

1. Verify that the memory SIMMs are inserted properly in their respective sockets (refer to the ESP3520B memory configuration).

"KEYBOARD ERROR"

"STUCK KEY"

"KEYBOARD CONTROLLER ERROR"

These messages indicate that the POST was unable to complete the initialization of the key board.

1. Verify that there are no "stuck" keys on the keyboard.
2. Verify that the keyboard is properly connected to the computer.
3. If a switchable keyboard is used, verify that the switch is positioned for an /AT computer.

"DISKETTE DRIVE A ERROR"

"DISKETTE DRIVE B ERROR"

This message indicates that the POST was unable to access the designated floppy disk drive.

1. Verify that only one floppy controller on the expansion cards installed is enabled.
2. Use the SYSTEM SETUP utility to verify that no drive type is specified for a drive that does not exist.
3. Verify that the floppy cable is properly connected to the drive and controller and that conductors 10 through 16 are twisted between the controller and drive A.
4. Verify that the power connector is connected to the drive.

"INCORRECT DRIVE A TYPE - RUN SETUP"
"INCORRECT DRIVE B TYPE - RUN SETUP"

This message indicates that the drive(s) specified in the SYSTEM SETUP utility does not match the type of floppy detected by the POST.

1. Use the SYSTEM SETUP utility to select the appropriate floppy drive installed.
2. If no floppy drives are installed, use the SYSTEM SETUP utility to verify that no FLOPPY DISK TYPE is specified.

"OPERATING SYSTEM NOT FOUND"

This message indicates that no floppy disk or hard disk could be found to boot from.

1. If booting from a floppy disk, verify that the disk is properly inserted and the drive door is closed.
2. Insert a different bootable floppy disk into the drive and press <F1>.
3. If attempting to boot from a hard disk, insert a bootable floppy disk into drive A and press ENTER. After booting from the floppy disk, verify that drive C is accessible. Use the FDISK (or similar) utility to verify that a bootable partition exists and is ACTIVE. Remove the floppy disk from drive A and reset the system. If the drive cannot be accessed or partition cannot be found, the drive may need to be reformatted.

CAUTION: Reformatting a drive causes the data on the drive to be lost.

4. If attempting to boot from a hard disk, use the HARD DISK SETUP utility to verify that the correct FIXED DISK TYPE is configured.

"FIXED DISK CONTROLLER FAILURE"

This message indicates that the FIXED DISK TYPE specified in the SYSTEM SETUP Utility was not valid or that no hard disk controller is installed.

1. The parameters listed in the HARD DRIVE SETUP utility must never exceed the specifications for the number of cylinders or heads. The USER DRIVE TYPE utility will allow the exact parameters of the drive to be entered.
2. If no hard disk is installed, use the HARD DISK SETUP utility to specify NONE for FIXED DISK TYPE.
3. If an add-in /AT hard disk controller is being used, verify that it is properly inserted into the expansion slot.
4. If an add-in 8-bit /XT hard disk controller is being used, use the HARD DISK SETUP utility to set the FIXED DISK TYPE to NONE. In some cases, the /XT hard disk controller may have to be removed from the system in order for the system to enter the HARD DISK SETUP utility.
5. Verify that the primary hard disk controller is configured for I/O address 1F0h and IRQ14, and the secondary controller is configured for I/O address 170h and IRQ15.
6. Make sure the power cable is connected properly.
7. Use the manufacturer's documentation to verify that all jumpers are configured correctly.

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"FIXED DISK 0 FAILURE"
"FIXED DISK 1 FAILURE"

This message indicates that the POST was unable to access the hard disk using the FIXED DISK TYPE parameters specified in the HARD DISK SETUP utility.

1. Verify that the hard drive has power connected to it.
2. Verify that the hard disk cables are connected properly.
3. Enter the HARD DISK SETUP utility and verify the hard disk type. Refer to the manufacturers specifications on the hard drive for configuration information.
4. The drive may need to be formatted.

WARNING: This will cause loss of all data on the drive.

"REAL TIME CLOCK ERROR"

This message indicates that the battery backed real time clock is not set correctly or has failed.

1. Use the SYSTEM SETUP utility to set the time and date.

"PARITY CHECK1"
"PARITY CHECK2"

These messages indicate that an I/O card activated the I/O channel check signal, which is typically used to indicate a RAM parity error on an add-in card. This may occur if the card is too slow to be accessed by the ESP3520B.

"KEYBOARD LOCKED - UNLOCK KEY SWITCH"

This message indicates that the keyboard appears to be in the LOCKED position.

1. Verify that the system key is not in the locked position.
2. Verify that the keylock wires are connected to pins 4 and 5 of connector J3.

"NON-SYSTEM DISK OR DISK BOOT ERROR
REPLACE AND PRESS ENTER WHEN READY"

This message indicates that a floppy disk appeared to be in the drive, but a valid boot sector could not be read from the disk.

1. Verify that the disk is properly inserted and the drive door is closed.
2. Insert a different bootable floppy disk into the drive and press a key.
3. Use the SYSTEM SETUP utility to verify that the correct FLOPPY DISK TYPE is configured.

SERIAL OR PARALLEL (PRINTER) PORT PROBLEMS

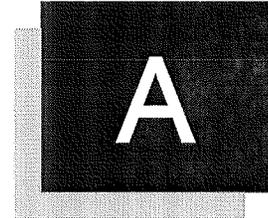
1. Verify that the peripheral device has power and is turned on.
 2. Verify that the peripheral device is properly connected to the serial or parallel port.
-

POWER LED DOES NOT WORK

1. Verify that the LED is connected to pins 1 and 3 of connector J3.
2. Verify that the polarization of the connection is correct. This can be checked by reversing the pin connections.

RESET BUTTON DOES NOT WORK

1. Verify that the RESET button is connected into pins 1 and 2 of connector J5.



System Monitor II Programming Instructions

- A.0 Overview
- A.1 Monitored Conditions
- A.2 Alarming Methods
- A.3 Programming Monitor Through I/O Port
- A.4 Reading Monitor Port Status
- A.5 Sending a Command to the Monitor
- A.6 Sending Data to the Monitor
- A.7 Receiving Data From the Monitor
- A.8 Programming Monitor Using Serial Port
- A.9 Temperature Notes
- A.10 Modem Connection Requirements
- A.11 Example Applications
- A.12 Quick Reference

A.0 Overview

The onboard system monitor of the ESP3520B is a CPU-independent, programmable device capable of monitoring the ESP3520B's voltages and temperatures, the rotational speed of up to eight cooling fans, the switch status of up to seven different switch closure devices, and the temperature status of remote parts of the system through a unique one wire daisy chain temperature interface. Each monitored event can be individually programmed to generate one or more of seven separate alarm types upon entering an error condition. The ESP3520B system monitor also supports a serial port interface that is capable of sending a user programmable dial string to a modem to report error conditions to a remote control site. To identify each unit that may call in to the control site, a programmable unit identification number is provided. The monitor's serial interface is capable of answering an incoming call, and will respond to remote interrogation commands. The monitor also has a mode of operation that will allow communication through I/O port 132h and the serial port of the monitor. In addition to monitoring the system's environmental conditions, the ESP3520B's monitor also stores the last POST code that the BIOS issues during the unit powerup. Supplementing the POST code storage, if the BIOS determines that an error condition exists, it will send an error code defining the error condition to the monitor for storage. Since the system monitor is independent from the CPU, this allows remote diagnosis of power up error conditions.

A.1 Monitored Conditions

System Voltages: The monitored system voltages are the +/- 12 volt lines, the +/- 5 volt lines, and the 3.3 volt CPU power supply line. Each voltage line has a programmable +/- percent tolerance for an alarm condition. The default tolerance is 10 percent. All of the voltage lines use the same programmable alarm issuing method.

System Temperatures: The temperatures monitored are the ambient system temperature, the temperature under the primary CPU (CPU1), and the temperature under the secondary CPU (CPU2). The alarm issuing method for the ambient temperature is separately programmable from the method used for the CPUs.

Fan Rotational Speed: The ESP3520B can monitor the rotation rate of up to eight fans at a time. Each fan has a minimum rotations per second (RPS) value that can be specified for its alarm condition. Also, each fan has an individually programmable alarm method.

Switch Closure: Fan input lines that are not being used to monitor fan rotational speeds can be programmed to monitor the ON/OFF status of a switch. Fan inputs 1 - 7 can be programmed as switch monitors. Each switch can be programmed to be active high or active low for its alarm condition.

Remote Temperatures: Fan input line 8 can be programmed as a remote temperature monitor when used with the Dallas Semiconductor DS1820 one wire digital thermometer. Multiple DS1820s can be connected, or daisy chained, to the Fan 8 input line and used together simultaneously. The alarm condition for the DS1820s is generated when the temperature goes outside of the user programmable Daisy Chain high and low boundary temperatures.

POST Codes: The ESP3520B BIOS sends its POST codes to I/O port 80h and to the system monitor. The system monitor stores each POST code as it is received. The monitor will report the last POST code received upon user request.

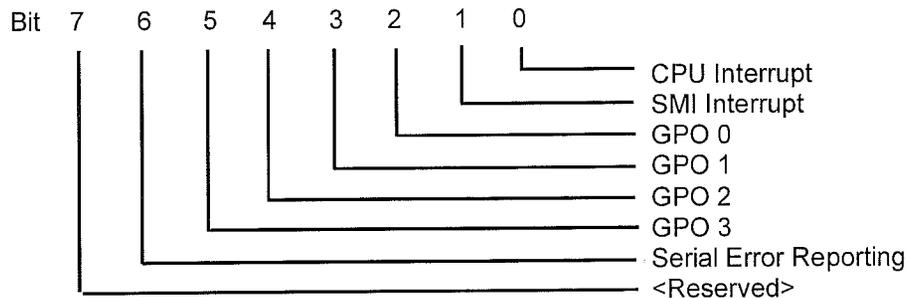
BIOS Failure Codes: The ESP3520B BIOS is capable of diagnosing several types of errors. If an error condition is detected by the BIOS, it will send an error code to the system monitor. If a modem dial string or unit identification number has been programmed, the monitor will report this error code. Otherwise, the monitor will report this code upon user request.

BIT

0	DISK_ERROR	: Hard drive controller failure or boot failure
1	KYBD_ERROR	: Keyboard failed (stuck key or no keyboard installed)
2	EISAR_ERROR	: EISA Configuration NVRAM checksum error
3	EISAC_ERROR	: EISA Slot Configuration error
4	POS_ERROR	: POST Timeout error
5	CMOS_ERROR	: CMOS Checksum Invalid
6	TIMER_ERROR	: Timer error
7	RTC_ERROR	: Real Time Clock Failed
8	CONFIG_ERROR	: System configuration differs from CMOS configuration
9	OPROM_ERROR	: Option ROM Error
10	COP_ERROR	: Math Coprocessor error
11	DISKETTE_ERROR	: Floppy drive error or boot failure
12	BOOT_ERROR	: Unable to boot successfully
13	CACHE_ERROR	: Error occurred configuring the secondary cache
14	IO_ERROR	: An IO address conflict exists
15	OTHER_ERROR	: Other error

A.2 Alarming Methods

The ESP3520B System Monitor offers seven different alarming methods to the user for each monitored event. Which alarm(s) used for an error condition is determined by the delivery byte for the monitored event. A delivery byte is defined as follows:



CPU Interrupt: If this bit is set in an event's delivery byte, an error condition will cause IRQ10 or IRQ11 to be generated. The interrupt generated is determined by Jumper E1 on the ESP3520B CPU Board.

SMI Interrupt: If this bit is set in an event's delivery byte, a System Management Interrupt will be generated on an error condition. This type of alarm is intended to be used with the Thermal Management support of the BIOS.

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GPO0-4: These bits of the delivery byte, when set, cause the corresponding General Purpose Output lines to assert on an error condition. The GPO lines are pins 9 - 12 of the J6 header connector of the CPU board.

Serial Error Reporting: If this bit is set in an event's delivery byte, an error message will be sent out the serial port on an error condition. If a dial string has been programmed, the monitor will know to send the dial string to the modem, wait for a connection, and then send the error message. If the unit identification string has been programmed, the monitor will send the unit identification string before it sends the error message. The system monitor serial port is set at 9600 BAUD, 8-bit word size, no parity, and 1 stop bit. The port uses RTS/CTS hardware handshaking.

The delivery Byte for an event is programmed by sending the Set Delivery Byte command for that event, followed by the delivery byte itself defining what alarm method is to be used on an error condition for that event. For example, if a CPU interrupt is to be generated and GPO 0 is to be turned on when Fan 1 falls below its minimum rotations per second, a delivery byte of 05h would be sent to the monitor after sending the Set Fan 1 Delivery Byte command.

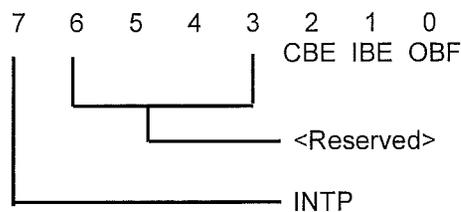
A.3 Programming The Monitor Through The I/O Ports

Typically the System Monitor is programmed using the BIOS System Monitor Configuration Utility, which is capable of programming all features of the monitor. The following section is provided for those users who wish to write their own utilities to control the monitor.

The ESP3520B System Monitor is programmed by sending commands and/or data to I/O ports 133h and 132h respectively. A command - data byte sequence is described as follows:

A.4 Reading The Monitor Port Status

To determine the monitor port status, the user would read port 133h to get the monitor's status byte. The status byte returned is defined as follows:



CBE (Command Buffer Empty) This bit is set when the command input buffer to the monitor is empty.

IBE (Input Buffer Empty) This bit is set when the data input buffer is empty.

OBF (Output Buffer Full) This bit is set when the monitor has data waiting for the user in port 132h.

INTP (Interrupt Pending) This bit is set when there are no interrupts or SMIs to be sent to the system. If this bit is clear, the monitor has an interrupt or SMI to send.

A.5 Sending A Command To The Monitor

If the user wants to send a command to the monitor, the user should first make sure that the command buffer is empty (CBE set). If it is, then the user can send a command to the monitor through port 133h. See the command descriptions at the end of this section for a list of valid commands and the number of corresponding data bytes that are associated with them.

Before sending a command to the monitor, the INTP bit (bit-7) should be checked. If it is clear, the monitor has an interrupt or SMI to send to the CPU. The system monitor will not send the interrupt if it has a command to process, so commands should not be sent until the bit is set.

A.6 Sending Data To The Monitor

Some commands require an additional data byte(s) to be sent to the slave. To send the data byte(s) to the monitor, the user again must read port 133 and determine that the input buffer is empty (IBE set). If the input buffer is empty, then the user can send the appropriate data to the monitor through port 132h. It is important to note that commands are sent to the monitor through port 133h and data is sent through port 132h. Similarly, data sent from the monitor is read through port 132h, and the buffer's status is read through port 133h.

A.7 Receiving Data From The Monitor

Some commands instruct the monitor to send the user data. After sending such a command, the user should read port 133h until the output buffer full (OBF) bit is set. When this bit is set, the user can read port 132h to obtain the data. If two bytes are returned, the user should read port 133h a second time until the output buffer full bit is set again, and then read port 132h to obtain the second byte. See the command descriptions to determine the number of returning data bytes.

NOTE: Command/Data byte sequences may be entered through software or manually using MS-DOS DEBUG or equivalent. However, if entering commands manually, it is important to note that if a command requires a data byte to follow it, the data must be sent within 2 seconds, or the command is thrown away.

A.8 Programming The Monitor Using The Serial Port

The monitor can also be programmed through the serial port. The serial port communicates at 9600 baud, 8 data bits, no parity, and 1 stop bit. The same commands that are used to program the monitor through the I/O ports are used to program the monitor through the serial port, though the serial commands are entered in ASCII. Commands that cannot be entered using the serial port are the Set Password, Set Dial String, and Set Unit ID Commands. Commands sent to the serial port are prefixed with the '@' character, followed by the command and data bytes, each separated with a colon. For example, to use the Set Switch Polarity command to set Fan 4 to act as a switch closure monitor, and to be active high, the following procedure would be used. First, by looking up the command in the Command Description List, the Set Fan Minimum RPS command is found to be Command 2Ah. The command is followed by two data bytes: the first byte is the fan to set, and the second byte is the active state of the switch. The command sequence would be as follows:

```
@2A:03:01<CR>
```

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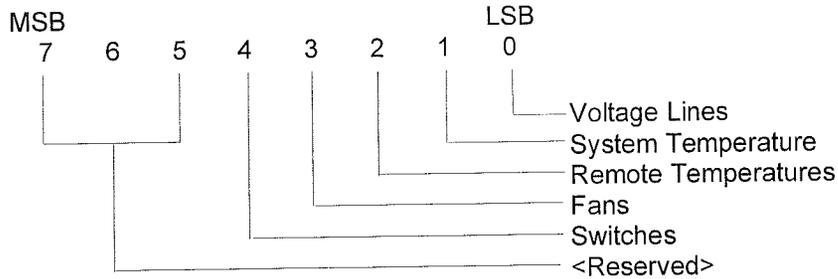
There are several key points to note about the above string. First, the @ symbol is the first character. This tells the monitor that the characters following it make up a command string. The next point to note is that the command, in ASCII, is the hex value of the command. Also note that a colon separates the command from the first data byte, and another colon separates the second data byte from the first. Another point to note is that switch four is specified with '03' and not just '3'. The numbering system used by the monitor starts with zero. The monitor expects the command and data bytes to be entered in two digits. Finally note that the command is processed when a carriage return is sent at the end of the string.

Serial Reporting Verbose Mode: The Monitor can be set to send verbose strings upon receiving commands, or can be set to send only hex values. This is done by sending command 09h followed by a 00 to disable or a 01 to enable verbose mode. The monitor defaults to verbose mode enabled.

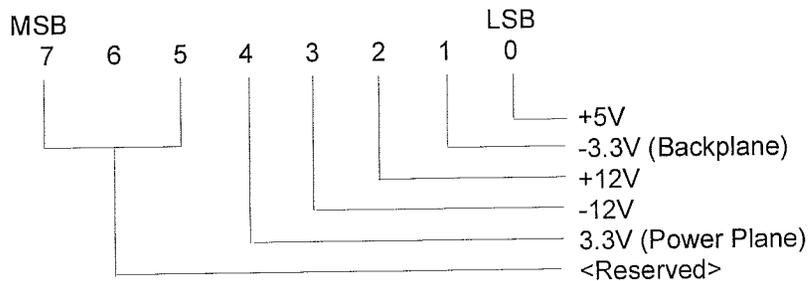
Password Entry: The Monitor can be programmed with a three character password through the I/O port using command 05h. If the password is programmed, then the monitor will request the password from the user upon first using the serial port.

LIST OF COMMANDS:

COMMAND	Data OUT	IN	Description:
00h	01	00	GET SYSTEM STATUS: This command returns a byte mask indicating the status of the events being monitored. A bit set to 1 indicates a failure. The byte mask is defined as follow:

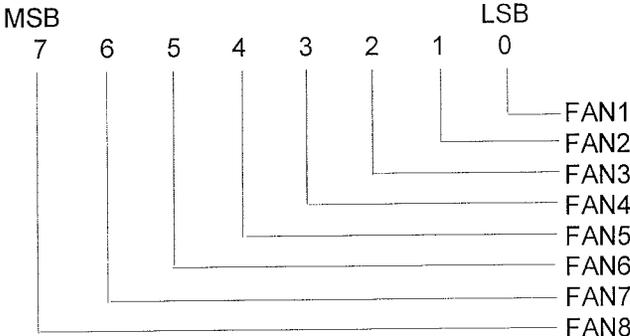


01h	01	00	GET VOLTAGE STATUS: This command returns a byte mask indicating the status of the voltage channels. A bit set to 1 indicates a failure. The byte mask is defined as follows:
-----	----	----	--

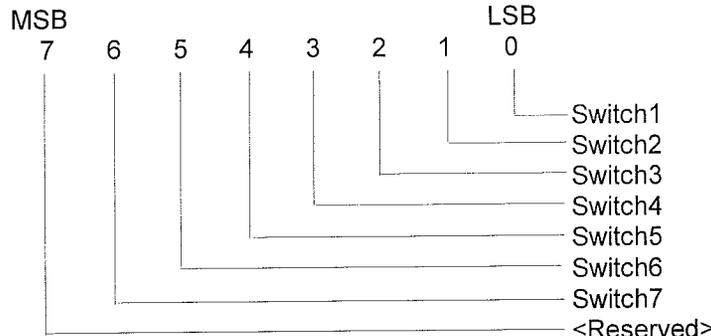


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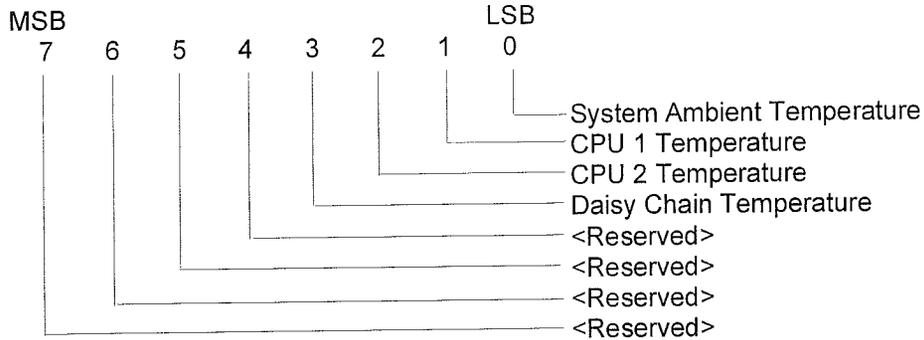
<u>COMMAND</u>	<u>Data OUT</u>	<u>IN</u>	<u>Description:</u>
02h	01	00	GET FAN STATUS: This command returns a byte mask indicating the status of the fans. A bit set to 1 indicates a failure. The byte mask is defined as follows:



03h	01	00	GET SWITCH STATUS: This command returns a byte mask indicating the status of the switches. A bit set to 1 indicates a failure. The byte mask is defined as follows:
-----	----	----	---



COMMAND	Data OUT	IN	Description:
04h	01	01	GET TEMPERATURE STATUS: This command, followed by a 1 or 0, returns a byte mask indicating the status of the temperatures monitored. A bit set to 1 indicates a failure. A 0 return is the overall system temperature status.



05h	00	03	SET PASSWORD (I/O port only): This command followed by a three byte string, sets the password for serial port access. When the password is set, the serial port will require the password to be entered before it will allow commands to be obeyed. Sending all zeros as the password will disable the password checking.
06h	00	1-20	SET DIAL STRING (I/O port only): This command, followed by up to 20 data bytes, sets the modem dial string for the serial port. If the string is shorter than 20 characters, send a hex 2A to terminate the string. This dial string will be sent before an error string is sent. After sending the dial string, the monitor will wait for DCD to be asserted. If DCD does not get asserted after 2 minutes, the monitor will abort its attempt to make a connection until another error condition occurs.
07h	00	1-10	SET UNIT ID (I/O port only): This command, followed by up to 10 data bytes, sets the unit ID string for serial error reporting. If the string is shorter than 10 characters, send a hex 2A to terminate the string. When this string is set, it will be sent before every error message string to identify the unit that is sending the error message.
08h	00	01	TOGGLE SERIAL ECHO: This command, followed by a data byte, enables or disables the serial port echo. 00 disables echoing, and 01 enable echoing. The default value is echoing disabled.
09h	00	01	TOGGLE NON-VERBOSE MODE: This command, followed by a data byte, enables or disables verbose strings sent out the serial port. 00 disables verbose mode, and 01 enables verbose mode. The default value is verbose mode enabled.

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<u>COMMAND</u>	<u>Data OUT</u>	<u>IN</u>	<u>Description:</u>
0Ah	00	01	ENABLE WATCHDOG: This command, followed by a count value, enables the watchdog function of the monitor. If the monitor does not receive the strobe watchdog command before the count value expires, the system will be reset. The count value is in fifty millisecond increments, which allows a maximum of 12.75 seconds (255*50ms) of strobe cycle time. Sending a value of zero as the count will disable the watchdog function.
0Bh	00	01	WATCHDOG WARNING COUNT: This command, followed by a count value, sets a point where the alarm(s) specified by the watchdog warning delivery byte will be generated. The count value is in the same 50 millisecond increments that the Enable Watchdog count is in. This function is provided to give a warning to the CPU that a reset is about to occur if the strobing means stops.
0Ch	00	00	STROBE WATCHDOG: This function resets the internal watchdog counter of the monitor, preventing a system reset until the Enable Watchdog Count expires. *** See commands 3Ah and 3Bh for further watchdog information.
0Dh	00	02	BIOS FAILURE DEFINITION: This command is intended for use with the system BIOS, however, it can be used as a general purpose two byte storage method. The command, followed by two data bytes, stores those two data bytes in the monitor's memory.
0Eh	02	00	GET BIOS FAILURE DEFINITION: This command returns the two bytes sent to the monitor by command 0Dh.
0Fh	01	00	GET LAST POST CODE: This command returns the last POST code that was sent to the monitor by the system BIOS.
10h	00	03	SET LOW BOUNDARY TEMPERATURE: This command, followed by three data bytes, sets the low boundary condition for an alarm for either the system ambient, CPU1, or CPU2 temperature. The first data byte defines which module's boundary to set: 00=system ambient, 01=CPU1, and 02=CPU2. The next two bytes form a nine bit two's complement number that defines the low temperature. The magnitude of the number should be twice that of the desired temperature, because the temperature module measures the temperature in 1/2 degree Celsius increments. The first byte is the most significant byte.

NOTE: The lowest temperature the monitor is capable of reading is -55°C. See the Temperature Notes section of this Appendix for more information on how to calculate the value for a desired temperature and how to calculate the two's complement of a number.

<u>COMMAND</u>	<u>Data OUT</u>	<u>IN</u>	<u>Description:</u>
11h	02	01	GET LOW BOUNDARY: This command, followed by a data byte specifying which module is desired, returns that temperature module's current low boundary for failure: 00=system ambient, 01=CPU1, 02=CPU2. The boundary temperature is returned high byte first, in a nine bit two's complement format, of a magnitude twice that of the actual temperature. See the Temperature Notes section of this Appendix for more information on two's complement numbers.
12h	00	03	SET HIGH BOUNDARY TEMPERATURE: This command, followed by three data bytes, sets the high boundary condition for an alarm for either the system ambient, CPU1, or CPU2 temperature. The first data byte defines which module's boundary to set: 00=system ambient, 01=CPU1, and 02=CPU2. The next two bytes form a nine bit two's complement number that defines the high temperature. The magnitude of the number should be twice that of the desired temperature, because the temperature module measures the temperature in 1/2 degree Celsius increments. The first byte is the most significant byte. NOTE: The highest temperature the monitor is capable of reading is 125°C. See the Temperature Notes section of this Appendix for more information on how to calculate the value for a desired temperature and how to calculate the two's complement of a number.
13h	02	01	GET HIGH BOUNDARY: This command, followed by a data byte specifying which module is desired, returns that temperature module's current high boundary for failure: 00=system ambient, 01=CPU1, 02=CPU2. The boundary temperature is returned high byte first, in a nine bit two's complement format, of a magnitude twice that of the actual temperature. See the Temperature Notes section of this Appendix for more information on two's complement numbers.
14h	02	01	GET TEMPERATURE: This command, followed by a data byte specifying which module is desired, returns that temperature module's current temperature: 00=system ambient, 01=CPU1, 02=CPU2. The temperature is returned high byte first in a nine bit two's complement format of a magnitude twice that of the actual temperature in degrees Celsius. See the Temperature Notes section of this Appendix for more information on how to calculate the actual temperature from a two's complement value.
1Ah	00	01	ENABLE TERMINAL TRANSFER MODE: This command enables terminal transfer mode. When Terminal Tx mode is enabled, all data sent to the I/O port 132h will be echoed out of the monitor's serial port. Also, any data sent into the monitor's serial port will be sent to port 132h.

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<u>COMMAND</u>	<u>Data OUT</u>	<u>IN</u>	<u>Description:</u>
1Bh	01	01	DISABLE TERMINAL TRANSFER MODE: This command will set the monitor back to standard operating mode. NOTE: To disable terminal Tx mode from the serial port send '@@@'.
1Ch	00	02	FORCE GENERAL PURPOSE OUTPUT LINE: This command followed by a byte specifying a General Purpose Output Line (GPO 0 - 3), then followed by either a00 or 01, forces the specified GPO line to either a low or high state respectively.
1Dh	00	02	SET GENERAL PURPOSE OUTPUT LINE ACTIVE STATE: This command, followed by a byte specifying a General Purpose Output Line (GPO 0 - 3), then followed by either a 00 or 01, sets the specified GPO line's active state on an error condition to either active low or active high, respectively.
1Eh	01	01	GET GENERAL PURPOSE OUTPUT LINE ACTIVE STATE: This command, followed by a byte specifying which General Purpose Output Line (GPO 0 - 3), returns that line's active state for an alarm condition.
20h	02	01	GET VOLTAGE CHANNEL X: This command, followed by a data byte specifying which voltage channel is desired, returns that channel's current voltage reading. The first byte returned is the whole part of the number, and the second byte is the decimal part of the number, i.e., 3.4v would return first a 3, and then a 4 as the second byte. Voltage lines are specified as follows: 00 -- +5 voltage 01 -- -5 voltage 02 -- +12 voltage 03 -- -12 voltage 04 -- CPU voltage
21h	01	01	GET VOLTAGE X TOLERANCE: This function returns the tolerance value for the specified voltage line. Voltage lines are selected as follows: 0 -- +5 voltage 1 -- -5 voltage 2 -- +12 voltage 3 -- -12 voltage 4 -- CPU voltage

<u>COMMAND</u>	<u>Data OUT</u>	<u>IN</u>	<u>Description:</u>
22h	00	02	<p>SET VOLTAGE X TOLERANCE: This function, followed by a voltage line byte and a tolerance byte, sets the +/- percentage tolerance for the specified line. Tolerances should be sent in as the desired percentage, i.e., 25% should be sent in as 25. Voltage lines are selected as follows:</p> <p>0 -- +5 voltage 1 -- -5 voltage 2 -- +12 voltage 3 -- -12 voltage 4 -- CPU voltage</p>
25h	01	01	<p>GET FAN X STATUS: This function, followed by a fan number byte, returns a byte value that represents the current rotations per second of the specified fan.</p>
26h	00	02	<p>SET FAN X MINIMUM RPS: This function, followed by a fan number byte and a minimum rotational value byte, sets the minimum rotations per second value before an error condition occurs for fan x. Valid minimum rps settings are 10 to 255. If a value of 1 - 9 is sent, the monitor uses a value of 10. If a value of zero is sent, the monitor ceases to monitor the fan. NOTE: This function must be set in order for the fan to be monitored.</p>
27h	01	01	<p>GET FAN X MINIMUM RPS: This function, followed by a fan number byte, returns the current minimum rps value stored for fan x.</p>
2Ah	00	02	<p>ENABLE/DISABLE SWITCH X: This function, followed by a switch number byte, then a polarity byte, enables or disables switch monitoring for that switch, and sets the polarity for that switch. If the polarity byte is 0, the polarity for no error is OFF. If the polarity byte is 1, the polarity for no error is ON. If the polarity byte is any other value, switch monitoring for this switch is disabled, and fan checking is enabled. Fans 1-7 are the only fan lines that can be set to be switch monitors.</p>
2Bh	01	01	<p>GET SWITCH X POLARITY: This function, followed by a switch number byte, returns the current polarity setting of the switch.</p>
2Ch	01	01	<p>READ SWITCH X: This function, followed by a switch number byte, returns the current status of the specified switch.</p>

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<u>COMMAND</u>	<u>Data OUT</u>	<u>IN</u>	<u>Description:</u>
30h	00	02	<p>SET VOLTAGE / TEMPERATURE / WATCHDOG DELIVERY: This command, followed by two data bytes, specifies the delivery method for either the voltage lines, temperatures, or watchdog warning. The first data byte specifies which event to set, and the second byte is the delivery byte itself. The events are specified as follows:</p> <p>00 = Voltage Delivery Byte 01 = System Ambient Temperature Delivery Byte 02 = CPU1 and CPU2 Temperature Delivery Byte 03 = Watchdog Warning Delivery Byte</p>
31h	01	01	<p>GET VOLTAGE / TEMPERATURE / WATCHDOG DELIVERY: This command, followed by a data byte specifying a monitored event, returns that events current Delivery Byte. Events are specified as follows:</p> <p>00 = Voltage Delivery Byte 01 = System Ambient Temperature Delivery Byte 02 = CPU1 and CPU2 Temperature Delivery Byte 03 = Watchdog Warning Delivery Byte</p>
32h	00	02	<p>SET FAN X DELIVERY: This command, followed by two data bytes, specifies the delivery method used for an alarm condition on a fan line. The first byte specifies which fan line, and the second byte specifies the delivery method. NOTE: Since the switch monitoring is done through the fan lines, the delivery bytes for fans 1-7 will specify the delivery method for the switch on that line. The delivery byte for fan 8 doubles as the delivery method for the daisy chain temperature interface in the same manner.</p>
33h	01	01	<p>GET FAN X DELIVERY: This command, followed by a data byte specifying a fan number, returns that fan's delivery byte.</p>
33A	00	01	<p>SET WATCHDOG TICK COUNT TIME GRANULARITY: Starting with System Monitor Version 2.3 and up, this command allows the user to define the watchdog count granularity from 50 milliseconds (default) to 1.35 seconds. Command 3Ah, followed by a data byte between 1 and 27, determines the amount of time that each tick value set by command 0Ah represents. One tick count is equal to 50 milliseconds times the granularity value. For example, if the granularity value is set to 20 (14h), then each tick count is [0.050s x 20] or 1 second. Therefore, if the watchdog count value programmed using command 0Ah is 15, then the watchdog timeout value is [15 x 1s] or 15 seconds.</p>

COMMAND Data
OUT IN Description:

Granularity (CMD 3 Ah)

Tick Count
(CMD 0Ah)

	1	2	3	4	5	...	27
1	50ms	100ms	150ms	200ms	250ms	...	1.35s
2	100ms	200ms	300ms	400ms	500ms	...	2.7s
3	150ms	300ms	450ms	600ms	750ms	...	4.05s
4	200ms	400ms	600ms	800ms	1s	...	5.4s
5	250ms	500ms	750ms	1s	1.25s	...	6.75s
⋮	⋮	⋮	⋮	⋮	⋮	⋮	
FFh	12.75s	25.5s	38.25s	51s	63.75s		5.7min

1 Tick Count
50ms x granularity
value

Watchdog Timeout Values for Tick Count vs Granularity

3Bh	01	00	GET WATCHDOG TICK COUNT GRANULARITY: This command returns the user defined timer granularity value. If a value of 0 is returned, then the no user value has been programmed, and the default of 50ms per tick is being used.
40h	00	02	SET DAISY CHAIN HIGH AND LOW BOUNDARIES: This command, followed by two data bytes, specifies the high and low boundary temperatures for error on the daisy chain interface. The values passed in are in an eight bit two's complement format. Unlike the system and CPU temperature boundaries which are entered in 1/2 degree increments, the daisy chain temperature boundary values are entered in full one degree Celsius increments.
41h	02	00	GET DAISY CHAIN HIGH AND LOW BOUNDARIES: This command returns the high and low boundary values used by the Daisy Chain for alarm generation.
42h	00	01	ENABLE/DISABLE DAISY CHAIN: This command, followed by a data byte, will enable daisy chain alarm monitoring. If the boundary temperatures have been programmed, AND the program EEPROM command has been sent at least once in the past, this will cause correct monitoring of the daisy chain interface. If the boundary temperatures have been programmed, but the program EEPROM command has never been sent, the interface will not operate correctly.

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<u>COMMAND</u>	<u>Data OUT</u>	<u>IN</u>	<u>Description:</u>
43h	0	0	WRITE TH/TL TO EEPROM: This command causes the monitor to program the EEPROMs onboard the DS1820s with the values configured with command 40h. The DS1820s will not operate correctly if the boundary values have not been programmed into the EEPROMs at least once. This command is provided to prevent the monitor from having to program the EEPROMs every power up, which will reduce the life of the temperature parts.

NOTE: Commands 42 and 43 will return a result code to the user. If the command is sent from the I/O port, a code of either 00 or 01 will be sent to the data port (132h). A 00 indicates that the operation was successful. A 01 indicates that there are no DS1820 devices connected to the fan 8 input line. From the serial port, an OK! will be sent if the operation was successful, and a 'No DS1820s connected to bus!' will be sent if the operation was not.

A.9 Temperature Notes

The temperature module is capable of measuring -55 C to +125 C. These temperatures are measured in 1/2 degree increments by the temperature monitor. Thus, the reported value from the temperature module is twice that of the current temperature.

The temperature module uses two's complement numbers to report the current temperature. Two's complement is a unique form of representing signed numbers. In two's complement, the most significant bit (MSB) of a number is used to signify the sign of the number. If the MSB is 1, the number is negative. Conversely, if the MSB is 0, the number is positive.

To convert a normal negative unsigned number to two's complement, the following procedure is used: 1. Complement the number bitwise, 2. Add 1 to the result. The same procedure is used to convert a two's complement number back to an unsigned number. Note: This conversion is ONLY necessary IF the number is negative (MSB = 1). Let's look at an example:

Suppose the temperature is -55 C. The temperature module will report that as a 0192h. This number is in 9-bit, two's complement form. Since the most significant bit is the lowest bit of the high byte, and it is one, we know the temperature is negative. Now we complement the 92h, and we get 6Dh. To this, we add one to get 6Eh, which is 110 decimal. Since this number represents the number of 1/2 degree increments the temperature module has counted, we divide this number by 2 to get 55. Since we knew that this number was negative from the MSB, we have now finished calculating the temperature to be -55 C.

The same type of procedure can be used to calculate the two's complement for the boundary values of the temperature module.

NOTE: The sign bit, which is the least significant bit of the high byte for the boundary value, is the ONLY bit that is allowed to be set by the temperature module. If a byte that has a value greater than one is sent to the monitor as the high byte for a boundary value, the monitor will ignore the new boundary value and keep the previous one. Let's look at an example of programming a boundary condition. Suppose a low boundary of negative 2 degrees Celsius is desired. First, the two's complement must be calculated. The first step is to multiply the number by two. Next, the complement of the resulting number, 4, is taken. The complement of 4 is 01FBh (remember the number is nine bits). To this number, add 1 to get the two's complement, which is 01FCh. To program the monitor's system low boundary, the following steps would be taken. First, the set system low boundary command, 10h, would be sent to port 133h. Next, when the command has been read by the monitor (CBE set), the high byte of the boundary temperature, 01h, would be sent to port 132h. After the monitor reads this byte (IBE set), the low byte of the boundary temperature, FCh, would be sent to port 132h.

A.10 Modem Connection Requirements

The System Monitor requires the following when a modem is connected to it:

1. The baud rate of the modem serial port MUST be fixed at 9600 baud. Most modems operate in a mode that will cause the baud rate of the serial port to match the connection rate. This mode of operation is not supported by the System Monitor, and should be disabled on the modem.
2. The word size MUST be fixed at 8 data bits, no parity, 1 stop bit.
3. Jumper E17 must be installed on the ESP3520B CPU board. This will set the serial port of the System Monitor to DTE mode.
4. The modem connected must be set to use RTS/CTS handshaking.
5. The modem must also be programmed to raise the DCD line ONLY when a connection is made to a remote modem. Some modems can be set to have DCD always asserted. The System Monitor uses the DCD line to determine if the dial string should be sent. If DCD is always asserted, the dial string will not be sent.

A.11 Example Applications

The System Monitor of the ESP3520B is a very versatile device, with a wide variety of capabilities. During the development and testing of this device, the engineers at Diversified Technology often came up with creative applications of the System Monitor. The following example applications are listed in this section to provide a means of demonstrating the versatility of the Monitor. The examples are broken down into both typical and atypical uses of the separate capabilities of the Monitor.

Application #1: Fan/Switch Input Lines

The obvious application of the fan input lines is the monitoring of the cooling fans of the system. However, the monitor is capable of measuring any square wave signal that swings between 0 and 5 volts, up to 15,300 rpm!

The fan input lines can also double as switch closure monitors. The condition the switch line should normally be at is programmable as either normally high, or normally low. If the switch condition changes, then an alarm is generated. In one example application, three fan lines were programmed as switch closure monitors. These lines were attached to three separate airflow meters. These airflow meters drove their output lines low if the amount of air flowing through them dropped below a certain point. The switch closure lines of the System Monitor were programmed to be normally high, and set to generate an interrupt if the line went to a low condition.

Application #2: Watchdog/Watchdog Warning

Another example application used the watchdog monitor capability of the Monitor, setting it to its maximum timeout, approximately 12 seconds. The system then set the watchdog warning to be an interrupt, and set it to occur at roughly half of the maximum, or about 6 seconds. The system's strobe input to the watchdog was set to occur at less than one second intervals. In this example application, the interrupt service routine would receive the watchdog warning interrupt 6 seconds before the system reset would occur, if the strobing mechanism were stopped. The interrupt service routine could then do anything from performing an emergency shutdown of the operating system, to acting as the strobe to the watchdog in place of the normal strobing mechanism.

Application #3: General Purpose Outputs

The System Monitor has four general purpose output lines. These lines are programmable as either active low or active high. Typically, these lines are used to drive LEDs, which would be an active low output. However, other applications could use the output line to drive an active high digital device or perhaps a relay.

Application #4: Serial Reporting / Interrogation

The most advanced features of the System Monitor are the serial capabilities it has. In one example application, a unit could be set up with a modem connected to the Monitor's serial port. The Monitor will answer any incoming calls made to the modem. This allows the unit's voltages, temperatures, etc. to be interrogated remotely. Other applications could chain multiple units to a central monitoring station through a serial switch box.

A.12 Quick Reference

<u>CMD</u>	<u>Data</u> <u>OUT/IN</u>	<u>Description</u>	<u>CMD</u>	<u>Data</u> <u>OUT/IN</u>	<u>Description</u>
00	1 / 0	Get system status byte	1D	0 / 2	Set GPO (x) Active State
01	1 / 0	Get voltage status byte	1E	1 / 1	Get GPO (x) Active State
02	1 / 0	Get fan status byte	20	2 / 1	Get voltage x
03	1 / 0	Get switch status byte	21	1 / 1	Get voltage x tolerance
04	1 / 0	Get temperature status byte	22	0 / 2	Set voltage x tolerance
05	0 / 3	Set password (I/O port only)	25	1 / 1	Get fan x RPS
06	0 / 14	Set dial string (I/O port only)	26	0 / 2	Set fan x minimum RPS
07	0 / 10	Set Unit ID (I/O port only)	27	1 / 1	Get fan x minimum RPS
08	0 / 1	Toggle Serial Echo	2A	0 / 2	Enable/Disable switch x
09	0 / 1	Toggle Non-Verbose Mode	2B	1 / 1	Get switch x polarity
0A	0 / 1	Enable watchdog (Set count)	2C	1 / 1	Read switch x
0B	0 / 1	Watchdog warning count	30	0 / 2	Set voltage/system temp / CPU temp /watchdog delivery
0C	0 / 0	Strobe watchdog			
0D	0 / 2	BIOS failure definition	31	1 / 1	Get voltage/system temp/CPU temp/watchdog delivery
0E	2 / 0	Get BIOS Failure definition			
0F	1 / 0	Get Last POST code	32	0 / 2	Set fan/switch x delivery
10	0 / 3	Set Low boundary temperature	33	1 / 1	Get fan/switch x delivery
11	2 / 1	Get low boundary	3A	0 / 1	Set Watchdog Granularity
12	0 / 3	Set High boundary temperature	3B	1 / 0	Get Watchdog Granularity
13	2 / 1	Get High boundary	40	0 / 2	Set Daisy Chain High and Low Boundries
14	2 / 1	Get temperature			
1A	0 / 0	Enable Terminal Tx Mode	41	2 / 0	Get Daisy Chain High and Low Boundries
1B	0 / 0	Disable Terminal Tx Mode			
1C	0 / 2	Force On/Off GPO(s) x	42	1 / 1	Enable / Disable Daisy Chain
			43	1 / 0	Write Boundries to EEPROM

Sub-Command Values

	<u>CMD</u>	Fan / SW	<u>CMD</u>
Temperatures			
System	00h	Fan 1	00h
CPU1	01h	Fan 2	01h
CPU2	02h	Fan 3	02h
		Fan 4	03h
		Fan 5	04h
Voltages		Fan 6	05h
(+5)	00h	Fan 7	06h
(-5)	01h	Fan 8	07h
(+12)	02h		
(-12)	03h		
(CPU)	04h	GPOs	
		GPO 0	00h
Delivery Bytes		GPO 1	01h
Voltage	00h	GPO 2	02h
System Temp	01h	GPO 3	03h
CPU Temp	02h		
Watchdog	03h		

30s	20	30
1 min	20	60
1½ min	20	90
2 min	20	120
2½ min	20	150
3 min	20	180
3½ min	20	210
4 min	20	240

Tick Count Granularity & Count Values for common Watchdog Timeout Values.

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Serial Port Commands

Command	Description	Command	Description
@00	Get System Status Byte	@20:vv	Read Voltage Line
@01	Get Voltage Status Byte	@21:vv	Get Volt vv Tolerance
@02	Get Fan Status Byte	@22:vv:tt	Set Volt vv Tolerance
@03	Get Switch Status Byte	@25:ff	Get Fan ff Status
@04	Get Temp Status Byte	@26:ff:rr	Set Fan ff minimum RPS
@08:xx	Toggle Serial Echo xx = 00 echo OFF xx = 01 echo ON	@27:ff	Get Fan ff minimum RPS
@09:xx	Toggle Verbose Mode xx = 00 Verbose OFF xx = 01 Verbose ON	@2A:ss:pp	Enable/Disable Switch
@0A:cc	Enable Watchdog (Set count)	@2B:ss	Get Switch Polarity
@0B:cc	Set Watchdog Warning Point	@2C:ss	Read Switch ss
@0C	Strobe Watchdog	@30:aa:dd	Set Monitored Item Alarm Delivery
@0E	Get BIOS Fail Code Word	@31:aa	Get Monitored Item Alarm Delivery
@0F	Get Last POST Code Received	@32:ff:dd	Set Fan/Switch ff Alarm Delivery
@10:mm:hh:ll	Set Low Temperature Boundary	@33:ff	Get Fan/Switch ff Alarm Delivery
@11:mm	Get Low Temperature Boundary	@3A:gg	Set Watchdog Granularity
@12:mm:hh:ll	Set High Temperature Boundary	@3B	Get Watchdog Granularity
@13:mm	Get High Temperature Boundary	@40:dh:dl	Set Daisy Chain High & Low Boundaries
@14:mm	Get Temperature	@41	Get Daisy Chain High & Low Boundaries
@1A	Enable Terminal Transfer Mode	@42:xx	Enable/Disable Daisy Monitoring xx = 00 Disable Daisy Monitoring xx = 01 Enable Daisy Monitoring
		@43	Write Daisy Chain Boundaries to EEPROM

Symbol Legend

mm = Module: 00 = System Ambient Temperature
01 = CPU1 Temperature
02 = CPU2 Temperature

hh = High byte of boundary value
ll = Low byte of boundary value
cc = Count in Tick Count increments

aa = Alarm: 00 = voltage
01 = System Temp
02 = CPU Temp
03 = Watchdog

dd = Delivery Byte
dh = Daisy Chain Temp High Boundary
dl = Daisy Chain Temp Low Boundary

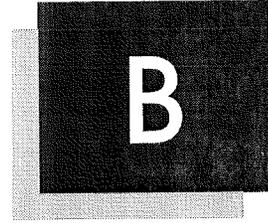
gg = Granularity value (1 < gg < 27 (1Bh))

vv = Channel: 00 = +5v
01 = - 5v
02 = +12v
03 = - 12v

tt = Voltage tolerance value (%)
ff = Fan/Switch Number: 00 = fan 1... 07 = fan 8
rr = Minimum fan RPS
ss = Switch Numbers: 00 = switch 1... 06 = switch 7

pp = Polarity: 00 = Negative (open)
01 = Positive (closed)
03 = Not Enabled as a switch

Tick Count = (gg x 50ms)



System Monitor Pop Up Utility

- B.0 Overview
- B.1 Selecting the Interrupt
- B.2 Selecting the Hot Key

B.0 Overview

The 3520.EXE program is a terminate and stay resident (TSR) program that displays the current system voltages, temperature, and fan rotational values in a pop-up window. The display window can be popped up via a hot-key sequence from the keyboard, or by an interrupt from the ESP3520B monitor. The interrupt used can be selected via a command line switch, as well as the hot-key sequence. Using a question mark as a switch will display a help screen.

B.1 Selecting The Interrupt

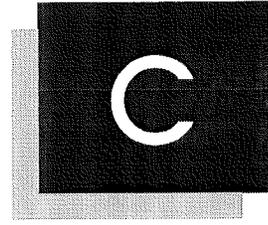
The 3520.EXE utility defaults to using interrupt 10. If the jumper setting on the ESP3520B is for interrupt 10, no command line setting is necessary. If the jumper is set for interrupt 11, then use the -i11 switch at the command line when executing the program. For example, executing "3520.EXE -i11" would set the TSR to pop up when interrupt 11 occurs. Valid interrupts are 10 and 11.

B.2 Selecting The Hot-Key

The 3520.EXE utility defaults to using the ALT-D key combination to pop up the display using the keyboard. Other key combinations are selectable using the -k switch. Valid switch settings are:

- k1 for Right Shift-D
- k2 for Left Shift-D
- k4 for CTRL-D
- k8 for ALT-D

System Monitor II Programming Utility



C.0 Dialprog.exe

C.0 Dialprog.exe

The DIALPROG.EXE utility allows the user to program a Unit ID string and/or a Dial String into the system FLASH. Once programmed, the system BIOS will send the Unit ID and Dial String to the System Monitor during each power up of the system.

Enter DIALPROG at the DOS prompt to execute the utility. If a Unit ID and Dial String have been programmed previously, the utility will display them. If no Unit ID and Dial String have been programmed, the utility will display an example Dial String, and a blank entry for the Unit ID.

After entering the desired Unit ID and/or Dial String, the utility will prompt the user for confirmation to program the FLASH. After receiving confirmation, the utility will program the user's Unit ID and Dial String into a blank portion of the FLASH. There is room for four Dial strings in the FLASH. The most recently programmed Dial String is the one that will be sent to the System Monitor on power up. If all four dial strings have been programmed, the utility will erase all four slots and program the newly entered Dial String as the first entry.