

American Megatrends, Inc.

Series 43

80386SX CAT Motherboard

User's Guide

MAN-643
9/23/92

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Revision History

6/91 Initial printing
9/9/91 Incorporated corrections to minor errors.
9/92 Incorporated corrections to minor errors.

Table of Contents

Chapter 1 Introduction 1

- Features 1
 - Microprocessor Speeds 1
 - Built-in I/O 2
 - CMOS RAM 2
 - System Expansion I/O Slots 2
 - Simple Memory Expansion 3
 - Dimensions 3
- SX CAT Specifications 4

Chapter 2 Installation 5

- Step 1 Set Initial Switch Settings 7
- Step 2 Install Math Coprocessor (Optional) 8
- Step 3 Install SIMM Memory 8
- Step 4 Install the Motherboard 9
- Step 5 Install and Connect Power Supply 10
- Step 6 Install External Battery (Optional) 10
- Step 7 Connect Cables 11
- Step 8 Install Adapter Cards (Optional) 11
- Step 9 Install Floppy Disk Drives 14
- Step 10 Connect the Hard Disk Drive 15
- Step 11 Perform Initial Test and Configuration 15

Chapter 3 AMIBIOS Power-On Self Test 17

- POST Phases 17
- BIOS Error Reporting 17
- BIOS Beep Codes 18
- AMIBIOS Beep Codes 18
- AMIBIOS Non-Fatal Error Messages 19
- POST Memory Test 21

Chapter 4 AMIBIOS Setup 23

- Section 1 Running AMIBIOS Setup 25
 - Setup Key Usage 26
 - Main Menu Setup Options 27
 - Auto Configuration With BIOS Defaults 27
 - Auto Configuration With Power-On Defaults 28
 - Write to CMOS and Exit 28
 - Do Not Write to CMOS RAM and Exit 28
- Section 2 STANDARD CMOS SETUP 29
 - Date And Day Configuration 29
 - Hard Disk Configuration 30
 - Hard Disk Parameter Table 31
 - Floppy Drive A and B: 32
 - Monitor 32

Keyboard 32

Table of Contents, Continued

Chapter 4 AMIBIOS Setup, cont'd

Section 3 ADVANCED CMOS SETUP	33
Typematic Rate Programming, Rate, and Delay	34
Memory Test Tick Sound	35
Memory Parity Error Check	35
Wait for <F1> If Any Error	37
System Boot Up Num Lock	37
Weitek Processor(s)	37
Floppy Drive Seek At Boot	37
System Boot Up Sequence	38
System Boot UP CPU Speed	38
Password Check Option	38
Fast Gate A20 Option	38
Section 4 ADVANCED CHIPSET SETUP	41
Section 5 AMIBIOS Password Support	49
Section 6 Hard Disk Utility	51
When to Use AMIBIOS Hard Disk Utilities	52
Hard Disk Format Utility	53
Auto Interleave Utility	56
Media Analysis Utility	59
Hard Disk Utility Error Messages	61

Chapter 5 Technical Description 63

J1 - J13 ISA Bus Connectors	64
16-Bit ISA Extension Pinout	65
J14 and J15 COM2 and COM1 Serial Port	65
J16 Keyboard Connector	66
J17 Floppy Disk Connector	67
J18 Parallel Port Connector	68
J19 Offboard Battery Connector	69
J20 IDE Connector	70
J21 Reset Connector	71
J22 Speaker Connector	71
J23 Keylock/Front Panel Connector	71
J24 IDE Activity LED Connector	71
J25 Turbo Speed LED Connector	72
J26 Turbo Speed Switch Connector	72
W3 Jumper for 4 MB SIMMs	72
P8 and P9 Power Supply Connectors	73
U15 BIOS Socket	74
U16 Keyboard Controller	74
SW1 Configuration Switch	75
Onboard SIMM Sockets	76
SX CAT Memory Organization/Usage	77
SX CAT Memory Map	78

Preface

To the OEM

Thank you for purchasing the SX CAT 80386SX AT- compatible motherboard from American Megatrends. This product is a state of the art 80386SX-based motherboard that includes the famous Hi-Flex AMIBIOS. It is assumed that you have also licensed the rights to use the American Megatrends SX CAT documentation.

This manual was written for the OEM to assist in the proper installation, use, and operation of the SX CAT motherboard. This manual is not meant to be read by the computer owner who purchases a computer with the SX CAT motherboard. It is assumed that you, the computer manufacturer, will use this manual as a sourcebook of information, and that parts of this manual will be included in the computer owner's manual.

Technical Support

If an SX CAT motherboard fails to operate as described or you are in doubt about a configuration option, please call technical support at 404-246-8600.

Acknowledgments

This manual was written by Robert Cheng and Paul Narushoff. The writers gratefully acknowledge the assistance of Uma S. Mondal and Vivek Saxena.

American Megatrends BBS

The American Megatrends BBS permits end users, OEMs, VARs, and system integrators to access technical information about American Megatrends motherboard, peripheral, and BIOS products. American Megatrends Product Engineering Change Notices, Tech Tips, and technical documentation are available on the BBS. Some parts of the BBS are not accessible to all callers. Call American Megatrends Technical Support at 404-246-8600 to find out how to access additional BBS information.

Data Transmission Rates

The American Megatrends BBS automatically handles modems with data transmission rates from 1,200 to 14,400 bps.

If using an HST modem, call 404-246-8780.

If using a non-HST modem, call 404-246-8782.

BBS Phone Numbers

The following table lists the characteristics of the American Megatrends BBS phone numbers. The American Megatrends BBS requires no parity, 8 data bits, and 1 stop bit.

Phone Number	Characteristics
404-246-8780	Supports HST and v.42bis.
404-246-8781	Supports HST and v.42bis.
404-246-8782	Dual standard. Can handle 2400 or 9600 bps. Supports v.32bis and v.42bis. Can handle up to 14,400 baud.
404-246-8783	Supports v.32bis and v.42bis.

Chapter 1

Introduction

Features

The SX CAT is an integrated AT®-compatible computer motherboard that uses the Intel® 80386SX microprocessor. The 80386SX provides the affordability of a 16-bit computer with the power of the 32-bit 80386DX. The SX CAT includes an AMIBIOS specifically tailored for the Chips and Technologies® SCAT-SX® chipset.

On the SX CAT, the control logic necessary for the basic AT computer functions have been compressed into one Chips and Technologies, Inc®. chip, the C&T 82C836. Another chip, the C&T 82C711, handles basic input/output functions such as serial, parallel, floppy disk and IDE hard disk drive control. Fewer components translates into a more reliable, higher price/performance design.

Microprocessor Speeds

The SX CAT motherboard is available in either 16 MHz or 20 MHz versions depending on the version of the 80386SX processor is installed.

The I/O bus runs at ½ the CPU speed to be compatible with the original AT design. The processor runs at either the normal clock speed or one-half clock speed for software compatibility.

SX CAT Features, Continued

Built-in I/O

The SX CAT contains built in input/output controllers to save both money and system setup time. The controllers include:

- two serial ports,
- one parallel printer port, a
- dual floppy drive interface that can be configured for low or high density, 3½ or 5¼ inch drives, and an
- Integrated Device Electronics (IDE) controller for an industry standard hard disk drive.

The controllers can be configured by the AMIBIOS Setup.

CMOS RAM

The BIOS Setup configuration settings are saved in CMOS RAM. CMOS RAM and the clock and calendar are powered by a built-in rechargeable 3.6V Ni-Cad battery.

System Expansion I/O Slots

In addition to these built in functions, the SX CAT motherboard has seven I/O slots (six 16-bit and one 8-bit) for further system expansion. These slots can be used for video graphics or other peripheral cards.

SX CAT Features, Continued

Simple Memory Expansion

The SX CAT motherboard provides easy memory expansion using industry standard SIMMs (Single In-Line Memory Modules). These modules can be either 1 MB x 9, 256 KB x 9, or 4 MB x 9. At least two SIMMs must be installed, but performance improves with four or more SIMMs. See *Chapter 5 Technical Description* on page for more detailed information about memory configuration.

Required Memory Speeds

Microprocessor speed	Memory Speed
16 MHz	100 ns or faster.
20 MHz	80 ns or faster.

Convenient, Reliable, Compatible Package

The SX CAT motherboard provides an easy-to-expand foundation based on a few integrated circuits assembled using state of the art surface mount technology, which reduces cost, minimizes potential handling damage and reduces the overall size.

Dimensions

The SX CAT motherboard is approximately 8.55 inches wide and 12 inches long. It contains the standard mounting holes of the Baby AT format.

The SX CAT is 100% IBM® AT-compatible and works with all IBM standard expansion cards.

SX CAT Specifications

CPU	16 or 20 MHz Intel® 80386SX
Math Coprocessor	socket for 80387SX
Chipset	Chips and Technologies, Inc. 82C836 SCAT-SX CHIPSet
Memory Architecture	page mode, 2/4 bank interleave
Maximum RAM	up to 16 MB through ISA bus
Memory Speed	100 ns at 16 MHz 80 ns at 20 MHz
Wait States	0.3 wait states on page hit
640K-1 MB Use	used for Shadow RAM or relocated above 1 MB
RAM Configurations	512 KB, 1 MB, 1.5 MB, 2 MB, 3 MB, 4 MB, 5 MB, 6 MB, 8 MB, 9 MB, 10 MB, and 16 MB configurations.
Onboard I/O	Chips and Technologies, Inc. 82C711 two serial ports one parallel port floppy disk controller 16-bit IDE hard disk drive interface
Dimensions	Baby AT size - 8.65" x 12"
ISA Bus Slots	six 16-bit and one 8-bit slot
ISA Bus Speed	PROCLK/4, PROCLK/5, or PROCLK/6. PROCLK can be 32 MHz or 40 MHz.
Turbo Speed Mode	keyboard control with LED display (not available in 16 MHz version).
Compatibility	DOS, OS/2, Unix, Xenix, any other 80386-based operating system and all multiuser DOS operating systems.

Chapter 2

Installation

SX CAT installation is a simple procedure that is eased because most of the hardware jumpers and switch setting found on many motherboards have been removed. This chapter discusses how to connect the various connectors found in a typical computer chassis.

Installation Steps

The installation steps are shown in the following table. Each step is discussed in detail below.

Step	Action	Turn to
1	Set initial switch settings.	Page
2	Install math coprocessor. (Optional)	Page
3	Install SIMM memory.	Page
4	Install the motherboard in the case.	Page
5	Install and connect power supply.	Page
6	Install external battery. (Optional)	Page
7	Connect cables.	Page
8	Install adapter cards. (Optional)	Page
9	Install floppy drives.	Page
10	Connect hard disk drive	Page
11	Perform initial test and configuration.	Page

SX CAT Motherboard Diagram

Step 1 Set Initial Switch Settings

The only switch on the SX CAT motherboard is a four-switch DIP switch marked SW1. The typical setting would be:

- switches 1 and 2 closed (or ON), and
- switches 3 and 4 open (or OFF).

This setting configures an onboard battery, no additional wait states for IDE interface memory transfers and a monochrome or VGA® or EGA® adapter.

If using an offboard battery, additional wait states or CGA™ color adapter, see the following table for switch settings.

Switch	Description
SW1-1	Close (On) to enable Onboard Battery. Open (Off) to enable Offboard Battery.
SW1-2	Close (On) to Enable Battery. Open (Off) to Disable Battery. Must be closed for normal system operation.
SW1-3	Close (On) for addition wait states on IDE interface. Open (Off) for no additional wait states.
SW1-4	Close (On) for Color Adapter. Open (Off) for Monochrome Adapter. This switch setting does not matter when using VGA or EGA adapters.

Step 2 Install Math Coprocessor (Optional)

A math coprocessor chip can speed certain application programs such as desktop publishing, Computer-Aided Design, and spreadsheets.

The SX CAT contains a socket for an 80387SX coprocessor. The math coprocessor must be the same speed as the main processor (either 16 MHz or 20 MHz). Match up the chamfered edge with the socket U27 and carefully press the chip into the socket. The math coprocessor is supplied separately.

Step 3 Install SIMM Memory

Memory should be installed as SIMMs rather than in adapter cards because SIMM memory can be accessed faster. The SIMM modules should be the proper speed for the microprocessor. The system must have an even number of SIMM modules (two, four, six, or eight). The minimum number of SIMMs is two. For maximum speed, SIMM modules should be installed in groups of four. Each group of two modules is a bank. 256 KB x 9, 1 MB x 9 or 4 MB x 9 SIMMs can be used. Both modules in a given bank must be the same size. If 256 KB x 9 modules are used, place them in the lower banks first. Refer to the technical description on page for the possible memory combinations.

Step 3 Install SIMM Memory, Continued

Installing SIMMs

SIMMs must be installed or removed with care to make sure that the sockets are not damaged. The latching tabs on the sockets must be handled carefully so as to not break them off. Make sure the SIMMs are firmly in place for reliable operation. Make sure that the modules do not interfere with adjacent expansion slots.

Install the SIMMs by gently sliding them into the socket. Tilt the SIMMs in the direction away from the latching tangs. Once the modules are seated, move them towards the tangs until they snap in place. This does not require much force. The SIMMs are keyed so that it is not possible to install them incorrectly.

Step 4 Install the Motherboard

The motherboard can be installed in the case after the SIMMs are installed. The motherboard should be oriented so that the keyboard connector and the expansion slot connectors are near the back of the case. The SX CAT motherboard is not supplied with mounting hardware, which normally comes with the case. The hardware typically contains screws and standoffs to firmly mount the chassis as well as insulate it from the case. At least one of the mounting holes must have a metal standoff that securely grounds the motherboard to the chassis.

Step 5 Install and Connect Power Supply

The power supply should match the physical configuration of the chassis. Make sure that the power switch is Off.

Before plugging everything in, make sure that the proper voltage has been selected. Power supplies often can run on a wide range of voltages, but must be set (usually with a switch) to the proper range. Use at least a 200 watt (or larger) power supply, which should have built-in filters to suppress radiated emissions. The filters help pass the appropriate FCC certification testing.

The power supply is connected to P8 and P9 on the motherboard. The connectors should be keyed to prevent mistakes. The keys on the connector must be cut to fit in some power supplies.

Step 6 Install External Battery (Optional)

The SX CAT uses a self-contained Ni-Cad battery to keep the configuration memory alive while the power is turned off. In ordinary circumstances, no other battery would be required. If an external battery is desired, it should be connected to J19 and switch SW1-1 should be opened (Off) to enable the offboard battery.

Step 7 Connect Cables

The following cables should be connected to the motherboard from the chassis:

- Reset Switch.
- Speaker should be connected to J22.
- Keylock switch and power on indicator connect to J23.
- Hard disk activity indicator connect to J24 unless an adapter card-based controller is used for the disk drive, in which case, attach the connector to the appropriate place on the option board.
- Turbo LED indicator connects to J25.
- Turbo switch connects to J26.

Step 8 Install Adapter Cards (Optional)

If using an adapter card disk controller, install it in the 16-bit slot closest to the keyboard connector. Installing the disk controller in this slot improves the timing margin slightly. The other slots can then be used on a best fit basis for the other cards.

The SX CAT motherboard contains several peripheral controllers. For maximum efficiency, these controllers should be used instead of adapter cards. The motherboard supplies controllers for two serial ports, one parallel port, floppy disks, and an IDE hard disk drive controller. Use AMIBIOS Setup to disable the controllers if you do not want to use them. The self-contained controllers are easily used by simply connecting the appropriate cable to the device.

The serial and parallel functions are connected using a simple ribbon cable that connects to J15 (serial port 1), J14 (serial port 2) or J18 (parallel port). Note the orientation of pin 1 of the connectors. This end of the connector typically is located near the edge of the cable with the red stripe on the ribbon cable. These cables are supplied with the SX CAT.

Step 8 Install Adapter Cards, Continued

16-Bit ISA Extension Pinout

The following 16-bit pins are an extension of the 8-bit board layout and are used in conjunction with the 8-bit board standard pins.

Pin	Use	Pin	Use
C1	SBHE-	D1	MEMCS16-
C2	LA23	D2	IOCS16-
C3	LA22	D3	IRQ10
C4	LA21	D4	IRQ11
C5	LA20	D5	IRQ12
C6	LA19	D6	IRQ13
C7	LA18	D7	IRQ14
C8	LA17	D8	DACK0-
C9	MEMR-	D9	DREQ0
C10	MEMW-	D10	DACK5-
C11	SD08	D11	DREQ5
C12	SD09	D12	DACK6-
C13	SD10	D13	DREQ6
C14	SD11	D14	DACK7-
C15	SD12	D15	DREQ7
C16	SD13	D16	+5
C17	SD14	D17	MASTER-
C18	SD15	D18	GND

Step 8 Install Adapter Cards, Continued

8-Bit ISA Slot Pinout

Pin	Use	Pin	Use
A1	IOCHCK-	B1	GND
A2	SD07	B2	RSTDRV
A3	SD06	B3	+5
A4	SD05	B4	IRQ9
A5	SD04	B5	-5
A6	SD03	B6	DREQ2
A7	SD02	B7	-12
A8	SD01	B8	OVS-
A9	SD00	B9	+12
A10	IOCHRDY	B10	GND
A11	AEN	B11	SMEMW-
A12	SA19	B12	SMEMR-
A13	SA18	B13	IOW-
A14	SA17	B14	IOR-
A15	SA16	B15	DACK3-
A16	SA15	B16	DREQ3
A17	SA14	B17	DACK1-
A18	SA13	B18	DREQ1
A19	SA12	B19	REF-
A20	SA11	B20	SYSCLK
A21	SA10	B21	IRQ7
A22	SA09	B22	IRQ6
A23	SA08	B23	IRQ5
A24	SA07	B24	IRQ4
A25	SA06	B25	IRQ3
A26	SA05	B26	DACK2-
A27	SA04	B27	T/C
A28	SA03	B28	BALE

A29	SA02	B29	+5
A30	SA01	B30	OSC
A31	SA00	B31	GND

Step 9 Install Floppy Disk Drives

The floppy drives should be attached to the chassis using the mounting hardware supplied with the drives or the chassis. The drives may need mounting guides before they can be attached to the chassis. Mounting guides should be supplied with either the drive or the chassis. The floppy controller on the SX CAT motherboard supports up to two floppy disk drives. The floppy drive cable connects to J17 and is supplied separately. Only twisted floppy cables can be used. Set both drives to ID 1. The connector at the far end of the cable then connects to the first floppy drive (A:) and the other connector connects to the second drive (B:).

Step 10 Connect the Hard Disk Drive

The IDE hard disk drive contains its own controller, a separate hard disk drive controller adapter card is not needed. The interconnection between the drive and the motherboard via a simple ribbon cable connected to J20. This cable is supplied separately.

Remember to check the location of pin 1 of each connector to ensure proper installation.

Review

Review the necessary jumper and switch settings for any additional cards. Don't forget to install the necessary blank panels on the back of the chassis. Failing to install the covers permits electromagnetic energy to escape, possibly causing interference with nearby electronic devices.

Step 11 Perform Initial Test and Configuration

Plug everything in and turn on the switch. If there are any signs of a problems, turn off the unit immediately.

The monitor should come on. The BIOS Power On Self Test (POST) should run. If POST does not run successfully, it beeps or displays error messages. If the unit needs to be configured, instructions on how to enter Setup are displayed.

If configuration is necessary, run the BIOS Setup utility, provide the requested information and save the configuration data in CMOS RAM. The system then resets, runs POST, and boots the operating system.

Step 11 Perform Initial Test and Configuration, Continued

In Case of Errors

If the system beeps during POST (power on self test), a serious problem exists with the system configuration or hardware. The beeps are part of a Beep Code (see Page) that almost always indicates a fatal error. A fatal error may indicate a bad part, but most often it means that you must run Setup to reconfigure, or just make sure all the connections are plugged in correctly.

An error message can appear on the monitor if the error is nonfatal. See page for nonfatal errors. Recheck the system configuration or the connections to assure that the installation procedures were followed.

Chapter 3

AMIBIOS Power-On Self Test

Overview

The AMIBIOS (Basic Input Output System) provides all IBM standard POST routines, as well as enhanced AMIBIOS POST routines. POST supports CPU internal diagnostics. POST codes are accessible via the Manufacturing Test Port (I/O Port 80h).

POST Phases

When the system is powered on, the AMIBIOS runs Power-On Self Test (POST), which has two phases:

System Test and Initialization (test and initialize motherboards for normal operations) and

System Configuration Verification (compare defined configuration with hardware actually installed).

BIOS Error Reporting

The AMIBIOS performs the various diagnostic checks at the time the system is powered up; if an error is encountered, the error are reported in one of two ways:

if...	then...
the error occurs before the display device is initialized,	a series of beeps sound. Beep codes indicate that a fatal error has occurred. The AMIBIOS Beep Codes are described on the next page.
the error occurs after the display device is initialized,	the error message is displayed. Non-fatal BIOS error messages are explained below. A prompt to press <F1> can also appear with non-fatal errors.

BIOS Beep Codes

Errors may occur during POST (Power On Self Test), performed every time the system is powered on. Fatal errors are communicated through a series of audible beeps. All errors except Beep Code 8 are fatal errors. Fatal errors do not allow the system to continue the boot process. Consult the component manufacturer for possible repairs if a fatal error occurs.

Non-fatal errors are those which, in most cases, allow the system to continue the boot process. They are normally displayed on the screen. The non-fatal BIOS error messages are shown on page .

AMIBIOS Beep Codes

The following table contains all AMIBIOS beep codes. Except for Beep Code 8, they are always fatal.

Beeps	Error message	Description
1	Refresh Failure	The memory refresh circuitry on the motherboard is faulty.
2	Parity Error	Parity error in base memory.
3	Base 64 KB Memory Failure	Memory failure in first 64 KB.
4	Timer Not Operational	Memory failure in base memory, or Timer 1 on the motherboard is not functioning.
5	Processor error	The CPU on the motherboard generated an error.
6	8042 - Gate A20 Failure	Gate A20 on the keyboard controller (8042) allows the CPU to operate in protected mode. Cannot switch to protected mode.
7	Processor Exception Interrupt Error	The CPU generated an exception interrupt.
8	Display Memory Read/Write Error	The system video adapter is either missing or its memory is faulty. This is not a fatal error.
9	ROM Checksum Error	The ROM checksum value does not match the value in the BIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for CMOS RAM has failed.

AMIBIOS Non-Fatal Error Messages

Errors are displayed in the following format:

```
ERROR Message Line 1
ERROR Message Line 2
Press the <F1> key to continue
```

is displayed and the system halts. The system does not halt if *Wait for <F1> If Any Error* in *ADVANCED CMOS SETUP* is *Disabled*. If a second message appears, it is

```
RUN SETUP UTILITY.
```

Press <F1> to run AMIBIOS Setup.

Error Message	Explanation
8042 Gate-A20 Error	Gate A20 on the keyboard controller (8042) is not working. Replace the 8042.
Address Line Short!	Error in the address decoding circuitry on the motherboard.
C: Drive Error	No response from drive C:.. Run the Hard Disk Utility and check the C: hard disk type in STANDARD CMOS SETUP.
C: Drive Failure	No response from hard disk drive C:.. It may be necessary to replace the hard disk.
Cache Memory Bad, Do Not Enable Cache!	Cache memory on the motherboard is defective. Run AMIDdiag.
CH-2 Timer Error	Most AT motherboards include two timers. There is an error in timer 2.
CMOS Battery State Low	CMOS RAM is powered by a battery. The battery power is low. Replace the battery.
CMOS Checksum Failure	After CMOS RAM values are saved, a checksum value is generated for error checking. This message appears if the previous value is different from the current value. Run AMIBIOS Setup.
CMOS System Options Not Set	The values stored in CMOS RAM are either corrupt or nonexistent. Run AMIBIOS Setup.
CMOS Display Type Mismatch	The video type in CMOS RAM does not match the type detected by the BIOS. Run AMIBIOS Setup.
CMOS Memory Size Mismatch	The amount of memory on the motherboard is different than the amount in CMOS RAM. Run AMIBIOS Setup.
CMOS Time and Date Not Set	Run STANDARD CMOS SETUP to set the date and time in CMOS RAM.

D: Drive Error	No response from drive D:. Run the Hard Disk Utility and check the D: hard disk type in STANDARD CMOS SETUP.
D: drive failure	No response from hard disk drive D:. It may be necessary to replace the hard disk.
Diskette Boot Failure	The boot diskette in floppy drive A: is corrupt. It cannot be used to boot the system. Use another boot diskette and follow the screen instructions.
Display Switch Not Proper	Some systems require a video switch on the motherboard be set to either color or monochrome. Turn the system off, set the switch properly, then power on.
DMA Error	Error in the DMA controller on the motherboard.
DMA #1 Error	Error in the first DMA channel on the motherboard.
DMA #2 Error	Error in the second DMA channel on the motherboard.
FDD Controller Failure	The BIOS cannot communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered down.
HDD Controller Failure	The BIOS cannot communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.
INTR #1 Error	Interrupt channel 1 failed POST.
INTR #2 Error	Interrupt channel 2 failed POST.
Invalid Boot Diskette	The BIOS can read the diskette in floppy drive A:, but it cannot boot the system with it. Use another boot diskette and follow the screen instructions.
Keyboard Is Locked...Unlock It	The keyboard lock on the system is engaged. The system must be unlocked to continue the boot process.
Keyboard Error	Timing problem with the keyboard. Make sure an American Megatrends Keyboard Controller BIOS is installed. Set the <i>Keyboard</i> option in STANDARD CMOS SETUP to <i>Not Installed</i> to skip keyboard POST routines.
KB/Interface Error	Error in the keyboard connector on the motherboard.
No ROM BASIC	Cannot find a proper bootable sector on either diskette drive A: or hard disk drive C:. The BIOS cannot find ROM Basic.
Off Board Parity Error	Parity error in offboard memory. The format is: OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) XXXX is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.
On Board Parity Error	Parity error in motherboard memory. The format is: ON BOARD PARITY ERROR ADDR (HEX) = (XXXX) XXXX is the hex address where the error occurred. Run AMIDiag to find and correct memory problems.

Parity Error ????	Parity error at an unknown address in system memory. Run AMIDiag to find and correct memory problems.
-------------------	---

POST Memory Test

Normally, the only visible POST routine is the memory test. The screen that appears when the system is powered on is shown below.

A BIOS Identification string is displayed at the left bottom corner of the screen, below the copyright message. Press <Ins> during system boot to display two additional BIOS ID strings. These strings contain the options installed in the AMIBIOS.

If a problem occurs with the system, copy the BIOS ID strings on a sheet of paper before consulting Technical Support. Set *Wait for <F1> If any Error in ADVANCED CMOS SETUP to Enabled*.

When a problem occurs, freeze the screen by powering on the system and holding a key down on the keyboard to cause a *Keyboard Error* message. The following is displayed after POST is completed:

Hit if you want to run SETUP

Press to access AMIBIOS Setup.

BIOS Configuration Summary Screen

The AMIBIOS displays the following screen when the POST routines are successfully completed.

System Configuration (C) Copyright 1985-1991 American Megatrends Inc.			
Main Processor	: 80386SX	Base Memory Size	: 640 KB
Numeric Coprocessor	: Present	Ext. Memory Size	: 7808 KB
Floppy Drive A:	: 1.2 MB ½	Hard Disk C: Type	: 44
Floppy Drive B:	: 1.44 MB ¼	Hard Disk D: Type	: None
Display Type:	: VGA or EGA	Serial Port(s)	: 3F8
ROM-BIOS Date:	: 05/01/91	Parallel Port(s)	: 378

Chapter 4

AMIBIOS

BIOS Features

The AMIBIOS has several features that can be accessed at any time.

Keyboard Speed Switching

The end user can increase processor speeds at any time by pressing <Ctrl> <Alt> <+>. Processor speed can be decreased by pressing <Ctrl> <Alt> <->. Of course, the OEM can modify these keystroke combinations through AMIBCP. The above values are merely the default settings.

Setup

AMIBIOS Setup is divided into three parts:

- STANDARD CMOS SETUP,
- ADVANCED CMOS SETUP, and
- Advanced Chipset Setup

AMIBIOS Setup, Continued

STANDARD CMOS SETUP

The AMIBIOS STANDARD CMOS SETUP utility permits the end user to configure and set system components such as floppy drives, hard disk drives, time and date, monitor type, and keyboard. These features are discussed in Section 2 on page .

ADVANCED CMOS SETUP

ADVANCED CMOS SETUP allows the end user to configure more advanced parts of memory configuration, peripheral support, and power management support. ADVANCED CMOS SETUP is discussed in Section 3 on page .

ADVANCED CHIPSET SETUP

ADVANCED CHIPSET SETUP configures chipset-specific features and is discussed in Section 4 on page .

Default Settings

Every option in AMIBIOS Setup contains two default values: a power-on default and the BIOS Setup default value.

Power-On Defaults

The power-on default settings consist of the safest set of parameters. Use them if the system is behaving erratically. They should always work but do not provide optimal system performance characteristics.

Setup Defaults

The BIOS Setup default values provide optimum performance settings for all devices and system features.

Section 1

Running AMIBIOS Setup

A record of the system configuration parameters (such as amount of memory, disk drives, video displays, and numeric coprocessors) is stored in CMOS RAM. When the computer is turned off, a back-up battery provides power to CMOS RAM, which retains the system parameters.

Each time the system is powered-on, it is configured with these values, unless CMOS RAM has been corrupted. AMIBIOS Setup resides in the ROM BIOS and is available each time the computer is turned on.

If CMOS RAM becomes corrupted, the system is configured with the default values stored in this ROM file. There are two sets of BIOS values stored in the ROM file: the BIOS Setup default values and the Power-On default values.

Running AMIBIOS Setup

When POST has completed, the following message appears:

Hit if you want to run SETUP

Press to run AMIBIOS Setup.

Setup Key Usage

Keystroke	Action
<Esc>	Returns to previous screen.
→, ←, ↑, ↓	Move the cursor from one option to the next.
<PgUp> and <PgDn>; <Ctrl><PgUp> <Ctrl><PgDn>	Modify the default value of the options for the highlighted parameter. If there are fewer than 10 options, <Ctrl> <PgUp> and <Ctrl> <PgDn> operate like <PgUp> and <PgDn>.
<F1>	Displays Help.
<F2>	Change background colors.
<F3>	Change foreground colors.
<F5>	Restores the values resident when the current Setup session began. These values are taken from CMOS RAM if CMOS RAM was uncorrupted at the start of the session. Otherwise, they are the BIOS Setup default values.
<F6>	Loads all features in the ADVANCED CMOS SETUP/ADVANCED CHIPSET SETUP with the BIOS Setup defaults.
<F7>	Loads all features in the ADVANCED CMOS SETUP/ADVANCED CHIPSET SETUP with the Power-On defaults.
<F10>	Saves all changes made to Setup and returns to DOS.

Note: The default value for <F5>, <F6>, and <F7> is always N. To execute these options, change the N to Y and press <Enter>.

Main Menu Setup Options

The AMIBIOS Setup Main Menu options are shown below.

Each option is explained in detail in this section.

Warning Message

A warning is displayed every time you choose STANDARD CMOS SETUP, ADVANCED CMOS SETUP, or ADVANCED CHIPSET SETUP. Press any key to continue.

Auto Configuration With BIOS Defaults

Auto Configuration With BIOS Defaults uses the default system values. The BIOS default value are best-case values that should optimize system performance. If CMOS RAM is corrupted, the BIOS defaults is automatically loaded. To use the BIOS defaults, type Y and press <Enter>. The following appears:

Default values loaded. Press any key to continue.

Auto Configuration With Power-On Defaults

This option configures the default Power-On values, worst-case values for system performance, but are the most stable values that can be chosen. Use this option as a diagnostic aid if the system is behaving erratically. Type *Y* and press <Enter> to use the Power-On defaults. The following appears:

Default values loaded. Press any key to continue.

Write to CMOS and Exit

The features selected and configured in AMIBIOS Setup are stored in CMOS RAM when this option is selected. A CMOS RAM checksum is calculated and written to CMOS RAM. Control is then passed to the ROM BIOS.

Press *N* and <Enter> to return to the Main Menu. Press *Y* and <Enter> to save the system parameters and continue the boot process.

Do Not Write to CMOS RAM and Exit

This option passes control to the ROM BIOS without writing any changes to CMOS RAM. Press *N* and <Enter> to return to the Main Menu. Press *Y* and <Enter> to continue the boot process without saving any system parameters.

Section 2

STANDARD CMOS SETUP

STANDARD CMOS SETUP is the first option on the Main Menu. Press <Enter> at the highlighted selection to display this option. The following screen appears.

STANDARD CMOS SETUP Options

Date And Day Configuration

Move the cursor to the Date field with the arrow keys and set the Date and Day by pressing <PgUp> and <PgDn> to change the values. Ranges for each value are shown in the lower left corner of the STANDARD CMOS SETUP Screen.

Time Configuration

Move the cursor to the Time field with the arrow keys and set the time by pressing <PgUp> and <PgDn> to change values. Uses 24 hour clock format, i.e., for PM numbers, add 12 to the hour. Enter 4:30 P.M. as 16:30:00.

STANDARD CMOS SETUP Options, Continued

Hard Disk Configuration

Hard disk drive types are identified by the following parameters:

Parameter	Description
Type	The number designation for a drive with certain identification parameters.
Cylinders	The number of cylinders in the disk drive.
Heads	The number of heads.
Write Precompensation	The size of a sector gets progressively smaller as the track diameter diminishes. Yet each sector must still hold 512 bytes. Write precompensation circuitry on the hard disk compensates for the physical difference in sector size by boosting the write current for sectors on inner tracks. This parameter is the track number where write precompensation begins.
Landing Zone	This number is the cylinder location where the heads normally park when the system is shut down.
Sectors	The number of sectors per track. Hard drives that use MFM have 17 sectors per track. RLL drives have 26 sectors per track. ERL and ESDI drives have 34 sectors per track.
Capacity	The formatted capacity of the drive based on the following formula: $(\text{Number of heads}) \times (\text{Number of cylinders}) \times (17 \text{ sectors per cylinder}) \times (512 \text{ bytes per sector})$

STANDARD CMOS SETUP Options, Continued

Hard Disk Parameter Table

Type	Cylinders	Heads	Write Precompensation	Landing Zone	Sectors	Capacity
1	306	4	128	305	17	10 MB
2	615	4	300	615	17	20 MB
3	615	6	300	615	17	31 MB
4	940	8	512	940	17	62 MB
5	940	6	512	940	17	47 MB
6	615	4	65535	615	17	20 MB
7	462	8	256	511	17	31 MB
8	733	5	65535	733	17	30 MB
9	900	15	65535	901	17	112 MB
10	820	3	65535	820	17	20 MB
11	855	5	65535	855	17	35 MB
12	855	7	65535	855	17	50 MB
13	306	8	128	319	17	20 MB
14	733	7	65535	733	17	43 MB
16	612	4	0	663	17	20 MB
17	977	5	300	977	17	41 MB
18	977	7	65535	977	17	57 MB
19	1024	7	512	1023	17	60 MB
20	733	5	300	732	17	30 MB
21	733	7	300	732	17	43 MB
22	733	5	300	733	17	30 MB
23	306	4	0	336	17	10 MB
24	925	7	0	925	17	54 MB
25	925	9	65535	925	17	69 MB
26	754	7	754	754	17	44 MB
27	754	11	65535	754	17	69 MB
28	699	7	256	699	17	41 MB
29	823	10	65535	823	17	68 MB
30	918	7	918	918	17	53 MB
31	1024	11	65535	1024	17	94 MB
32	1024	15	65535	1024	17	128 MB
33	1024	5	1024	1024	17	43 MB
34	612	2	128	612	17	10 MB
35	1024	9	65535	1024	17	77 MB

36	1024	8	512	1024	17	68 MB
37	615	8	128	615	17	41 MB
38	987	3	987	987	17	25 MB
39	987	7	987	987	17	57 MB
40	820	6	820	820	17	41 MB
41	977	5	977	977	17	41 MB
42	981	5	981	981	17	41 MB
43	830	7	512	830	17	48 MB
44	830	10	65535	830	17	69 MB
45	917	15	65535	918	17	114 MB
46	1224	15	65535	1223	17	152 MB

STANDARD CMOS SETUP Options, Continued

Hard Disk Parameter Table, cont'd

Not Installed could be used for diskless workstations and SCSI hard disks. Type 47 can be used for both hard disks C: and D:. The parameters for type 47 under Hard Disk C: and Hard Disk D: can be different, allowing two different user-definable hard disk types.

Floppy Drive A and Floppy Drive B:

The settings are *360 KB 5¼ inch*, *1.2 MB 5¼ inch*, *720 KB 3½ inch*, *1.44 MB 3½ inch*, or *Not Installed*, which could be used for diskless workstations, since it prevents the generation of missing floppy messages.

Monitor

The settings are *Monochrome*, *Color 40x25*, *VGA/PGA/EGA*, *Color 80x25*, or *Not Installed*, which could be used for network file servers, since it prevents the display of missing monitor messages.

Keyboard

The settings are *Installed* or *Not Installed*.

Section 3

ADVANCED CMOS SETUP

The ADVANCED CMOS SETUP options are:

Typematic Rate Programming,
Typematic Rate Delay,
Typematic Rate (Chars/Sec),
Above 1 MB Memory Test,
Memory Test Tick Sound,
Memory Parity Error Check,
Hit Message Display,
Hard Disk Type 47 RAM Area,
Wait For <F1> If Any Error,
System Boot Up Num Lock,
Weitek Processor,
Floppy Drive Seek At Boot,
System Boot Up Sequence,
System Boot Up CPU Speed,
Fast Gate A20 Option,
Turbo Switch Function,
Password Checking Option, and
Video ROM Shadow C000,16K
Video ROM Shadow C400,16K,
Adaptor ROM Shadow C800,16K,
Adaptor ROM Shadow CC00,16K,
Adaptor ROM Shadow D000,16K,
Adaptor ROM Shadow D400,16K,
Adaptor ROM Shadow D800,16K,
Adaptor ROM Shadow DC00,16K
Adaptor ROM Shadow E000,16K,
Adaptor ROM Shadow E400,16K,
Adaptor ROM Shadow E800,16K,
Adaptor ROM Shadow EC00,16K, and
System ROM Shadow F000,64K.

Help Screens

ADVANCED CMOS SETUP has help screens, accessed by pressing <F1>, which displays the settings for a screen option.

Warning Message

A warning message is displayed when ADVANCED CMOS SETUP is selected. Press any key to continue.

ADVANCED CMOS SETUP

The ADVANCED CMOS SETUP screen is shown below.

ADVANCED CMOS SETUP Options

Typematic Rate Programming, Rate, and Delay

Typematic Rate Programming enables or disables the following two options. Typematic Rate Delay and Typematic Rate control the speed at which a keystroke is repeated. When a key is pressed and held down, the character is displayed, and after a delay set by the Typematic Rate Delay, repeats at a rate set by the Typematic Rate value. When two or more keys are pressed and held down simultaneously, only the last key pressed is repeated at the typematic rate. Repeating stops when the last key pressed is released, even if other keys are pressed.

Above 1 MB Memory Test

This feature, when enabled, executes the POST memory routines on RAM above 1 MB (if present on the system). If disabled, the BIOS only tests the first 1 MB of RAM. The settings are *Enabled* or *Disabled*.

ADVANCED CMOS SETUP Options, Continued

Memory Test Tick Sound

This option enables or disables the ticking sound during the memory test. The settings are *Enabled* or *Disabled*.

Memory Parity Error Check

If enabled, this option enables testing of memory parity in all RAM. The settings are *Enabled* or *Disabled*.

Hit Message Display

Disabling this option prevents the system from halting after

Hit if you want to run Setup

appears when the system boots. The settings are *Enabled* or *Disabled*.

ADVANCED CMOS SETUP Options, Continued

Hard Disk Type 47 RAM Area

You can specify a user-definable hard disk type for drive C: and drive D:. The type 47 drive parameters must be entered in STANDARD CMOS SETUP (see page). This option specifies the type 47 data storage area – *0:300h* in lower system RAM or in the *top 1 KB* of applications memory, starting at address 639K or 511K (depending on how much base memory the system has). Type 47 data is stored in shadow RAM if shadowing is enabled. The following graphic illustrates type 47 data storage.

ADVANCED CMOS SETUP Options, Continued

Wait for <F1> If Any Error

Before the system boots, the BIOS executes POST, a series of system diagnostic routines. If POST generates a non-fatal error and the system can still function, an appropriate error message is displayed followed by:

Press <F1> to continue.

If this option is disabled, the BIOS still displays the appropriate error message, followed by the F1 message, but the end user does not have to press <F1>. The settings are *Enabled* or *Disabled*.

System Boot Up Num Lock

You can turn off the Num Lock key when the system is powered on to allow you to use the arrow keys on both the numeric keypad and the Enhanced Keyboard. The settings are *On* or *Off*. The defaults are *On*.

Weitek Processor(s)

This option allows you to specify that the Weitek WTK3167 numeric processor is configured. The settings are *Present* or *Absent*. You must enable the math coprocessor in ADVANCED CMOS SETUP before you can use a Weitek 3167.

Floppy Drive Seek At Boot

This option allows you to disable the Seek instruction when booting from a floppy to allow a fast boot and to decrease the possibility of damage to the heads. The settings are *Enabled* or *Disabled*. The defaults are *Disabled*.

ADVANCED CMOS SETUP Options, Continued

System Boot Up Sequence

This option sets the disk drive boot sequence after the BIOS completes POST. The settings are *C:,A:* or *A:,C:*. The BIOS default is *C:,A:*. The Power-On default is *A:,C:*.

System Boot UP CPU Speed

Sets that the system boot speed. The settings are *High* or *Low*. The default speed is *low*.

Password Check Option

A password can be used to prevent unauthorized system boot or Setup use. This option enables the password check option. The settings are *Always* (a password is required every time the system boots), *Setup* (a password is required every time Setup is executed), or *Disabled*. See page for instructions on changing a password.

Fast Gate A20 Option

Gate A20 controls the ability to access memory addresses above 1 MB by enabling or disabling access to the processor address line A20. To remain XT-Compatible and be able to access conventional memory (from 0 - 1024K), address line A20 must always be low, so Gate A20 must be disabled. However, some software programs both enter protected mode and shut down through the BIOS. For this software, Gate A20 must be constantly enabled and disabled via the keyboard controller, which can slow processing considerably. Fast Gate A20 is an alternate method of enabling Gate A20 that permits access to memory addresses above 1 MB. Use Fast Gate A20 to speed Gate A20 enabling and disabling, which in turn speeds up programs that constantly change from addressing conventional memory to addressing memory addresses above 1 MB. For example, enabling this option makes programs such as network operating systems execute faster. The settings are *Enabled* or *Disabled*.

ADVANCED CMOS SETUP Options, Continued

Video ROM Shadow C000,16K **Video ROM Shadow C400,16K**

ROM shadow is a technique in which video BIOS code is copied from slower ROM to faster RAM. The video BIOS is then executed from the RAM. When enabled, the 16 KB memory segment at the address specified in the option title is shadowed from ROM to RAM and executed from RAM. The settings are *Enabled* or *Disabled*. The defaults are *Enabled*.

Adaptor ROM Shadow C800,16K, **Adaptor ROM Shadow CC00,16K,** **Adaptor ROM Shadow D000,16K,** **Adaptor ROM Shadow D400,16K,** **Adaptor ROM Shadow D800,16K,** **Adaptor ROM Shadow DC00,16K** **Adaptor ROM Shadow E000,16K,** **Adaptor ROM Shadow E400,16K,** **Adaptor ROM Shadow E800,16K,** **Adaptor ROM Shadow EC00,16K**

The 16 KB memory segment at each of the addresses specified in the above options can be shadowed from ROM to RAM. The settings are *Enabled* or *Disabled*. The defaults are *Disabled*.

System ROM Shadow F000,64K.

The system BIOS should always be shadowed. The settings are *Enabled* or *Disabled*. The defaults are *Enabled*.

Turbo Switch Function

This option enables the turbo switch. The settings are *Enabled* or *Disabled*. The defaults are *Enabled*.

Section 4

ADVANCED CHIPSET SETUP

The following screen appears when ADVANCED CHIPSET SETUP is selected from the Setup menu:

```
BIOS SETUP PROGRAM ADVANCED CHIPSET SETUP
(C) 1990 American Megatrends Inc., All Rights Reserved

On Board Serial Port 1 : Enabled
On Board Serial Port 2 : Enabled
On Board Parallel Port : Enabled
On Board Floppy Controller : Enabled
On Board IDE Controller : Enabled
Low CPU Clock Speed : CXIN/2
Bus Clock Select : PROCLK/4
DMA Clock Select : BCLK/2
Refresh Command Width : 280 ns
Coprocessor Ready Control : 80387SX
Additional RAM Wait State : Enabled
RAS Timeout Feature : Disabled
Extended Boundary : 1 MB
Global EMS Memory : Disabled
EMS I/O Port Access : Disabled
EMS Page Registers : EMS 0

ESC:Exit ↑→↓←:Sel (Ctrl)Pu/Pd:Modify F1:Help F2:Color
F5:Old Values F6:BIOS Setup Defaults F7:Power-On Defaults
```

ADVANCED CHIPSET SETUP Options

On Board Serial Port 1

This option enables or disables serial port 1 on the SX CAT motherboard. The settings are I/O ports 3F8h - 3FFh, I/O ports 3E8h - 3EFh, or Disabled.

If the configuration data stored in CMOS RAM is corrupted when the system is powered on, the system BIOS automatically configures onboard serial port 1 according to the presence or absence of serial ports on any adapter cards in the system expansion slots (offboard serial ports).

ADVANCED CHIPSET SETUP Options, Continued

On Board Serial Port 1, cont'd

Autoconfiguration only occurs when CMOS RAM data is corrupted. The result for serial port 1 is:

If the Offboard Serial Port is	the Onboard Serial Port 1 is Autoconfigured as	
None	3F8h	Can be disabled or changed to 3E8h via BIOS ADVANCED CHIPSET SETUP.
3F8h	3E8h	Can be disabled via BIOS ADVANCED CHIPSET SETUP. If changed to 3F8h, an I/O port address conflict occurs.
3E8h	3F8h	Can be disabled via BIOS ADVANCED CHIPSET SETUP. If changed to 3E8h, an I/O port address conflict occurs.
3F8h, 3E8h	Disabled	If changed to 3F8h or 3E8h, an I/O port address conflict occurs.

J15 is serial port 1 on the SX CAT motherboard. If disabled through Setup, do not attach any device to J15 or to any cable attached to J15. Onboard Serial Port 1 is hardwired to interrupt request line 4 (IRQ4). If Serial Port 1 is disabled through ADVANCED CHIPSET SETUP, then IRQ4 may be used by other adapter cards.

ADVANCED CHIPSET SETUP Options, Continued

On Board Serial Port 2

This option enables or disables serial port 2 on the SX CAT motherboard. The settings are I/O Ports 2F8h - 2FFh, I/O Ports 2E8h - 2EFh, or Disabled.

If the configuration data stored in CMOS RAM is corrupted when the system is powered on, the system BIOS automatically configures onboard serial port 2 according to the presence or absence of serial ports on any adapter cards in the system expansion slots (offboard serial ports).

Autoconfiguration only occurs when CMOS RAM data is corrupted. The result for serial port 2 is:

If the Offboard Serial Port is	the Onboard Serial Port 2 is Autoconfigured as	
None	2F8h	Can be disabled or changed to 2E8h via BIOS ADVANCED CHIPSET SETUP.
2F8h	2E8h	Can be disabled via BIOS ADVANCED CHIPSET SETUP. If changed to 2F8h, an I/O port address conflict occurs.
2E8h	2F8h	Can be disabled via BIOS ADVANCED CHIPSET SETUP. If changed to 2E8h, an I/O port address conflict occurs.
2F8h, 2E8h	Disabled	If changed to 2F8h or 2E8h, an I/O port address conflict occurs.

J14 is serial port 2 on the SX CAT motherboard. If disabled through Setup, do not attach any device to J14 or to any cable attached to J14. Serial Port 2 is hardwired to interrupt request line 3 (IRQ3). If Serial Port 2 is disabled through ADVANCED CHIPSET SETUP then IRQ3 may be used by other adapter cards.

ADVANCED CHIPSET SETUP Options, Continued

On Board Parallel Port

This option enables or disables the onboard parallel port. The settings are I/O ports 378h - 37Fh, I/O ports 278h - 27Fh, or Disabled. J18 is the onboard parallel port.

If the configuration data stored in CMOS RAM is corrupted when the system is powered on, the system BIOS automatically configures the onboard parallel port according to the presence or absence of parallel ports on any adapter cards in the system expansion slots (offboard parallel ports).

Autoconfiguration only occurs when CMOS RAM data is corrupted. The result for the onboard parallel port is:

If the Offboard Parallel Port is	the Onboard Parallel Port is Autoconfigured as	
None or 3BCh	378h	Can be disabled or changed to 278h via BIOS ADVANCED CHIPSET SETUP.
378h	278h	Can be disabled via BIOS ADVANCED CHIPSET SETUP. If changed to 378h, an I/O port address conflict occurs.
278h	378h	Can be disabled via BIOS ADVANCED CHIPSET SETUP. If changed to 278h, an I/O port address conflict occurs.
378h, 278h	Disabled	If changed to 378h or 278h, an I/O port address conflict occurs.

J18 is the parallel port on the SX CAT motherboard. If disabled through Setup, do not attach any device to J18 or to any cable attached to J18. The parallel port is hardwired to interrupt request line 5 (IRQ5). If the onboard parallel port is disabled through ADVANCED CHIPSET SETUP, IRQ5 may be used by other adapter cards.

ADVANCED CHIPSET SETUP Options, Continued

On Board Floppy Controller

The AMIBIOS detects if an external floppy disk controller is installed in the system. The onboard floppy controller is automatically enabled and disabled accordingly. The settings are Enabled or Disabled.. Make sure that the floppy cable is connected to J17 on the SX CAT motherboard.

On Board IDE Controller

Enable this option to use the onboard IDE hard disk drive controller. Make sure that the IDE cable is connected to J20 on the SX CAT motherboard. The AMIBIOS detects if an external hard disk controller is installed in the system. The onboard IDE controller is automatically enabled and disabled accordingly. However, when using a SCSI or ESDI controller with a built-in BIOS, the autodetect feature may not function properly and the onboard IDE controller must be disabled ed in ADVANCED CHIPSET SETUP. The settings are Enabled or Disabled.

Low CPU Clock Speed

There are four options available to set the low CPU Clock Speed. If *System Boot Up CPU Speed* is set to Low in ADVANCED CMOS SETUP, select CXIN, CXIN/2, CXIN/4, or CXIN/8 in this option. CXIN is the fastest setting; CXIN/8 is the slowest. The BIOS and Power-On defaults are CXIN/2.

Bus Clock Select

This option selects the source of the AT Bus Clock. The settings are PROCLK/4, PROCLK/5, or PROCLK/6. PROCLK is the processor clock, twice the rated microprocessor speed. For example, PROCLK is 32 MHz for a 16 MHz SX CAT motherboard and 40 MHz for a 20 MHz motherboard. The BIOS and Power-On defaults are PROCLK/4.

ADVANCED CHIPSET SETUP Options, Continued

DMA Clock Select

Allows the user to program the DMA clock to operate at either BCLK or BCLK/2 (BUS CLOCK). The BIOS and Power-On defaults are BCLK/2.

Refresh Command Width

This option specifies the command width during a refresh cycle. These pulse widths are derived from the oscillator. The settings are 140 ns, 210 ns, 280 ns, or 350 ns. The BIOS Default is 280 ns. The Power-On Default is 350 ns.

Coprocessor Ready Controlled By

This option determines whether READY is controlled by the C&T SCATSX (82C836) or the math coprocessor (80387SX) during coprocessor accesses. Settings are *80387SX generates READY* or *82C836 generates READY*. The BIOS and Power-On defaults are *80387SX generates READY*.

Additional RAM Wait State

Allows an additional T-state (two PROCLK cycles) to be inserted on all local memory accesses. The added T-state is added during the CAS (Column Address Strobe) active interval, extending the width of the CAS pulse. Settings are *Enabled* or *Disabled*. The defaults are *Enabled*.

RAS Timeout Feature

A RAS (Row Address Strobe) Timeout Feature is provided to support DRAMs that require a 10 microsecond maximum on RAS-active time. If the timeout is enabled, RAS is not allowed to remain low continuously for more than 9.5 microseconds. If the timeout is disabled, periodic refresh cycles limit the maximum possible RAS active time to 15 microseconds. Settings are *Enabled* or *Disabled*. The BIOS and Power-On Defaults are *Disabled*.

ADVANCED CHIPSET SETUP Options, Continued

EMS Options

The settings are *Enabled* or *Disabled*. You must have a software EMS driver (such as AMISeems) to use EMS memory and to configure EMS options. The defaults settings are *Disabled*.

Extended Boundary

Specifies the upper boundary of memory within the total memory defined. Memory residing above this boundary is accessible only via EMS. The settings are:

Settings	Settings	Settings
No boundary	4 MB	11 MB
1 MB No Extended Boundary	5 MB	12 MB
1.25 MB	7 MB	13 MB
1.5 MB	8 MB	15 MB
2 MB	9 MB	
3 MB	10 MB	

The BIOS and Power-On defaults are *No Boundary*.

Global EMS Memory

Activates EMS memory. The settings are *Enabled* or *Disabled*. The BIOS and Power-On defaults are *Disabled*.

EMS I/O Port Access

Determines access to EMS I/O ports. Settings are *Enabled* or *Disabled*. The BIOS and Power-On Defaults are *Disabled*.

EMS Page Registers

Specifies the I/O ports used to read and write EMS page registers. The settings are *EMS 0 = I/O ports 0208h, 0209h, and 020Ah*, or *EMS 1 = I/O ports 0218h, 0219h, or 021Ah*. The BIOS and Power-On Defaults are *EMS 0*.

Section 5

AMIBIOS Password Support

AMIBIOS Setup has an optional password feature. The system can be configured so the end user is required to enter a password every time the system boots, or whenever the end user runs Setup. The password function can also be disabled. If disabled, the prompt does not appear.

Changing a Password

The password check option is enabled or disabled in ADVANCED CMOS SETUP (Page). The password check function is enabled by choosing either *Always* or *Setup*.

Change Password generates an error message if the Password Checking Option is disabled in ADVANCED CMOS SETUP. You must enable Password Checking to change the password.

The password (1-6 characters) is stored in CMOS RAM. The default password (*AMI*) is stored in ROM and is only to be used if CMOS RAM is corrupted. The default password can be changed. To change a password, select the Change Password option from the main Setup screen and press <Enter>. Enter the default password *AMI* and press <Enter>. The typed characters do not display. After the current password has been correctly entered, the end user is asked to retype it.

If the password confirmation is incorrect, an error message appears. If the new password confirmation is entered without error, the end user presses <Esc> to return to the Main Setup menu. The password is stored in CMOS RAM after Setup completes. The next time the system boots, the end user is prompted for the password if the password function is present and has been enabled.

Changing A Password, Continued

Password Options Control Prompt

When and if the prompt appears is dependent upon the options chosen in ADVANCED CMOS SETUP. If *Always* was set in ADVANCED CMOS SETUP, the prompt appears when the system is powered on. If *Setup* was set in ADVANCED CMOS SETUP, the prompt does not appear when the system is powered on, but when AMIBIOS Setup is run. If *Disabled* was set in ADVANCED CMOS SETUP, the password prompt never appears.

Using a Password

The end user must enter the new password when the password prompt appears and press <Enter>. The end user should use the default password if CMOS RAM is corrupted.

The end user should keep a record of the new password when the password is changed. If he forgets the password and password protection is enabled, the only way to boot the system is to disable CMOS RAM by removing the battery for at least 20 minutes, replacing it, rebooting, and reconfiguring the system.

Section 6

Hard Disk Utility

Overview

The AMIBIOS includes three hard disk utilities:

Utility	Purpose	Turn to
Hard Disk Format	Performs a low level format of the hard drive(s). Read the system or hard disk drive documentation to find out if the hard disk has been preformatted.	Page
Auto Interleave	Determines the optimum interleave factor.	Page
Media Analysis	Analyzes each hard disk drive track to determine whether it is usable. The track is marked bad if unusable.	Page
Hard Disk Utility Error Messages	Explanations of all error messages that can be generated by the Hard Disk Utilities	Page

These routines work on drives that use the MFM, RLL, or ESDI data recording techniques. They do not work on IDE or SCSI drives.

Warning

The AMIBIOS Hard Disk Utilities destroy all hard disk data. Back up the data on the hard disk before running this utility.

When to Use AMIBIOS Hard Disk Utilities

When	Conditions	Run...
Installing a new hard disk.	The hard disk drive manufacturer provided a list of bad tracks, the system documentation includes the optimum interleave factor, and the drive is preformatted .	None
Installing a new hard disk.	You do not have a list of bad tracks.	Media Analysis
Installing a new hard disk.	You do not know the optimum interleave factor.	Auto Interleave
Installing a new hard disk.	The drive is not formatted.	Hard Disk Format
Installing a used hard disk drive.	N/A	All Hard Disk Utilities

When Hard Disk Diagnostics is selected, the following screen appears.

Select one of the three options and press <Enter>.

Hard Disk Format Utility

Warning

Hard Disk Format destroys all hard disk data. Back up the data on the hard disk before running this utility.

This routine do not work on IDE or SCSI drives. Use Hard Disk Format to integrate a new hard disk to the system, or to reformat a used hard disk that has developed bad tracks as a result of aging or poor handling. Select Media Analysis to find bad tracks.

When you press <Enter> at Hard Disk Format, the following screen appears.

Hard Disk Format Utility, Continued

Answer the questions on the screen. The first two questions are already completed if one disk was selected in STANDARD CMOS SETUP. Enter C or D in Disk Drive and press <Enter>. If only one drive was selected in STANDARD CMOS SETUP, the cursor will be at *Interleave*.

The Disk Drive Type is read from CMOS RAM. The Interleave factor can be selected manually or determined by Auto Interleave.

The hard disk drive manufacturer usually provides a list of bad tracks. Enter these tracks. They will then be marked as bad to prevent data from being stored on them.

The following screen is displayed after entering Y in Mark Bad Tracks, pressing <Enter>, and selecting add, delete, revise, or clear from the Bad Track Edit Menu.

Hard Disk Format Utility, Continued

Type *Y* and press <Enter>. The warning screen appears.

Warning

Once you type *Y* and press <Enter>, data on the hard drive will be irrevocably lost.

Auto Interleave Utility

Warning

Auto Interleave destroys hard disk data. Back up the data on the hard disk before running this utility.

Auto Interleave calculates the optimum interleave factor through trial and error by measuring the transfer rate for four different interleave values. To determine the best interleave factor, the system will format a portion of the hard disk for each transfer rate calculated. The cylinders, heads and sectors formatted for each value will be displayed in the activity box. It does not work on IDE or SCSI drives.

Select Auto Interleave on the main Hard Disk Utility Screen and press <Enter>. The following screen appears.

Auto Interleave Utility, Continued

The cursor is on Mark Bad Tracks. The default is *N*. To mark additional bad tracks, type *Y* and press <Enter>. The following screen appears.

After selecting options from the Bad Tracks Edit Menu, press <Esc>. Type *Y* and press <Enter> to proceed with the Auto Interleave process. A warning screen appears.

Auto Interleave Utility, Continued

Press <Enter> to return to the main Hard Disk Utility screen. To proceed, type *Y* and press <Enter>.

Media Analysis Utility

Media Analysis performs a series of tests to locate bad or damaged tracks on the hard disk as a result of aging or poor handling. This utility locates all bad tracks and lists them in the Bad Track List Box. Since this test writes to all cylinders and heads on the hard disk to verify any bad tracks, the test requires several minutes to complete. For best results, run this test in its entirety. Media Analysis does not work on IDE or SCSI drives.

Select Media Analysis from the main Hard Disk Utility Menu and press <Enter>. The following screen appears.

Media Analysis Utility, Continued

The cursor is on Proceed. When you press <Enter>, the warning screen appears.

Press <Enter> to stop. The main Hard Disk Utility screen appears. Type Y and press <Enter> to perform the hard disk drive analysis.

Hard Disk Utility Error Messages

Initialization Errors

Message	Explanation
No Hard Disk Installed	There is no hard disk drive in the system but you tried to run the Hard Disk Utility.
FATAL ERROR Bad Hard Disk	No response from the hard disk, or the hard disk is not repairable. Check all cable and power connections to the hard disk.
Hard Disk Controller Failure	Error response from the reset command sent to the hard disk controller. The controller may not be seated properly in the BUS slot.
C: (D:) Hard Disk Failure	The hard disk drive (C: or D:) is not responding to commands. Check power and cable connections to the hard disk.

Operation Errors

Message	Explanation
Address Mark Not Found	The address mark (initial address) on the hard disk could not be found.
Attachment Failed to Respond	No response has been received from the hard disk drive. An operation has already begun and the hard disk did not respond. It had responded earlier.
Bad ECC on Disk Read	When the hard disk drive utility writes to the disk, it also calculates an ECC (Error Correction Code) value for the data being written. This ECC value is written to the drive and then read back. The value read back is different from the one calculated.
Bad Sector Flag Detected	An operation was performed on a sector that has been flagged, i.e., marked, as bad.
Controller Has Failed	A diagnostic command that failed was issued to the controller.
Drive Not Ready	An operation on the hard disk drive has timed out. The hard disk drive utility has waited beyond a preset specified time limit.
Drive Parameter Activity Failed	A reset command was sent to the controller followed by drive parameters. Using these parameters, the controller did not get a response from the hard disk. Make sure the drive type is correct.
ECC Corrected Data	The ECC value (explained above) read from the disk is not the

Error	same value written to the disk. The data is not correct. An attempt was made to correct the data, but the ECC value is not corrected.
Requested Sector Not Found	The requested sector could not be found.
Reset Failed	The reset command did not properly reset the hard disk.
Seek Operation Failed	A seek command failed. A seek operation is the act of finding a particular sector on the hard disk.
Undefined Error - Command Aborted	An unidentifiable error condition occurred.
Write Fault on Selected Drive	A write fault occurred during the write operation on the hard disk drive.

Chapter 5

Technical Description

Overview

The technical features of the SX CAT motherboard are described in this chapter. Detailed information about connector pinouts and memory configurations are provided.

SX CAT Connector List

Connector	Function
J1 - J13	ISA Bus Connectors
J14 and J15	COM2 and COM1 Serial Port Connectors
J16	Keyboard Connector
J17	Floppy Disk Connector
J18	Parallel Port Connector
J19	Offboard Battery Connector
J20	IDE Hard Disk Connector
J21	Reset Connector
J22	Speaker Connector
J23	Keylock/Front Panel Connector
J24	IDE Activity LED Connector
J25	Turbo Speed LED Connector
J26	Turbo Speed Switch Connector
W3	4 MB SIMM Selection Jumper (not available in 16 MHz version)
P8 and P9	Power Supply Connectors
U15	BIOS Socket
U16	Keyboard Controller
U27	80387SX Math Coprocessor Socket
SIM1 - SIM8	Onboard DRAM SIMM Sockets
SW1	Configuration Switch

Detailed Description of Connectors

J1 - J13 ISA Bus Connectors

J1 - J13 are the ISA compatible slots, J1 - J7 are the 8-bit slots and J8 - J13 are the 16-bit extension slots. The ISA Bus operates at ½ the CPU speed. If the motherboard has a 16 MHz 80386SX, the ISA Bus operates at 8 MHz.

8-Bit ISA Slot Pinout

Pin	Use	Pin	Use
A1	IOCHCK-	B1	GND
A2	SD07	B2	RSTDRV
A3	SD06	B3	+5
A4	SD05	B4	IRQ9
A5	SD04	B5	-5
A6	SD03	B6	DREQ2
A7	SD02	B7	-12
A8	SD01	B8	OVS-
A9	SD00	B9	+12
A10	IOCHRDY	B10	GND
A11	AEN	B11	SMEMW-
A12	SA19	B12	SMEMR-
A13	SA18	B13	IOW-
A14	SA17	B14	IOR-
A15	SA16	B15	DACK3-
A16	SA15	B16	DREQ3
A17	SA14	B17	DACK1-
A18	SA13	B18	DREQ1
A19	SA12	B19	REF-
A20	SA11	B20	SYSCLK
A21	SA10	B21	IRQ7
A22	SA09	B22	IRQ6
A23	SA08	B23	IRQ5
A24	SA07	B24	IRQ4
A25	SA06	B25	IRQ3
A26	SA05	B26	DACK2-
A27	SA04	B27	T/C
A28	SA03	B28	BALE
A29	SA02	B29	+5

A30 SA01
A31 SA00

B30 OSC
B31 GND

16-Bit ISA Extension Pinout

Pin	Use	Pin	Use
C1	SBHE-	D1	MEMCS16-
C2	LA23	D2	IOCS16-
C3	LA22	D3	IRQ10
C4	LA21	D4	IRQ11
C5	LA20	D5	IRQ12
C6	LA19	D6	IRQ13
C7	LA18	D7	IRQ14
C8	LA17	D8	DACK0-
C9	MEMR-	D9	DREQ0
C10	MEMW-	D10	DACK5-
C11	SD08	D11	DREQ5
C12	SD09	D12	DACK6-
C13	SD10	D13	DREQ6
C14	SD11	D14	DACK7-
C15	SD12	D15	DREQ7
C16	SD13	D16	+5
C17	SD14	D17	MASTER-
C18	SD15	D18	GND

J14 and J15 COM2 and COM1 Serial Port

J14 and J15 are used to connect any RS-232 type peripheral to the SX CAT motherboard. These connectors provide a 100% IBM compatible serial port interface. The connecting cable is a 10-pin double-row ribbon that connects from the motherboard (J14/15) to a male 9-pin D-sub connector that should be fastened to the chassis.

Pin	Use	Pin	Use
1	Carrier Detect	6	Data Set Ready
2	Receive Data	7	Request to Send
3	Transmit Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	GND	10	Key (N/C)

J16 Keyboard Connector

The SX CAT motherboard provides a standard 5-pin DIN type keyboard connector to be used with a standard IBM AT-Compatible keyboard.

Pin	Use
1	Keyboard Clock
2	Keyboard Data
3	N/C
4	GND
5	+5V

J17 Floppy Disk Connector

The SX CAT motherboard supports both 3½" and 5¼" floppy disk drive in low density (360 KB/720 KB) and high density (1.2 MB/1.44 MB). There can be a maximum of two floppy drives of any combination connected to the interface. The connecting cable is a 34-pin ribbon connector with two 34-pin edge connectors that connect to the floppy drives. There should be a small twist in the cable between the floppy connectors. The last (end) connector should be connected to drive A.:

Pin	Use	Pin	Use
1	GND	2	RPM/LC
3	GND	4	N/C
5	GND	6	N/C
7	GND	8	-INDEX
9	GND	10	-MOTOR0
11	GND	12	-FDSEL1
13	GND	14	-FDSEL0
15	GND	16	-MOTOR1
17	GND	18	DIR
19	GND	20	-STEP
21	GND	22	-WDATA
23	GND	24	-WGATE
25	GND	26	-TRK0
27	GND	28	-WRPROT
29	GND	30	-RDATA
31	GND	32	HDSEL
33	GND	34	DSKCHNG

Floppy Diskette, Continued

Description of Twist in Floppy Cable

Floppy B	Floppy A
10 to	16
11 to	15
12 to	14
13 to	13
14 to	12
15 to	11
16 to	10

J18 Parallel Port Connector

J18 is connects an IBM-type parallel printer to the SX CAT motherboard. The connecting cable is a 26-pin double-row ribbon that connects from the motherboard (J18) to a female 25-pin D-sub connector that should be fastened to the chassis.

Pin	Use	Pin	Use
1	-STROBE	2	-AUTOFEED
3	PD0	4	-ERROR
5	PD1	6	-INIT
7	PD2	8	-SLCTIN
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	-ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	N/C

J19 Offboard Battery Connector

J19 can be used to connect an offboard battery for the CMOS RAM and Real Time Clock in the event the onboard battery fails. *SW1-1 must be opened before adding and offboard battery.*

Pin	Use
1	+VBAT
2	Key (N/C)
3	GND
4	GND

J20 IDE Connector

J20 is used to connect a hard disk drive with an Integrated Drive Electronics Interface. The interface is 100% compatible with the IBM AT Hard Disk Controller. The IDE interface can be disabled via Setup. You must disable the onboard IDE interface to use an ISA bus ESDI, RLL, SCSI, or MFM hard disk controller.

Pin	Use	Pin	Use
1	-RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15
19	GND	20	KEY (N/C)
21	N/C	22	GND
23	-IOW	24	GND
25	-IOR	26	GND
27	N/C	28	ALE
29	N/C	30	GND
31	INT14	32	-IOCS16
33	HA1	34	N/C
35	HA0	36	HA2
37	-CS0	38	-CS1
39	-IDEACT	40	GND

J21 Reset Connector

A single pole momentary pushbutton switch can be connected to J21 for use as a reset switch.

J22 Speaker Connector

A standard 8 ohm speaker should be connected to J22.

Pin	Use
1	Speaker Data
2	N/C Key
3	GND
4	+5

J23 Keylock/Front Panel Connector

J23 can be connected to the front panel power-on LED and keylock switch. The keylock switch disables the system from booting the operating system or entering Setup until the keylock is unlocked.

J24 IDE Activity LED Connector

J24 can be connected to a front panel LED to reflect the activity of onboard IDE hard disk interface. If an ISA bus hard disk controller is used, J24 should not be used.

J25 Turbo Speed LED Connector

J25 can be connected to a front panel LED to reflect the current CPU operating speed. The CPU speed can be toggled from the keyboard by a user-settable keychord in Setup.

J26 Turbo Speed Switch Connector

J26 can be connected to a front panel turbo switch that allows the CPU speed to be altered via this front panel pushbutton. When the button is in (closed), the system operates at low speed. When the button is out (open), the system operates at high speed. The keyboard speed control overrides the front panel speed setting.

W3 Jumper for 4 MB SIMMs

The W3 setting determines if 4 MB SIMMs can be used in the system. If the jumpers are placed between 1-2 and 3-4, 4 MB SIMMs are not supported. If the jumper between 2-3 is installed, 4 MB SIMMs are supported.

P8 and P9 Power Supply Connectors

The DC power supply should be connected to the motherboard at P8 and P9. The AT compatible power supply cable follows a color code convention that assists in proper connection to the motherboard. Not all power supply vendors conform to the standard color coding scheme.

P8	Pin	Use	Color	Description
	1	Powergood	Orange	not used on SX CAT
	2	+5	Red	
	3	+12	Yellow	
	4	-12	Blue	Key located here
	5	GND	Black	
	6	GND	Black	

P9	Pin	Use	Color	Description
	1	GND	Black	Key located here
	2	GND	Black	
	3	-5	Green	
	4	+5	Red	
	5	+5	Red	
	6	+5	Red	

U15 BIOS Socket

U15 provides a single 8-bit EPROM socket for the AMIBIOS ROM. The AMIBIOS for the SX CAT is designed specifically for the Chips and Technologies, Inc. SCATSX CHIPSet.

U16 Keyboard Controller

The SX CAT uses an AT compatible keyboard controller that supports both 84-key and 101-key AT compatible keyboards. The keyboard controller also controls the turbo LED control via the AMIBIOS.

U27 80387SX Math Coprocessor Socket

An optional 80387SX can be inserted in the U27 socket. The math coprocessor can vastly improve spreadsheet and CAD software performance. The math coprocessor must be rated at the same speed as the processor.

Warning

Do not install or remove the 80387SX unless power is removed from the SX CAT motherboard.

SW1 Configuration Switch

SW1-1	Close to enable Onboard Battery Open to enable Offboard Battery
SW1-2	Close to Enable Battery Open to Disable Battery (This switch must be closed for normal system operation.)
SW1-3	Close for addition wait states on IDE interface Open for no additional wait states
SW1-4	Close for Color Adapter Open for Monochrome Adapter (If using either a VGA or EGA adapter, the position of this switch does not matter.)

Onboard SIMM Sockets

SIM1 through SIM8 provide for up to 16 MB of onboard high speed memory. The memory used should be Single In-Line Memory Modules (SIMMs). Memory must be at least 100 ns or faster for processors operating at 16 MHz and 80 ns or faster for 20 MHz operation. The possible SX CAT memory configurations are:

Total Memory	Number of SIMMs	Type	Location
512 KB	2	256KBx9	SIM1 - SIM2
1 MB	4	256KBx9	SIM1 - SIM4
1.5 MB	6	256KBx9	SIM1 - SIM6
2 MB	8	256KBx9	SIM1 - SIM8
2 MB	2	1 MBx9	SIM1 - SIM2
3 MB	4 2	256 KBx9 1 MBx9	SIM1 - SIM4 SIM5 - SIM6
4 MB	4	1 MBx9	SIM1 - SIM4
5 MB	4 4	256 KBx9 1 MBx9	SIM1 - SIM4 SIM5 - SIM8
6 MB	6	1 MBx9	SIM1 - SIM6
8 MB	8	1 MBx9	SIM1 - SIM8
9 MB	4 2	256 KBx9 4 MBx9	SIM1 - SIM4 SIM5 - SIM6
10 MB	2 2	1 MBx9 4 MBx9	SIM1 - SIM2 SIM3 - SIM4
16 MB	4	4 MBx9	SIM1 - SIM4

SX CAT Memory Organization/Usage

The SX CAT can use dynamic random access memory (DRAM) accessed in page mode. Page mode DRAMs permits near zero wait state operation since page mode access time to the DRAMs is significantly faster than a normal access.

Bank interleave is used when groups of SIMMs are installed. This technique interleaves 2 banks of DRAM SIMMs by alternating accesses between them, further reducing the access time to the DRAMs and allowing virtually zero wait state operation.

The 640 KB to 1 MB memory region is user-configurable as shadow RAM or can be remapped above 1 MB for use as extended memory. Shadow RAM provides significant improvement in system performance and VGA/EGA video throughput. This memory is configured via Setup in the system BIOS.

SX CAT Memory Map

000000h 09FFFFh	640 KB for system data and DOS Applications
0A0000h 0BFFFFh	128 KB for Display Adapter
0C0000h 0C7FFFh	32 KB for EGA/VGA Adapter ROM BIOS (Optional)
0C8000h 0CFFFFh	32 KB for Hard Disk ROM BIOS (Optional)
0D0000h 0DFFFFh	64 KB for Adapter RAM/ROM BIOS (Optional)
0E0000h 0EFFFFh	64 KB for Adapter RAM/ROM BIOS (Optional)
0F0000h 0FFFFFFh	64 KB for System ROM BIOS
100000h 7FFFFFFh	7 MB for Onboard Extended RAM
800000h FFFFFFh	8 MB for ISA Bus Memory Adapters (Optional) or 8 MB for Onboard Extended RAM

Index

- 8042 - Gate A20 Failure 18
- 8042 Gate-A20 Error 19
- Above 1 MB Memory Test 34
- Adapter Card
 - 16-Bit Card Pinout 12
 - 8-Bit Pinout 13
- Address Line Short! 19
- Advanced CMOS Setup 33
- Auto Interleave 51
- Auto Interleave Utility 56
- Base 64 KB Memory Failure 18
- Beep Codes 18
- BIOS
 - Advanced Chip Set Setup 41
 - Beep Codes 18
 - Errors 17
 - Fatal error messages 18
 - Hard Disk Utilities 51
 - Non-Fatal Error Messages 19
 - Password support 49
- BIOS Setup 23
- C: Drive Error 19
- C: Drive Failure 19
- Cache Memory Bad, Do Not Enable Cache! 19
- CH-2 Timer Error 19
- CMOS Battery State Low 19
- CMOS Checksum Failure 19
- CMOS Display Type Mismatch 19
- CMOS Memory Size Mismatch 19
- CMOS Shutdown Register Read/Write Error 18
- CMOS System Options Not Set 19
- CMOS Time & Date Not Set 19
- D: Drive Error 19
- D: drive failure 19
- Default values loaded. Press any key to continue 27
- Diskette Boot Failure 19
- Display Memory Read/Write Error 18
- Display Switch Not Proper 20
- DMA #1 Error 20
- DMA #2 Error 20
- DMA Error 20
- Errors
 - BIOS 17
- Fast Gate A20 38
- Fast Gate A20 Options 38
- FDD Controller Failure 20

Index, Continued

Features

- SX CAT 1
- Floppy Drive A and Floppy Drive B: 32
- Floppy Drive Seek At Boot 37
- Format Utility 53
- Hard Disk
 - Configuration 30
- Hard Disk Format 51, 53
- Hard Disk Parameter Table 31
- Hard Disk utilities
 - Error messages 61
 - When to use 52
- Hard Disk Utility 51
- HDD Controller Failure 20
- Hit if you want to run SETUP 21, 35
- Hit Message Display 35
- I/O Port 80h 17
- Installing Adapter Cards 13
- Interleave factor 56
- INTR #1 Error 20
- INTR #2 Error 20
- Invalid Boot Diskette 20
- KB/Interface Error 20
- Keyboard 32
- Keyboard Error 20
- Keyboard Is Locked...Unlock It 20
- Manufacturing Test Port 17
- Mark Bad Tracks 57
- Media Analysis 51
- Media Analysis Utility 59
- Memory Parity Error Check 35
- Memory Test Tick Sound 35
- Monitor 32
- No ROM BASIC 20
- Num Lock 37
- Numeric/Weitek Processor(s) 37
- Off Board Parity Error 20
- On Board Parity Error 20
- Parity Error 18
- Parity Error ???? 20
- Password Check Option 38
- Password Support 49
 - Changing the password 49
- POST 17
- Processor error 18
- Processor Exception Interrupt Error 18
- Refresh Failure 18

Index, Continued

- ROM Checksum Error 18
- SCSI 53
- Setup 23
 - Above 1 MB Memory Test 34
 - Advanced CMOS Setup 33
 - Auto Configuration 27
 - Fast Gate A20 38
 - Floppy Drive Seek At Boot 37
 - Hard Disk 30
 - Hard Disk Parameter Table 31
 - Key Usage 26
 - Memory Parity Error Check 35
 - Memory Test Tick Sound 35
 - Numeric/Weitek Processor(s) 37
 - Password Check Option 38
 - Running 25
 - Standard CMOS Setup 29
 - System Boot UP CPU Speed 38
 - System Boot Up Num Lock 37
 - System Boot Up Sequence 38
 - System ROM Shadow 39
 - Typematic Rate Delay and Typematic Rate 34
 - Video or Adaptor ROM Shadow 39
 - Wait for F1 If Any Error 37
 - warning screen 33
- Specifications 4
- Standard CMOS Setup 29
- SX CAT
 - Board size 3
 - Features 1
 - Specifications 4
- System Boot UP CPU Speed 38
- System Boot Up Num Lock 37
- System Boot Up Sequence 38
- System ROM Shadow 39
- Timer Not Operational 18
- Typematic Rate and Delay 34
- Video or Adaptor ROM Shadow 39
- Wait for <F1> If any Error 21
- Wait for F1 If Any Error 37

