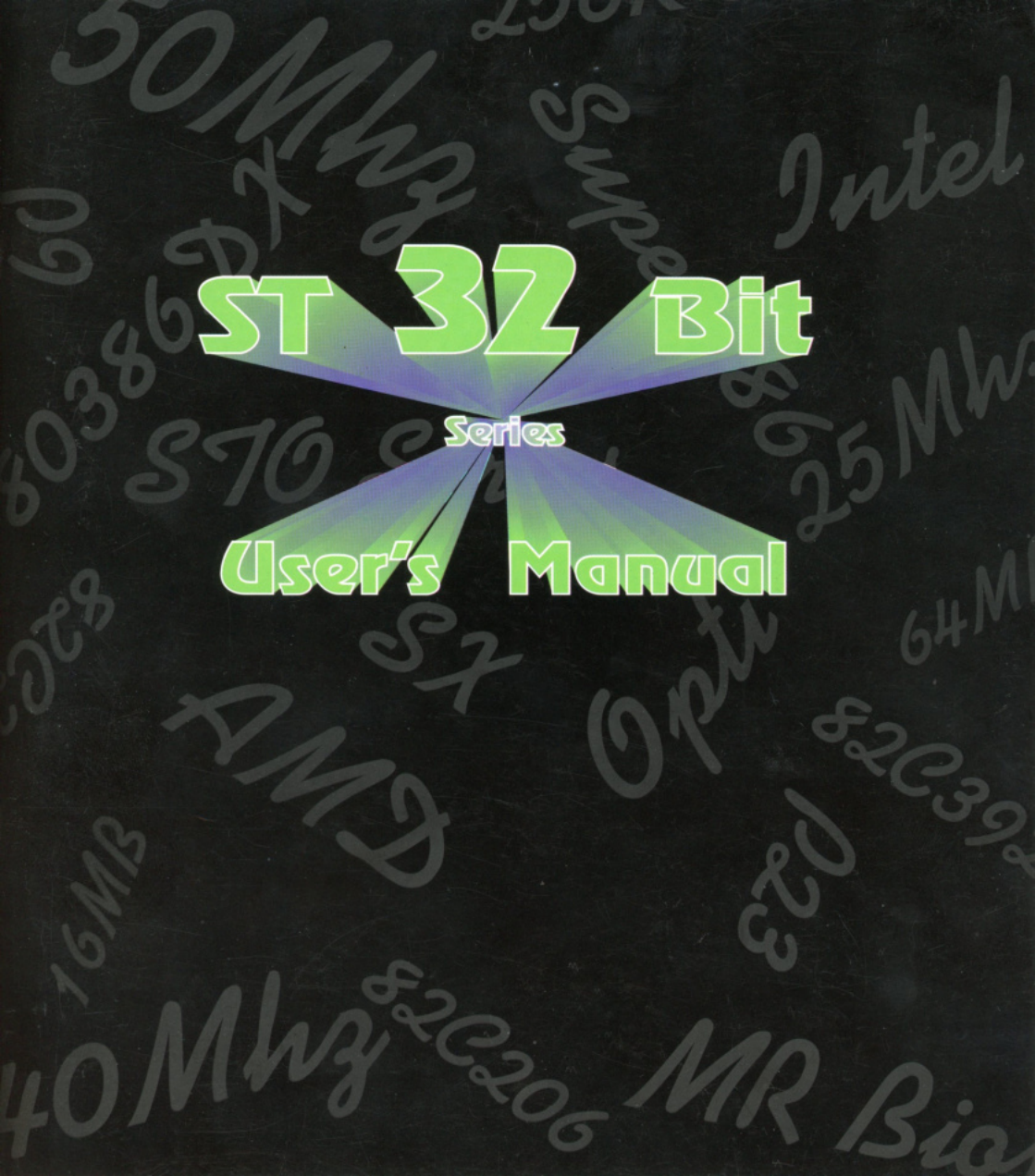
ST 32 Bit
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User's Manual

The information contained in this document is subject to change without notice.

Suggestion

Power Supply

A good quality switching power supply is extremely important for the system. It increases stability, reliability and performance. The power supply should provide a minimum 200 Watts output and +5V output should be within 4.95V and 5.25V. Adding a line filter between the power and computer is highly recommended.

Ventilation

Selection of system case as well as position of various connection flat cables should be considered and organized. A well organized configuration will definitely give better stability. Additional ventilating fans for File Server application is highly recommended.

Installation

Whenever installation or repair job of the system have to be taken, the job handler should be a qualified personnel. In all cases, the power should be disconnected or at off position. Precaution against static electricity.

Incompatibility

Reason of incompatibility can be from various probabilities, and users are most welcome to contact us directly with this concerns.

Preface

This manual contains the following chapters

- ❑ STO486WB 80486DX/SX Mother Board with Cache Subsystem
- ❑ STO386WB 80386DX Mother Board with Cache Subsystem
- ❑ STO386SXC 80386SX Mother Board with Cache Subsystem
- ❑ STO386SXP 80386SX Mother Board with Non-cache Mode
- ❑ CPU & Math Co-Processor Installation
- ❑ STOM-16/32S 32 Bit Memory Expansion Card
- ❑ SIMM Memory, I/O Slot and General Information
- ❑ Processor Clock Setup
- ❑ BIOS CMOS Setup
- ❑ Hard Drive Table
- ❑ Error Message

The following sections being included in each mother board

- ❑ Introduction
- ❑ Available models
- ❑ Features
- ❑ Hardware Installation
- ❑ Jumpers & Connectors Setting and Location

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STO486WB

Series

User's Manual

Introduction

The **STO486WB** series offers optimum performance for high end 80486DX and 80486SX/80487SX based 32 Bit Systems. The **STO486WB** is designed for systems running from 20/25 upto 33/40 Mhz. (Provision for 50Mhz). The system board provides a full 32 bit architecture for Multitasking and Multi-user environment, and is ideal for a file server, CAD/CAM as well as work station applications.

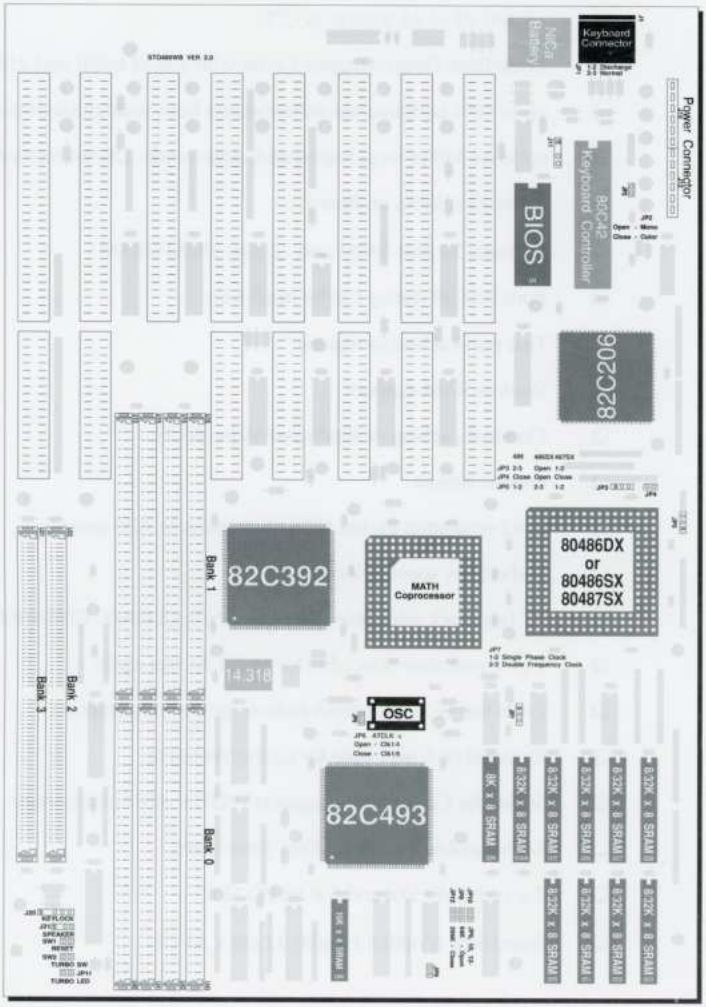
Models available:

STO486WBX-20/25	20/25Mhz Main Board for 80486SX/80487SX
STO486WBX-20/25-64	20/25Mhz Main Board for 80486SX/80487SX with 64K cache
STO486WBX-20/25-256	20/25Mhz Main Board for 80486SX/80487SX with 256K cache
STO486WB-33	33Mhz Main Board for 80486DX
STO486WB-33-64	33Mhz Main Board for 80486DX with 64K cache
STO486WB-33-256	33Mhz Main Board for 80486DX with 256K cache

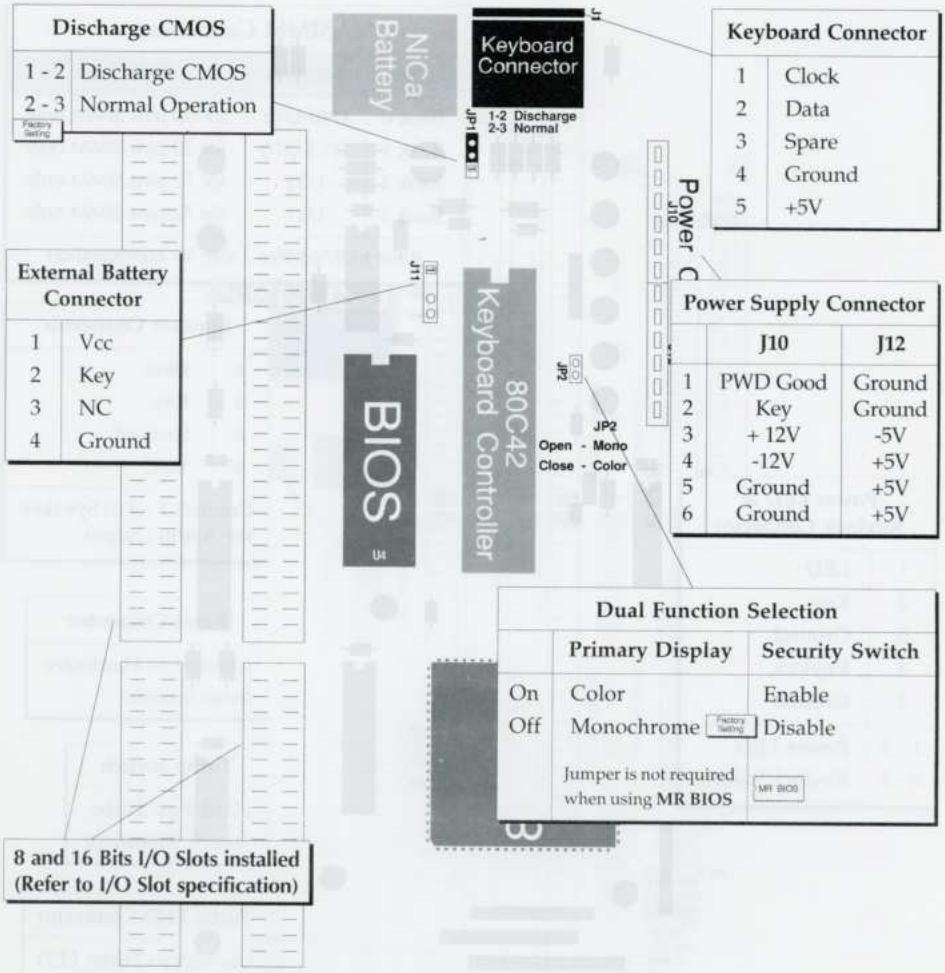
Features

- ❑ 1X and 2X clock source for CPU
- ❑ Write-Back Direct-Mapped Cache with size of 64KB and 256KB
- ❑ up to 10% performance enhancement from write-through cache scheme
- ❑ up to 64-MB of local high-speed, page-mode, DRAM memory space
- ❑ 4 Memory Banks on Board
- ❑ Supports 30 pins SIMM and 72 pins SIMM DRAM
- ❑ Burst-line-fill during Cache-Read-Miss
- ❑ Two non-cacheable regions
- ❑ Shadow RAM support
- ❑ Optional caching of shadowed Video BIOS
- ❑ Hidden refresh
- ❑ 8042 emulation for fast CPU-reset and gate A20 generation
- ❑ Turbo/Slow speed selection
- ❑ AT bus clock selectable from CLK2IN/5, CLKIN/3, CLKIN/4 or CLKIN/6
- ❑ 0 or 1 wait state selectable for 16-bit AT bus cycle
- ❑ CAS# before RAS# refresh reduces power consumption
- ❑ Optional or 1 wait state for Cache-Write-Hit
- ❑ Socket for Co-processor, support WEITEK 4167 coprocessor
- ❑ Rechargeable Battery for Real Time Clock
- ❑ 7 x 16 bit I/O Slot and 1 8 bit I/O Slot
- ❑ Board Size (Width x Height) 22 cm x 33 cm

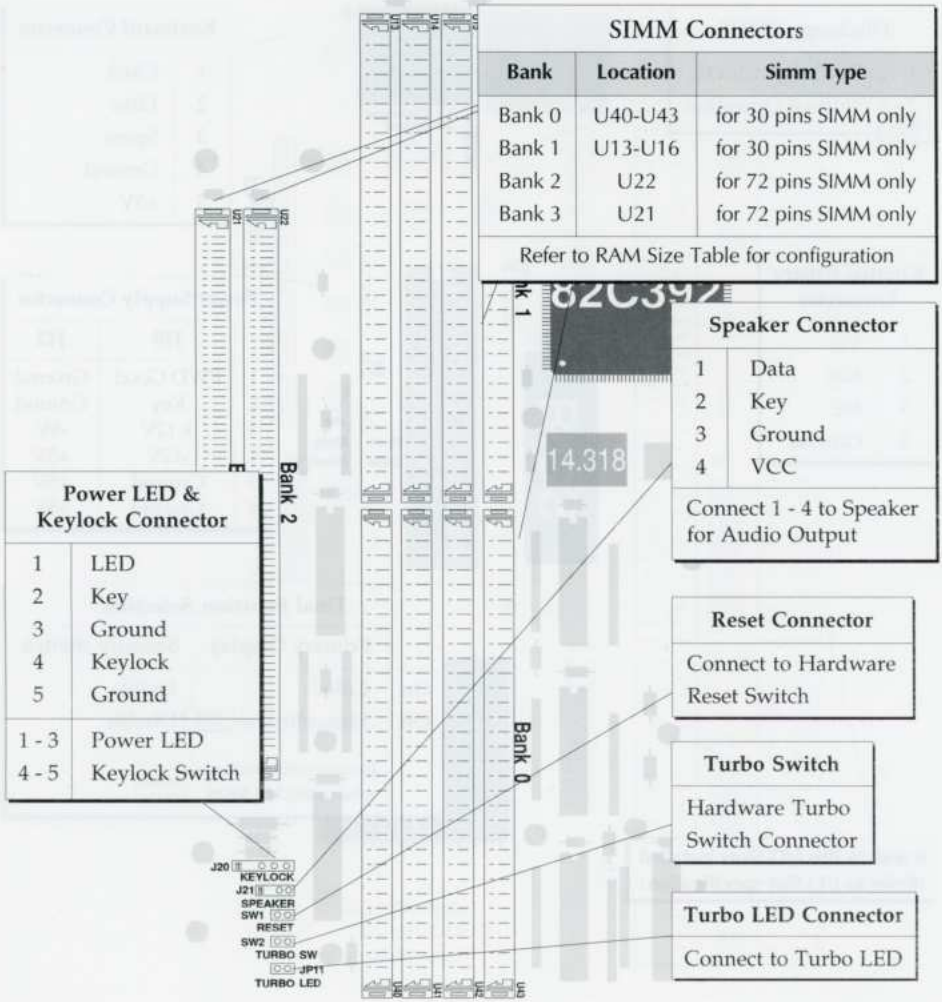
System Board Layout



Connectors & Jumper Settings



Connectors & Jumper Settings



SIMM Connectors		
Bank	**Location**	**Simm Type**
Bank 0	U40-U43	for 30 pins SIMM only
Bank 1	U13-U16	for 30 pins SIMM only
Bank 2	U22	for 72 pins SIMM only
Bank 3	U21	for 72 pins SIMM only

Refer to RAM Size Table for configuration

Power LED & Keylock Connector	
1	LED
2	Key
3	Ground
4	Keylock
5	Ground
1 - 3	Power LED
4 - 5	Keylock Switch

Speaker Connector	
1	Data
2	Key
3	Ground
4	VCC

Connect 1 - 4 to Speaker for Audio Output

Reset Connector

Connect to Hardware Reset Switch

Turbo Switch

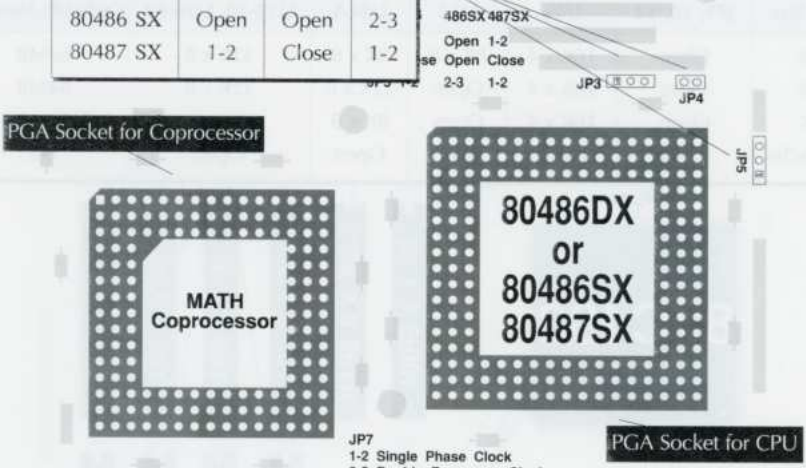
Hardware Turbo Switch Connector

Turbo LED Connector

Connect to Turbo LED

Connectors & Jumper Settings

CPU Type Selection			
CPU Type	**JP3**	**JP4**	**JP5**
80486 DX	2-3	Close	1-2
80486 SX	Open	Open	2-3
80487 SX	1-2	Close	1-2

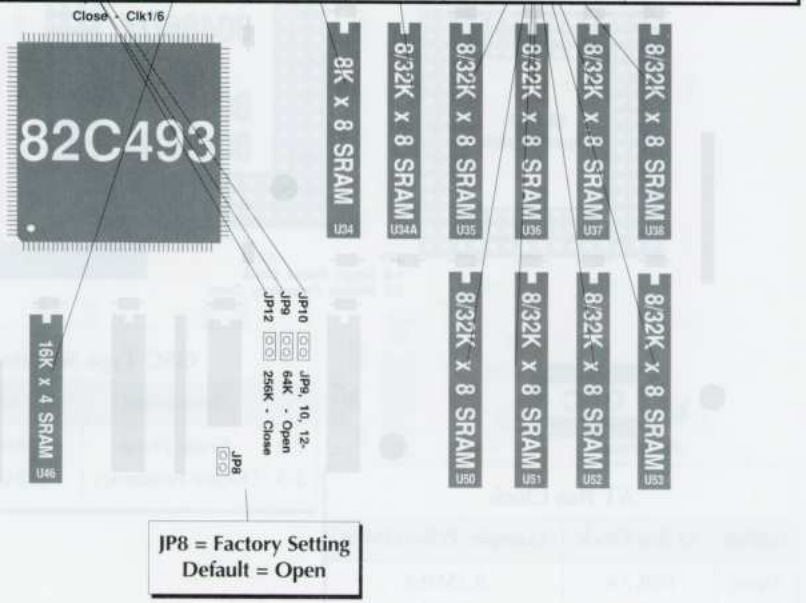


OSC Type Selection			
	Description	**OSC Clock**	**PClk**
1-2	Single Phase	40Mhz	40Mhz
2-3	Double Frequency	40Mhz	20Mhz

AT Bus Clock		
Setting	**AT Bus Clock**	**Example, Pclk=33Mhz**
Open	Pclk / 4	8.25Mhz
Close	Pclk / 6	5.50Mhz
Also refer to **BIOS setup for Software Setting**		

Connectors & Jumper Settings

Cache Size Table						
Cache Size	**JP9, 10, 12**	**U46**	**U34**	**U34A**	**U35-38, U50-53**	**Cachable Memory**
256K	Close	16K x 4	8K x 8	8K x 8	32K x 8	64MB
256K	Close	16K x 4	Open	32K x 8	32K x 8	64MB
64K	Open	16K x 4	Open	8K x 8	8K x 8	16MB
Non-Cache	Open	Open	Open	Open	Open	Nil



JP8 = Factory Setting
Default = Open

Memory Installation

DRAM Type: 1MB or 4MB x 9 30 pins SIMM for Bank 0/1 and 256KB, 512KB, 1MB or 2MB x 36 72 pin SIMM for Bank 2/3. (STO486WB is not yet supported 4MB x 36 SIMM.)

DRAM Speed: 80ns or faster DRAM for better performance. (70ns is recommanded)

Note: Refer to table below for Bank 0/3 memory configuration. Turn off System before installing the SIMM and exercise precaution against static electricity.

RAM Size Table

Bank 0	Bank 1	Bank 2	Bank 3	Total	Bank 0	Bank 1	Bank 2	Bank 3	Total
256K				1M	1M	1M	1M	4M	28M
256K	256K			2M	1M	4M	1M	1M	28M
1M				4M	4M	1M	1M	1M	28M
256K	1M			5M	1M	4M			32M
256K	256K	1M		6M	1M	4M	4M		36M
1M	1M			8M	4M	1M	4M		36M
256K	1M	1M		9M	4M	4M	1M		36M
256K	256K	1M	1M	10M	4M	1M	4M	4M	40M
1M	1M	1M		12M	1M	4M	4M	1M	40M
256K	1M	1M	1M	13M	4M	1M	4M	1M	40M
1M	1M	1M	1M	16M	4M	4M	1M	1M	40M
4M				16M	4M	4M	4M		48M
1M	4M			20M	1M	4M	4M	4M	52M
4M	1M			20M	4M	1M	4M	4M	52M
1M	1M	4M		24M	4M	4M	4M	1M	52M
1M	4M	1M		24M	4M	4M	4M	4M	64M
4M	1M	1M		24M					

(Cache Subsystem is not valid for total memory less than 4MB on board)

SRAM/DRAM Specification

Speed(Oscillator)	Cache SRAM	Tag SRAM	DRAM
20Mhz (40Mhz)	25ns	25ns	80ns
25Mhz (50Mhz)	25ns	25ns	80ns
33Mhz (66Mhz or 33Mhz)	25ns	15ns	80ns

Turbo/Cache Switch

Hardware Turbo Switch

The **STO486WB** only can use Hardware Turbo Switch for this function, and the Table is as follows.

Turbo Switch - SW2		
SW2	**Speed**	**LED - JP11**
Open	Turbo	Off
Close	Normal	On

Software Cache Subsystem Switch

In addition to the turbo switch the cache subsystem can be enabled or disabled when using the BIOS setup, a RUNTIME software switch of this function can also activate this facility. (Also see CMOS Setting).

Runtime Cache Switch	
CTRL ALT +	Enable Cache
CTRL ALT -	Disable Cache

This feature will not effect the Turbo LED at JP11.

Important Note:

Do not use the Run Time Software Cache Subsystem Switch feature to enable or disable the Cache Subsystem when the user has installed EMS on the system. This may cause the system to hang-up.

(Newer version, BIOS, later than 1.0F, may fixed this problem.)

STO386WB Series

User's Manual

Introduction

The **STO386WB** Mother board utilises the **Intel 80386DX** or **AMD 386DX CPU**, **391/2** Write Back chipset, and **BIOS** from **Microid Research.** The system board takes full advantage of the 32 bit achitecture of the 80386, microprocessor and adds to it the high performance benefits of the Write Back Caching Subsystem . The board has a maximum capacity for installing up to 64MB of DRAM on board.

Applications for the board include Personal Computer, Work Station, or even as a File Server. It is capable of running multitasking as well as multi-user applications.

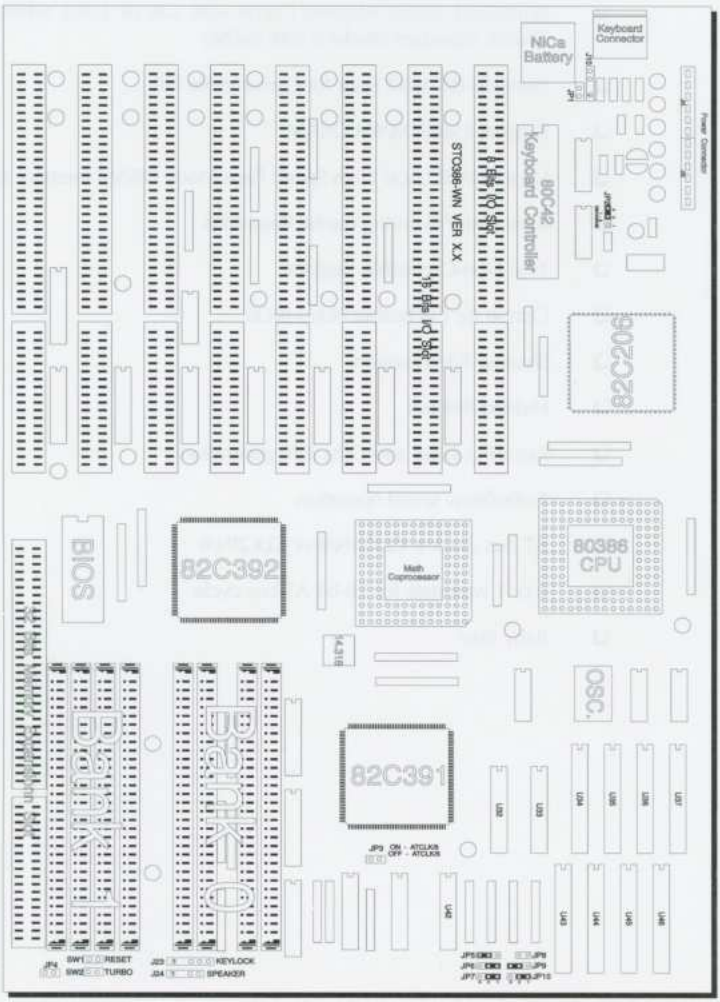
Models available:

STO386WB-33-32	33Mhz 32K Cache for PGA Type CPU
STO386WB-33-64	33Mhz 64K Cache for PGA Type CPU
STO386WB-33-128	33Mhz 128K Cache for PGA Type CPU
STO386WB-33-256	33Mhz 256K Cache for PGA Type CPU
STO386WB-40-32	40Mhz 32K Cache for PGA Type CPU
STO386WB-40-64	40Mhz 64K Cache for PGA Type CPU
STO386WB-40-128	40Mhz 128K Cache for PGA Type CPU
STO386WB-40-256	40Mhz 256K Cache for PGA Type CPU
STO386WBQ-33-32	33Mhz 32K Cache with PQFP CPU
STO386WBQ-33-64	33Mhz 64K Cache with PQFP CPU
STO386WBQ-33-128	33Mhz 128K Cache with PQFP CPU
STO386WBQ-33-256	33Mhz 256K Cache with PQFP CPU
STO386WBQ-40-32	40Mhz 32K Cache with PQFP CPU
STO386WBQ-40-64	40Mhz 64K Cache with PQFP CPU
STO386WBQ-40-128	40Mhz 128K Cache with PQFP CPU
STO386WBQ-40-256	40Mhz 256K Cache with PQFP CPU

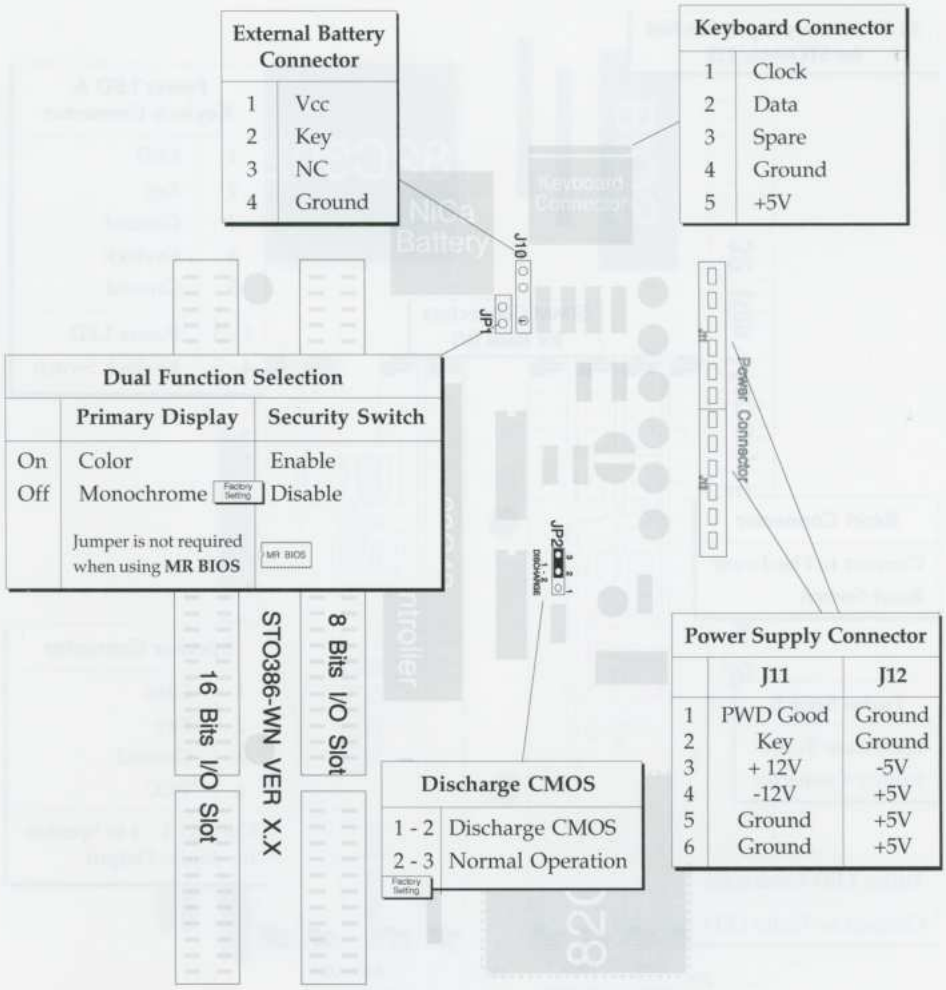
Features

- ❑ Write-Back Direct Mapped Cache with size of 32KB, 64KB, 128KB and 256KB. (Standard Model is 64K cache)
- ❑ Optional 0/1 Wait State for Cache Write Hit
- ❑ Support 256K/1M/4M DRAM
- ❑ Up to 64MB Local High Speed Page Mode DRAM memory space
- ❑ Burst Line Fill during Cache Read Miss
- ❑ Two Non-Cacheable Regions
- ❑ Option for Cacheable video BIOS
- ❑ Shadow RAM support
- ❑ Hidden Refresh
- ❑ Fast CPU Reset and Gate A20 generation
- ❑ Turbo/Slow speed operation
- ❑ AT bus clock = CLK2IN/8 or CLK2IN/6
- ❑ 0 or 1 wait state for 16-bit AT bus cycle
- ❑ Baby Size

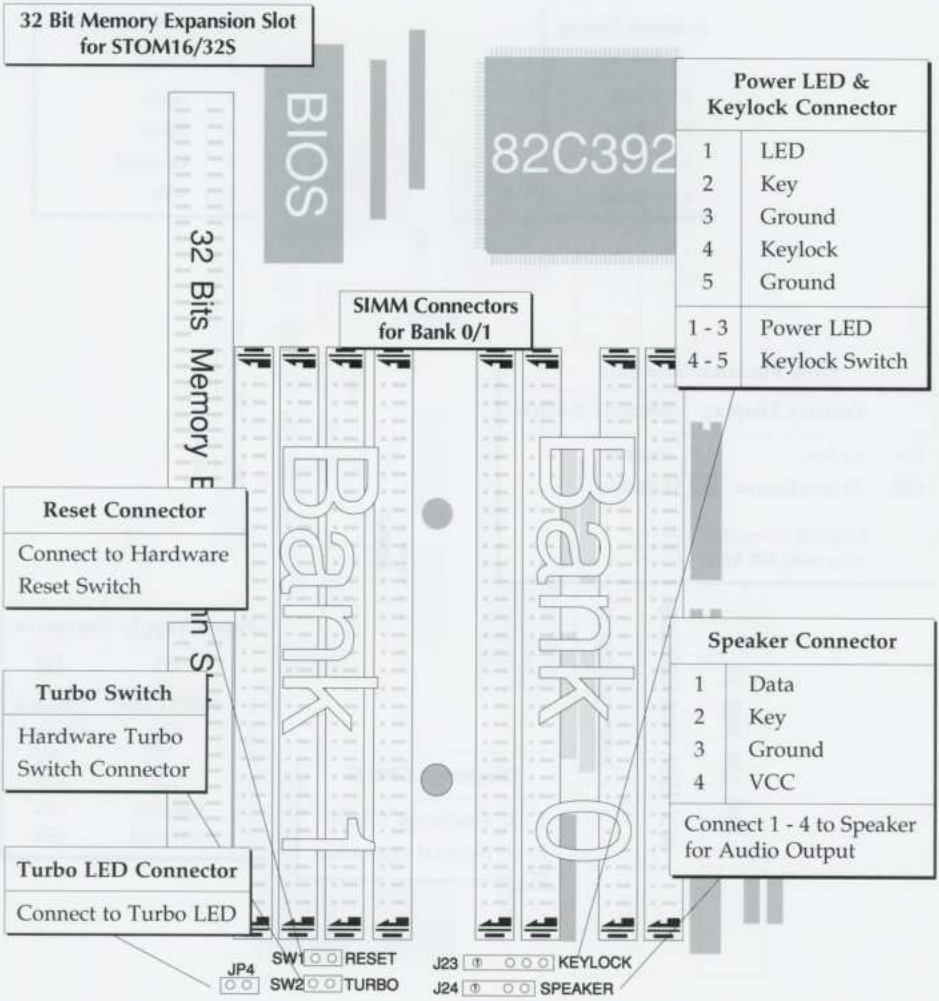
System Board Layout



Connectors & Jumper Settings



Connectors & Jumper Settings



Connectors & Jumper Settings

Socket for Optional

PGA Socket for
80386 CPU

Cache Size Table — Reverse = Standard Model

	32K	64K	128K	256K
JP5	1-2	2-3	2-3	2-3
JP6	1-2	1-2	1-2	2-3
JP7	1-2	1-2	2-3	2-3
JP8	Open	Open	Close	Close
JP9	2-3	2-3	2-3	1-2
JP10	2-3	1-2	1-2	1-2
U32,33,42	16K x 4 15ns	16K x 4 15ns	16K x 4 15ns	16K x 4 15ns
U34-37	8K x 8 25ns	8K x 8 25ns	32K x 8 25ns	32K x 8 25ns
U43-46	Nil	8K x 8 25ns	Nil	32K x 8 25ns

OSC.

JP3 ON - ATCLK/8
OFF - ATCLK/6

U32 U33 U34 U35 U36 U37

U42 U43 U44 U45 U46

JP5 JP8
JP6 JP9
JP7 JP10

AT BUS Clock Table

	Pclk=33Mhz	Pclk=40Mhz
Open	11.00Mhz	13.33Mhz
Close	8.25Mhz	10.00Mhz

Memory Installation

DRAM Type 256KB x 9, 1MB x 9 or 4MB x 9 SIMM.

DRAM Speed 80ns and 70ns DRAM or faster DRAM for 33Mhz and 40Mhz respectively.

Note: Refer to Table below for Bank 0/1 and Bank 2/3 memory configuration. Turn off System before installing the SIMM and exercise precautions against static electricity.

RAM SIZE Table

Bank 0	Bank 1	Bank 2	Bank 3	Total	Bank 0	Bank 1	Bank 2	Bank 3	Total
256K				1MB	256K	256K	256K	4M	19MB
256K	256K			2MB	1M	4M			20MB
256K	256K	256K		3MB	256K	1M	4M		21MB
256K	256K	256K	256K	4MB	256K	256K	1M	4M	22MB
1M				4MB	1M	1M	4M		24MB
256K	1M			5MB	256K	1M	1M	4M	25MB
256K	256K	1M		6MB	1M	1M	1M	4M	28MB
256K	256K	256K	1M	7MB	4M	4M			32MB
1M	1M			8MB	4M	4M	256K		33MB
1M	1M	256K		9MB	256K	256K	4M	4M	34MB
256K	256K	1M	1M	10MB	4M	4M	1M		36MB
1M	1M	1M		12MB	256K	1M	4M	4M	37MB
1M	1M	1M	256K	13MB	1M	1M	4M	4M	40MB
1M	1M	1M	1M	16MB	4M	4M	4M		48MB
4M				16MB	4M	4M	4M	256K	49MB
256K	4M			17MB	4M	4M	4M	1M	52MB
256K	256K	4M		18MB	4M	4M	4M	4M	64MB

Cache Subsystem

The cache subsystem can be installed as per required. Default cache subsystem is 64KB . (See Cache Size Table)

Turbo/Cache Switch

The **STO386WB** only can use Hardware Turbo Switch for this function, and the Table is as follows.

Hardware Turbo Switch

Turbo Switch - SW2		
SW2	Speed	LED - JP4
Open	Turbo	Off
Close	Normal	On

Software Cache Subsystem Switch

In addition to the turbo switch the cache subsystem can be enable or disable when using the BIOS setup, a RUNTIME software switch of this function can also activate this facility. (Also see CMOS Setting).

Runtime Cache Switch	
CTRL ALT +	Enable Cache
CTRL ALT -	Disable Cache

This feature will not effect the Turbo LED at JP4.

System AT BUS Clock

To provide a faster BUS Speed a jumper, JP3, has been included for this function. (Refer to JP3 in the Connectors & Jumpers Section). The factory default , JP3 = Close, is recommended. (See AT BUS Clock Table)

Note: Certain Add-on Cards may have compatibility problem if the AT Bus clock is set too fast.

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STO386SXC

Series

User's Manual

Introduction

The **STO386SXC** Mother board utilises the 80386SX CPU, from either **AMD** or **Intel**, **Opti** 82C281 chip, and BIOS from **Microid Research**. The system board takes full advantage of the external 16 bit and internal 32 bit achitecture of the 80386SX, microprocessor and adds to it the benefits of the **Opti** Write Back Caching System.

It is capable to install maximum of 16MB memory on board, either by 256K x 9, 1MB x 9 or 4MB x 9 SIMM.

Applications for the board include Personal Computer, Work Station, or even as a File Server. It is capable of running multitasking as well as multi-user applications.

Models available:

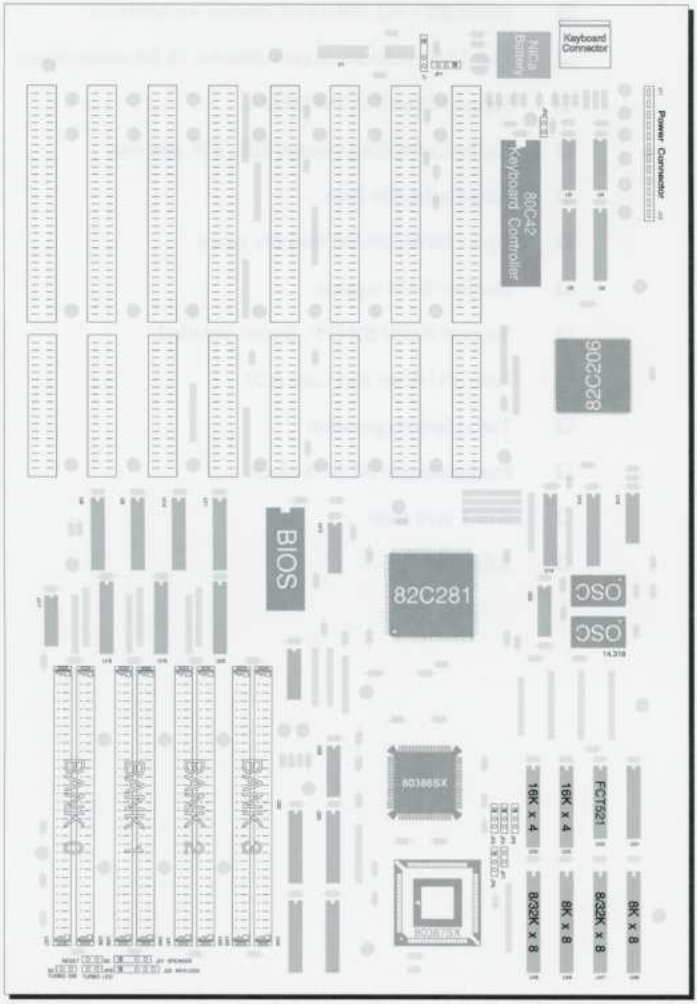
STO386SXC-16-xx 16Mhz Version
STO386SXC-20-xx 20Mhz Version
STO386SXC-25-xx 25Mhz Version

xx = with 16K, 32K or 64K Cache Subsystem

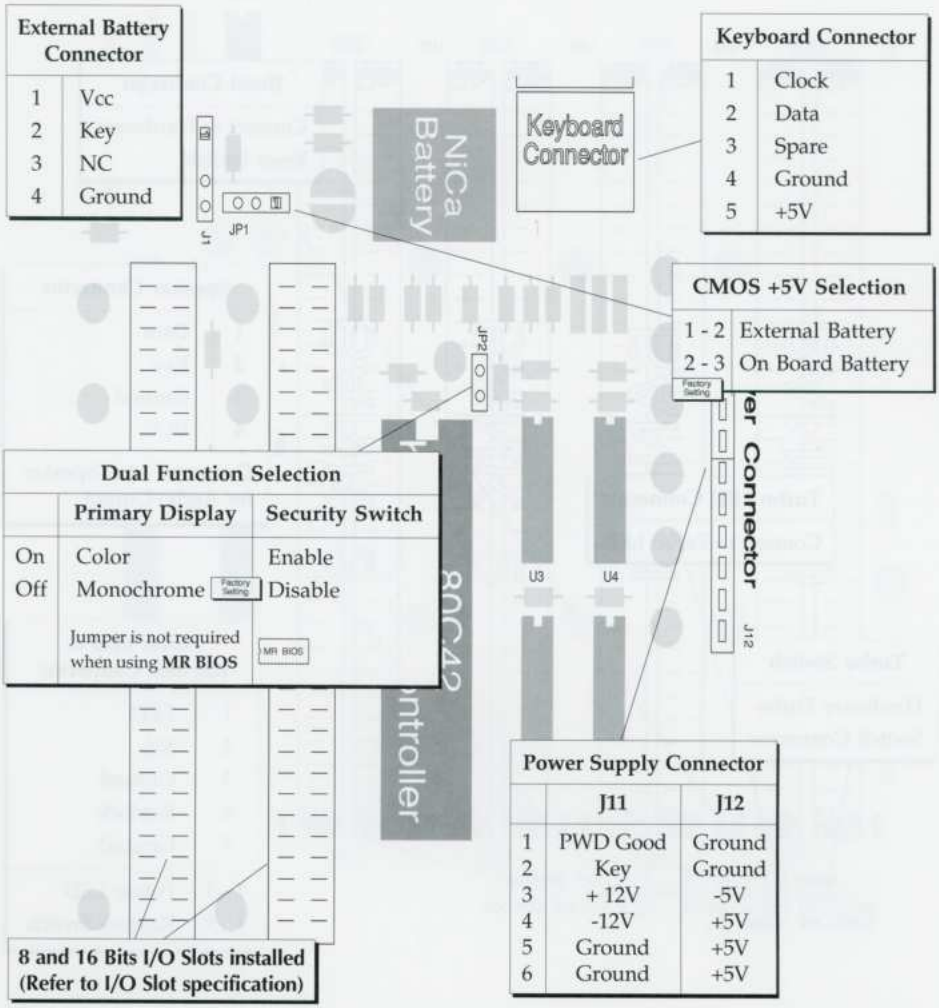
Features

- ❑ 80386SX CPU, full 32 bit internal Architecture
- ❑ Run 32 bit software in cost effective 16 bit environment
- ❑ Support 256K/1M/4M DRAM
- ❑ Cache Control Subsystem, 16K, 32K and 64K
- ❑ Non-Cacheable Area
- ❑ Up to 16MB DRAM memory space
- ❑ Shadow RAM support
- ❑ Support 80387SX FPP, Socket installed
- ❑ Fast CPU Reset and Gate A20
- ❑ Turbo Speed operation
- ❑ Programmable AT BUS clock
- ❑ 0 or 1 wait state
- ❑ Baby Size

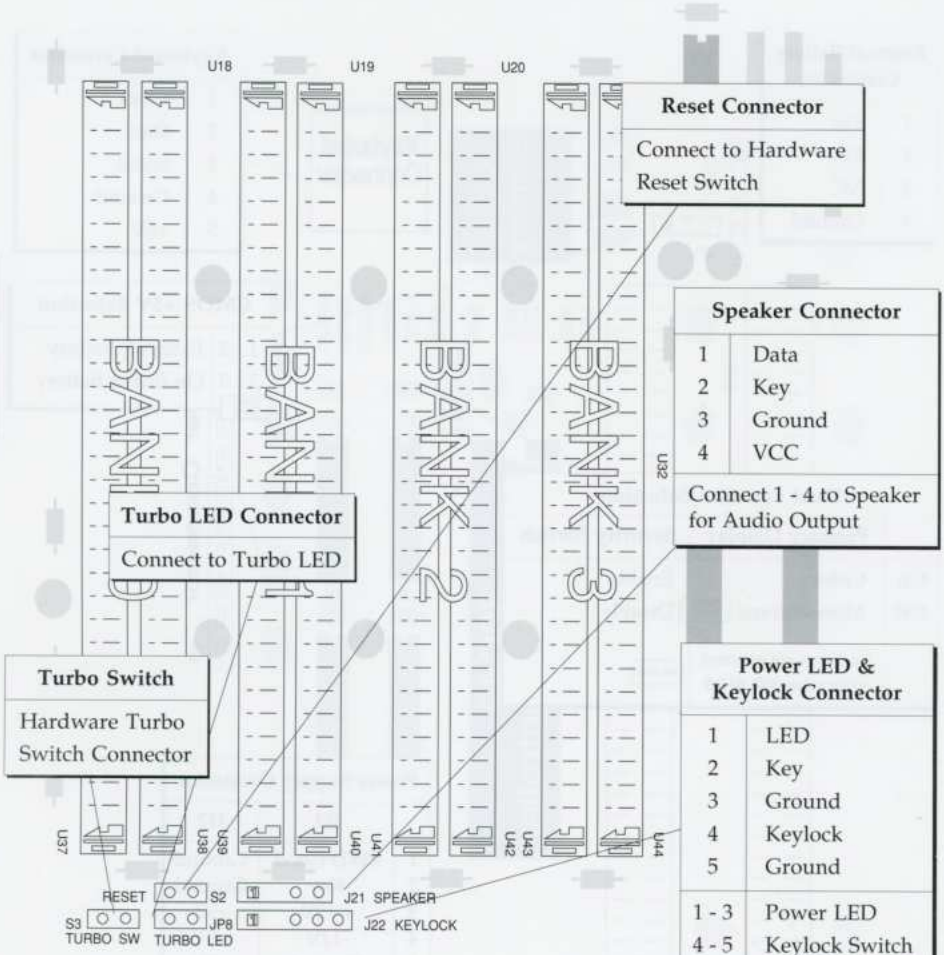
System Board Layout



Connectors & Jumper Settings



Connectors & Jumper Settings



Connectors & Jumper Settings

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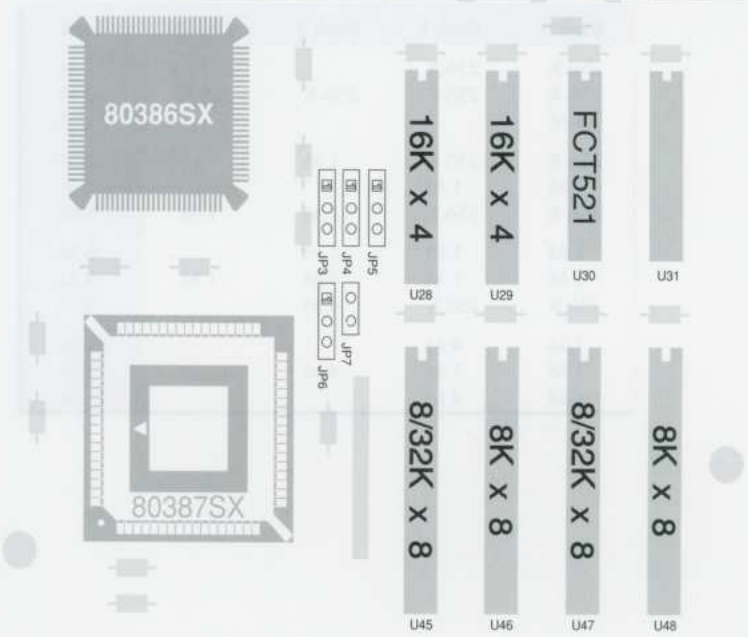
Cache Size Table								
Cache Size	U28-29	U45/47	U46/48	JP3	JP4	JP5	JP6	JP7
16K	16K x 4	8K x 8	Open	1-2	1-2	1-2	Off	Off
32K	16K x 4	8K x 8	8K x 8	2-3	1-2	1-2	On	Off
64K	16K x 4	32K x 8	Open	2-3	2-3	2-3	Off	On



Memory Installation

DRAM Type: 256KB x 9, 1MB x 9 or 4MB x 9 SIMM type.

DRAM Speed: 80ns and 70ns DRAM or faster DRAM for 16/20Mhz and 25Mhz respectively.

Note: Refer to Table below for Bank 0/1 and Bank 2/3 memory configuration. Turn off system before installing the DRAM and exercise precautions against static electricity.

RAM SIZE Table

Bank 0	Bank 1	Bank 2	Bank 3	Total
256 K	256 K			1 M
256 K	256 K	256 K	256 K	2 M
1 M				2 M
256 K	256 K	1 M		3 M
1 M	1 M			4 M
256 K	256 K	1 M	1 M	5 M
1 M	1 M	1 M		6 M
1 M	1 M	1 M	1 M	8 M
256 K	256 K	4 M		9 M
1 M	4 M			10 M
1 M	1 M	4 M		12 M
4 M	4 M			16 M

Turbo Switch

The STO386SXC can use the Hardware Turbo Switch as per following table. Hardware Turbo Switch - S3. When the BIOS SPEED set "LOW".

S3	Speed	LED
Open	Turbo	On
Close	Normal	Off

Run Time Software Turbo Switch can also enable or disable the Turbo/ Normal Mode but when S3, (Hardware Turbo Switch) is closed the Turbo LED is always "OFF".

Software Turbo Switch	
CTRL ALT +	Enable Turbo Mode
CTRL ALT -	Disable Turbo Mode

Software Cache Subsystem switch	
CTRL ALT Shift +	Enable Cache system
CTRL ALT Shift -	Disable Cache system

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STO386SXP

Series

User's Manual

Introduction

The **STO386SXP** Mother board utilises the **80386SX CPU**, from either **AMD** or **Intel**, **Opti 82C283** chip, and **BIOS** from **Microid Research**. The system board takes full advantage of the external 16 bit and internal 32 bit architecture of the **80386SX** microprocessor.

The board has a maximum capacity for installing up 16MB of DRAM on board, in configurations which accept cost effective DIP type DRAM for Bank 0/1, with either 256K x 4 plus 256K x 1 or 1M x 4 plus 1M x 1. By changing the jumpers Bank 0/1 can be changed to accept SIMM type DRAM.

Applications for the board include Personal Computer, Work Station, or even as a File Server. It is capable of running multitasking as well as multi-user applications.

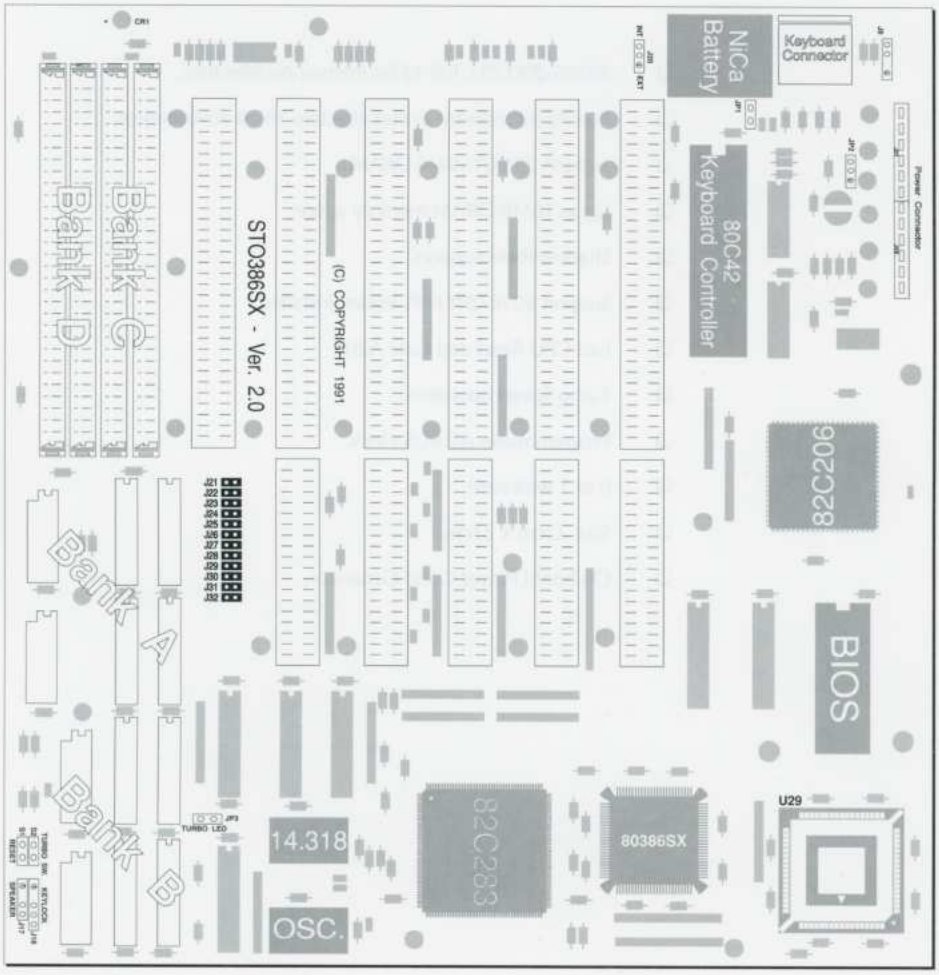
Models available:

STO386SXP-16	16Mhz Version
STO386SXP-20	20Mhz Version
STO386SXP-25	25Mhz Version

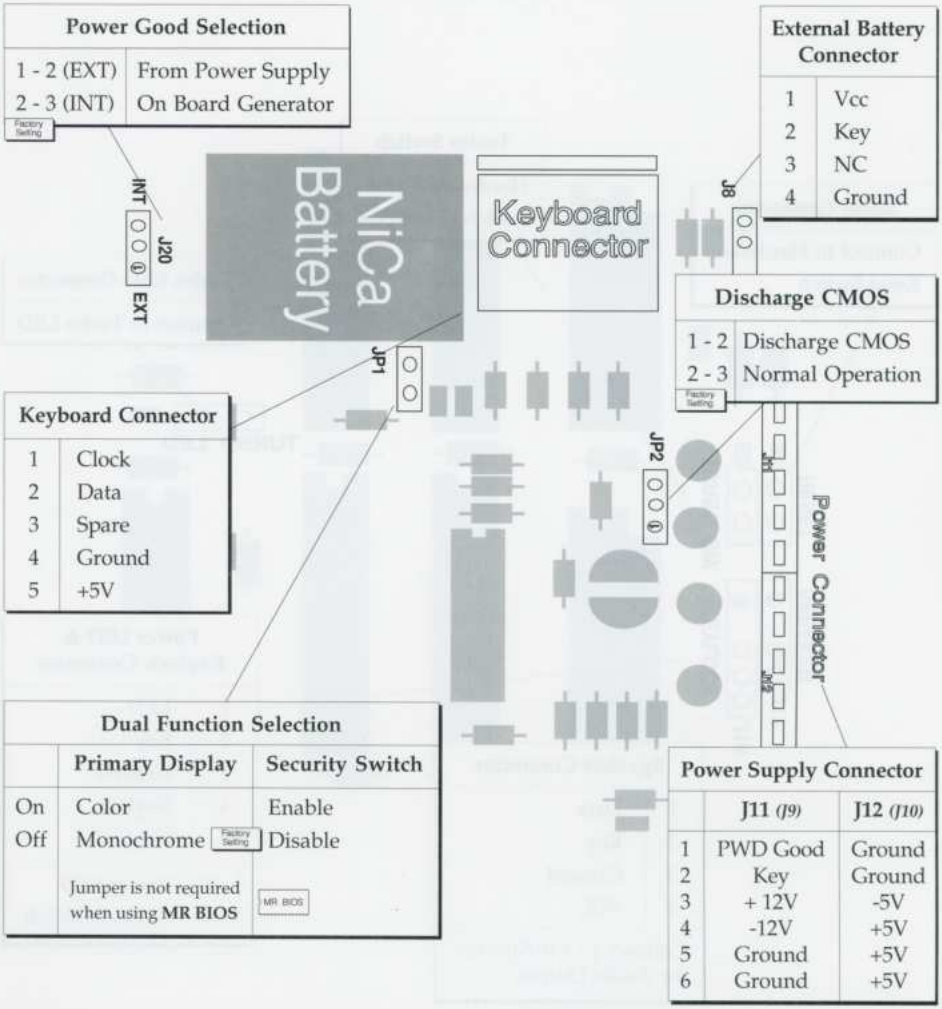
Features

- ❑ 80386-SX CPU, full 32 bit internal Architecture.
- ❑ Run 32 bit software in cost effective 16 bit environment.
- ❑ Support 256K/1M/4M DRAM.
- ❑ Up to 16MB DRAM memory space.
- ❑ Shadow RAM support.
- ❑ Support 80387SX FPP, Socket installed.
- ❑ Fast CPU Reset and Gate A20.
- ❑ Turbo Speed operation.
- ❑ Programmable AT BUS clock.
- ❑ 0 or 1 wait state.
- ❑ Size 22cm x 23cm.
- ❑ On board Power Good Generator.

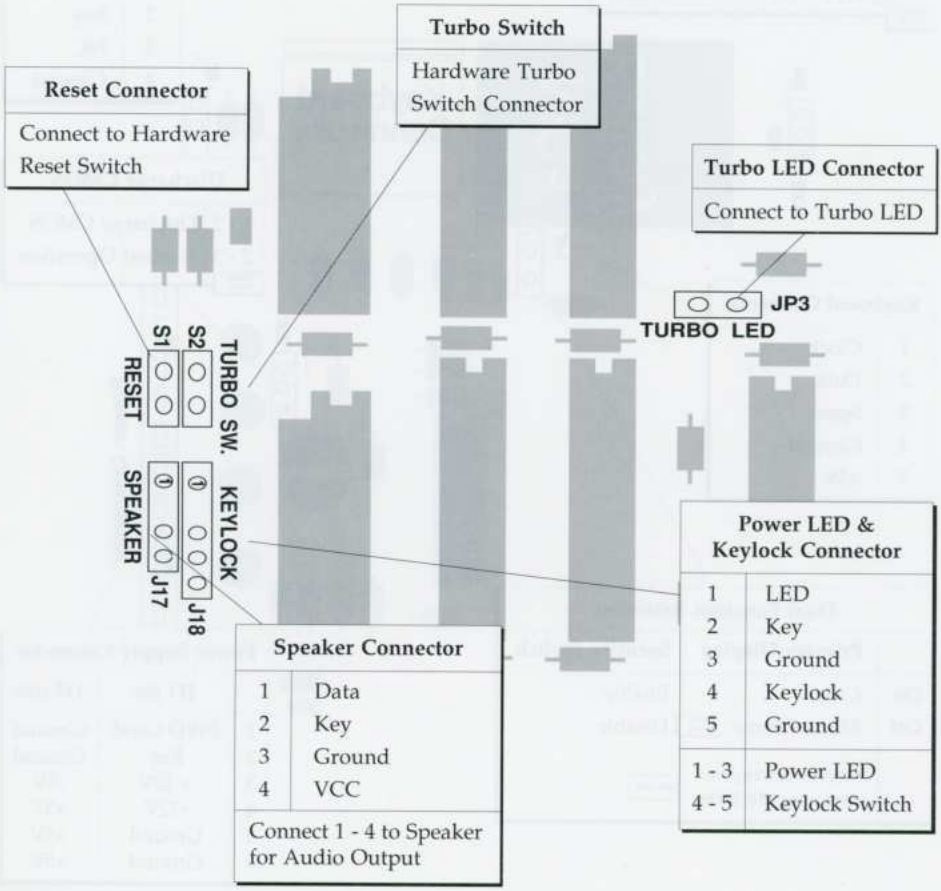
System Board Layout



Connectors & Jumper Settings



Connectors & Jumper Settings



Memory Installation

DRAM Type: 256KB x 9, 1MB x 9 or 4MB x 9 SIMM type, and 256KB x 4 + 256K x 1, and 1MB x 4 + 1MB x 1 DIP type.

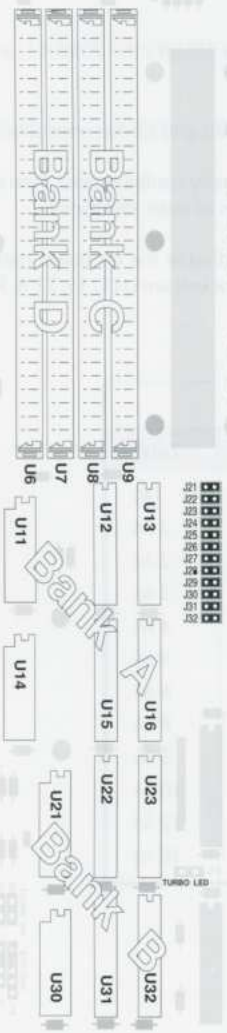
DRAM Speed: 80ns and 70ns DRAM or faster DRAM for 16/20Mhz and 25Mhz respectively.

Note: Refer position of Bank 0/1 and Bank 2/3 for memory configuration. Turn off System before installing the DRAM and caution of static electricity.

Disable Parity Bit: When Parity not installed, the MR BIOS will disable the on board parity function automatically. (Parity Bit DIP DRAM Sockets are U11, 14, 21 & 30)

RAM SIZE Table

Bank 0	Bank 1	Bank 2	Bank 3	Total
256 K	256 K			1M
256 K	256 K	256 K	256 K	2 M
1 M				2 M
256 K	256 K	1 M		3 M
1 M	1 M			4 M
256 K	256 K	1 M	1 M	5 M
1 M	1 M	1 M		6 M
1 M	1 M	1 M	1 M	8 M
256 K	256 K	4 M		9 M
1 M	4 M			10 M
1 M	1 M	4 M		12 M
4 M	4 M			16 M



Bank 0, 1, 2 & 3 are on the system board, they are located as per diagram to the left. There are 2 choices to organise Bank 0/1 and Bank 2/3, when jumpers J21 to J32 are in the horizontal position (choice 1) Bank 0/1 is the DIP RAM Banks and when the jumpers are changed to the vertical (choice 2) position the SIMM Slots become Bank 0/1 and the DIP RAM becomes Bank 2/3. The table below defines these choices:

	Bank	Connectors Location	DRAM	J21-32
Choice 1	0	U11 - 16 *(Bank A)*	DIP	
	1	U21-23, 30 - 32 *(Bank B)*	DIP	
	2	U8, 9 *(Bank C)*	SIMM	
	3	U6, 7 *(Bank D)*	SIMM	
Choice 2	0	U8, 9 *(Bank C)*	SIMM	
	1	U6, 7 *(Bank D)*	SIMM	
	2	U11 - 16 *(Bank A)*	DIP	
	3	U21 - 23, 30 - 32 *(Bank B)*	DIP	

DIP type DRAM installation at Bank A & B. U12, 13, 15, 16, 22, 23, 31 & 32 are for either 256KB x 4 or 1MB x 4 type DRAM, and U11, 14, 21 & 30 are for 256KB x 1 or 1MB x 1 type DRAM.

DIP type DRAM Combination Table	
U12,13,15,16,22,23,31 & 32	U11, 14, 21 & 30
256KB x 4 1MB x 4	256KB x 1 1MB x 1

Installation of DIP type DRAM into 34 Pins Socket

Turbo Switch

Hardware Turbo Switch - S2

The STO386SXP can use the Hardware Turbo Switch as per following table.

S2	Speed	LED - JP3
Open	Turbo	On
Close	Normal	Off

Note: A {**CTRL ALT -** } should be performed prior to switching the hardware turbo switch to obtain the correct speed mode. The run time software turbo switch can also enable or disable to Turbo/Normal Mode. When S2, hardware turbo switch, is closed the software turbo switch will not effect the Turbo LED at JP3.

Important Note: Runtime Software Turbo switch is highly recommanded for this application.

Runtime Turbo Switch	
CTRL ALT +	Enable Turbo Mode
CTRL ALT -	Disable Turbo Mode

This Page is Blanked Intentionally

General Installation

CPU & Math Co-processor Installation

System board may be shipped without the CPU being installed. Therefore insertion of the CPU by the user will be required. Please refer to the diagrams below for 386 and 486 CPU installation. Ensure that PIN 1 on the CPU (that is the corner marked or cropped on the CPU) is installed to line up with the Cropped corner of the receiving socket.

Users may require to add a Math Co-processor, such as Weitek 3167/4167 for 80386 and 80486 system board respectively or a 80387*SX* for the 80386*SX* system board.

Installation Procedure:

1. Take precautions against static electricity.
2. Turn off system and open the system case.
3. Place the CPU or the Math Co-processor onto the PGA/PLCC socket as marked on the PCB. Make sure the Pin 1 of the CPU or the Math Co-processor corresponding to the Pin 1 of the PGA Socket as marked on the PCB.
4. Carefully & firmly press the chip into socket.
5. Close the system case, and reconnect all necessary connections, then turn on the system.

Note: The speed of the CPU should correspond to the system board. Also the speed of the Math Co-processor should be as fast as the system board CPU.

PGA Socket for 4167

PLCC Socket for 80387*SX*

PGA Socket for 80386 ☞

PGA Socket for 80486/486*SX*

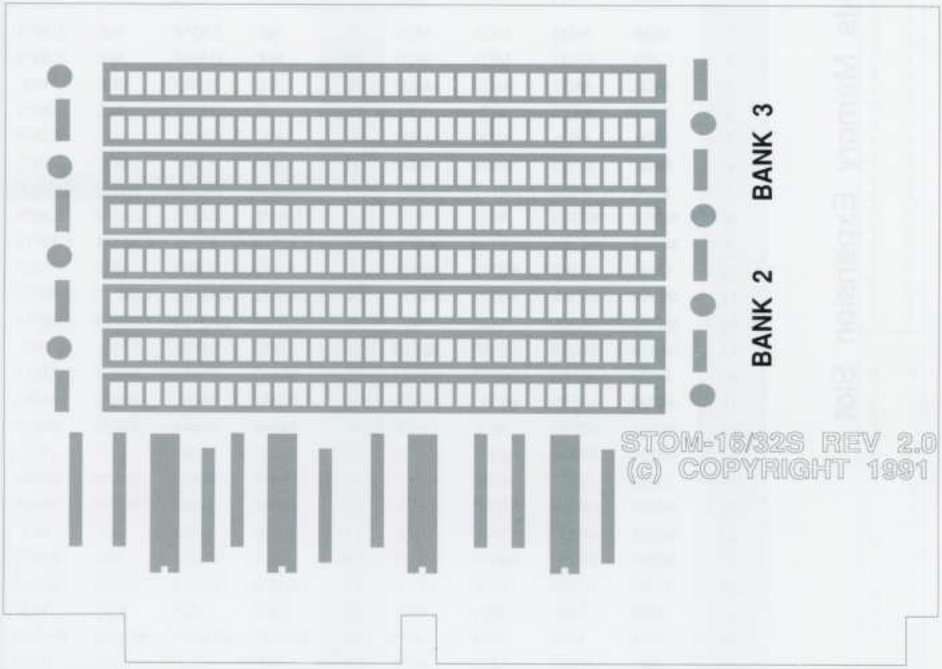
PGA Socket for 80387/3167 ☞

STOM-16/32S - 32 Bits Memory Expansion Card

Features:

- ❑ Support Bank 2 & 3 Only.
- ❑ Support 256KB x 9, 1MB x 9, 4MB x 9 SIMM Module. (4MB type only support our STO386-33WB & STO486 Ver. C).
- ❑ Provide Memory Expansion with additional capacity 1, 2, 4, 5, 8, 16, 17, 20 & 32MB when using combination of 256KB, 1MB and 4MB x 9 SIMM.

Note: Refer to STOM-16/32S RAM SIZE Table for final configuration, also refer to 32 bits memory expansion slot specification and Pin assignment for compatibility.



STOM-16/32S Memory Card Installation - Installing Bank 2 and 3 onto the system by using the Expansion Ram card STOM-16/32S.

1. Turn off system and open the system case.
2. Place the SIMMs onto the SIMM Socket onto Bank 2/3 of the expansion Card with designed amount of Memory, configuration as per RAM SIZE table.
3. Plug the Expansion Ram Card onto the 32 bit Slot as marked.
4. Close the system case, and reconnect all necessary connections, then turn on the system. The Sign-up Screen will report addition memory being installed, and set the CMOS accordingly for the right amount of memory installed.

(The SIMM and STOM-16/32S can be purchased from either our distributors or us)

STOM-16/32S & 32 Bits Slot Pin Assignment

Pin #	Side B Card	Side B Slot	Side A Card	Side A Slot	Pin #	Side B Card	Side B Slot	Side A Card	Side A Slot
1	MD0	MD0	MD1	MD1	26	N/C	CAS*0	N/C	CAS*1
2	GND	GND	MD3	MD3	27	N/C	CAS*2	N/C	CAS*3
3	MD2	MD2	MD5	MD5	28	GND	GND	VCC	VCC
4	MD4	MD4	VCC	VCC	29	N/C	CAS*4	N/C	CAS*5
5	MD6	MD6	MD7	MD7	30	N/C	CAS*6	N/C	CAS*7
6	GND	GND	MD9	MD9	31	GND	GND	VCC	VCC
7	MD8	MD8	MD11	MD11		**Side D**	**Side D**	**Side C**	**Side C**
8	MD10	MD10	VCC	VCC	1	CAS*8	CAS*8	CAS*9	CAS*9
9	MD12	MD12	MD13	MD13	2	CAS*10	CAS*10	CAS*11	CAS*11
10	GND	GND	MD15	MD15	3	GND	GND	VCC	VCC
11	MD14	MD14	MD17	MD17	4	CAS*12	CAS*12	CAS*13	CAS*13
12	MD16	MD16	VCC	VCC	5	CAS*14	CAS*14	CAS*15	CAS*15
13	MD18	MD18	MD19	MD19	6	GND	GND	VCC	VCC
14	GND	GND	MD21	MD21	7	RMA0	RMA0	RMA1	RMA1
15	MD20	MD20	MD23	MD23	8	RMA2	RMA2	RMA3	RMA3
16	MD22	MD22	VCC	VCC	9	RMA4	RMA4	RMA5	RMA5
17	MD24	MD24	MD25	MD25	10	GND	GND	VCC	VCC
18	GND	GND	MD27	MD27	11	RMA6	RMA6	RMA7	RMA7
19	MD26	MD26	MD29	MD29	12	RMA8	RMA8	RMA9	RMA9
20	MD28	MD28	VCC	VCC	13	GND	GND	VCC	VCC
21	MD30	MD30	MD31	MD31	14	N/C	RAS*0	N/C	RAS*1
22	GND	GND	VCC	VCC	15	RAS*2	RAS*2	RAS*3	RAS*3
23	MP0	MP0	MP1	MP1	16	GND	GND	VCC	VCC
24	MP2	MP2	MP3	MP3	17	ROWE*	ROWE*	RMA10	RMA10
25	GND	GND	VCC	VCC	18	N/C	N/C	VCC	VCC

SIMM Memory Pin Assignment

30 Pin SIMM			
#	Assignment	#	Assignment
1	Vcc	16	DQ5
2	CAS	17	A8
3	DQ1	18	A9
4	A0	19	NC
5	A1	20	DQ6
6	DQ2	21	WE
7	A2	22	Vss
8	A3	23	DQ7
9	Vss	24	NC
10	DQ3	25	DQ8
11	A4	26	Q9
12	A5	27	RAS
13	DQ4	28	CAS9
14	A6	29	D9
15	A7	30	Vcc

72 Pin SIMM							
#	Assignment	#	Assignment	#	Assignment	#	Assignment
1	Vss	19	NC	37	DQ18	55	DQ13
2	DQ1	20	DQ5	38	DQ36	56	DQ31
3	DQ19	21	DQ23	39	Vss	57	DQ14
4	DQ2	22	DQ6	40	CAS0	58	DQ32
5	DQ20	23	DQ24	41	CAS2	59	Vcc
6	DQ3	24	DQ7	42	CAS3	60	DQ33
7	DQ21	25	DQ25	43	CAS1	61	DQ15
8	DQ4	26	DQ8	44	RAS0	62	DQ34
9	DQ22	27	DQ26	45	RAS1	63	DQ16
10	Vcc	28	A7	46	NC	64	DQ35
11	NC	29	NC	47	WE	65	DQ17
12	A0	30	Vcc	48	NC	66	NC
13	A1	31	A8	49	DQ10	67	PRD1
14	A2	32	A9	50	DQ28	68	PRD2
15	A3	33	RAS1	51	DQ11	69	PRD3
16	A4	34	RAS0	52	DQ29	70	PRD4
17	A5	35	DQ27	53	DQ12	71	NC
18	A6	36	DQ9	54	DQ30	72	Vss

Note:

- Available 30 pin SIMM, 256K x 9, 1MB x 9 and 4MB x 9.
- Available 72 pin SIMM, 256K x 36, 512K x 36, 1MB x 36 and 2MB x 36.
- The **STO386SXP** can use 8 bit 30 pin SIMM, and the **MR BIOS** will disable the Parity bit automatically.
- Some Memory Module may not adapte to Hidden Refresh Method access, therefore adjustment to Normal access in the **CMOS setup** would be required.

8 Bits and 16 Bits I/O Slot Pin Assignment

Pin #	B	A	D	C
1	GND	-I/O CH CK	-MEM CS16	SBHE
2	RESET DRV	SD 7	-I/O CS16	LA23
3	+5 Vdc	SD6	IRQ10	LA22
4	IRQ9	SD5	IRQ11	LA21
5	-5 Vdc	SD4	IRQ12	LA20
6	DRQ2	SD3	IRQ15	LA19
7	-12 Vdc	SD2	IRQ14	LA18
8	OWS	SD1	-DACKO	LA17
9	+12 Vdc	SD0	DRQO	-MEMR
10	GND	-I/O CH RDY	-DACK5	-MEMW
11	-SMEMW	AEN	DRQ5	SD08
12	-SMEMR	SA19	-DACK6	SD09
13	-IOW	SA18	DRQ6	SD10
14	-IOR	SA17	-DACK7	SD11
15	-DACK3	SA16	DRQ7	SD12
16	DRQ3	SA15	+5 Vdc	SD13
17	-DACK1	SA14	-MASTER	SD14
18	DRQ1	SA13	GND	SD15
19	-Refresh	SA12		
20	CLK	SA11		
21	IRQ7	SA10		
22	IRQ6	SA9		
23	IRQ5	SA8		
24	IRQ4	SA7		
25	IRQ3	SA6		
26	-DACK2	SA5		
27	T/C	SA4		
28	BALE	SA3		
29	+5 Vdc	SA2		
30	OSC	SA1		
31	GND	SA0		

Processor Clock Setup

The frequency of the Processor Clock is generated by an Oscillator. Normally, the processor clock is half of the oscillator clock, i.e. Oscillator Clock equals 66Mhz, then the Processor Clock is 33Mhz.

The **STO486WB** Mother Board can be Single/Double Frequency with respect to the Oscillator Clock, therefore a 50Mhz Oscillator can be installed and the Processor Clock is also 50Mhz when using Single Clock Source.

If the system board is not utilising an oscillator then the Processor Clock will be controlled by a **Clock Chip** to set the timing of the clock chip , please refer to the Frequency Table below for setting jumpers JC0, JC1, and JC 2 for the required frequency.

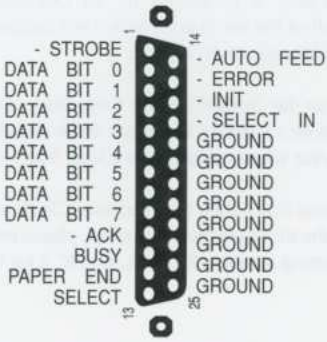
Frequency Table by Clock Chip

JC0	JC1	JC2	Clock (Mhz)
0	0	0	20.00
1	0	0	24.00
0	1	0	32.00
1	1	0	40.00
0	0	1	50.00
1	0	1	66.66
0	1	1	80.00
1	1	1	100.00

(0 = Open 1 = Close Frequency Generated by ICD2023)

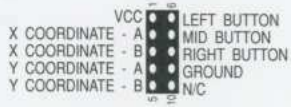
Caution: Make sure the frequency is being setted according to the specification of the system board. Otherwise, the system board may not run.

I/O Connector Pin Assignment

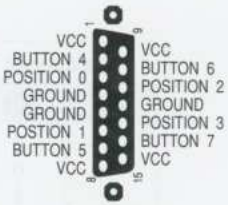


Parallel Printer Port
Pin Assignment

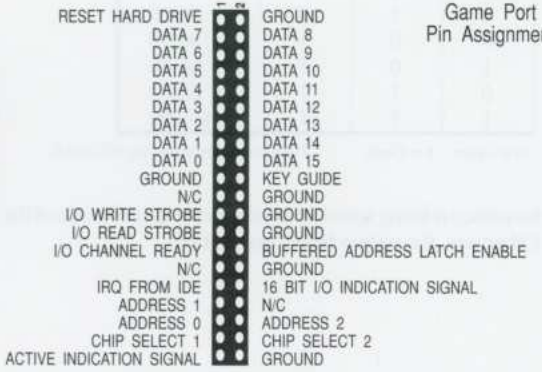
Serial Port - RS232C
Pin Assignment



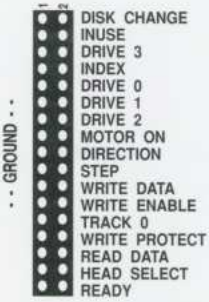
Bus Mouse Port
Pin Assignment



Game Port
Pin Assignment



IDE Controller Connector
Pin Assignment



Floppy Disk Controller Connector
Pin Assignment

CMOS Setup

Main BIOS setup

Also known as CMOS setup, and this is for **MR BIOS**.

This is also for our **STO486WB, STO386WB, STO386*SX*P** as well as **STO386*SX*C**.

Why The configuration of various settings, such as real time clock, combination of add-on cards, system memory usage, special applications & etc. All these settings are being kept by the CMOS MEMORY, it will pass the setting to the operating system when system being boot up. The CMOS MEMORY is backup by the NiCa rechargeable battery even the power is down.

In order to achieve the maximum system performance, to setup the CMOS memory is essential.

When Setup will be required with either one of the following conditions:-

- First Time Installation.
- Change of Memory size (Extended/Expanded Memory Settings), Drivers, Display card & etc.
- Low level formatting of Fixed/Hard Drives.
- Change of Password.
- Change of system features, such as Shadow Ram for BIOS and Video, Remapping of memory, Wait State, DMA, Enable cache, Speed, Boot Sequence, Keyboard and etc.
- The Backup battery would be empty or low when the system being down for a long time, therefore First Time Installation should be done accordingly.

How The setup menu is user friendly, easy to use and self explanatory. Additional information is also provided.

The CMOS setup menu also can apply to various system boards, such as for **80486DX, 80486*SX*, 80487*SX*, 80386DX, AMB386DXL 80386*SX*, AMD386*SX*** and as well as **80286** CPU. Therefore, some of the special features as mentioned may not be available to that particular system board.

Main BIOS setup

Also, the information in this menu may not be as same as the screen, this is due to updating of new features in the BIOS from time to time. Therefore, users are welcome to contact us with this concerns when required.

Defaults & Suggestions

Default values also given with a (*), to fine tune the system performance is to adjust the setting according. However, error setting will give system crash or hang. If happened, then set to default value and try again.

A special feature also built-in with this **BIOS** that when error setting have been set and give problem. Then switch off the power supply, and turn on the system again, or by press the reset switch. Press **ESC** during system checkup to enter the setup menu again, then make the necessary change accordingly.

The following are required Keystrokes during the setup Menu.

F10 TO RECORD AND EXIT

Press **F10** to record the new configuration to **CMOS**, and terminate the Setup session. The system will proceed to boot-up.

Home End ← → MOVES CURSOR

The Menu-cursor can be moved respectively to the first entry, last entry, or next leftward, rightward entry.

↵ TO SELECT

The Menu-cursor currently illuminates an entry, such as CLOCK, VIDEO, FLOPPY, etc., and the Edit-Window currently shows the configuration related to that Menu entry. Press **ENTER** to commence editing that **"Edit Page"**. The cursor will move from the Menu-Line into the **"Edit-Page"**, upon the first editable field. Note: **PgDn** key can be used instead of **ENTER** in this context.

ESC FOR MENU ↑ ↓ ← → MOVES CURSOR

The cursor is currently in the **"Edit-Window"**. **ESC** (or **PgUp**) returns it to the Menu Line. Note: the newly edited configuration is not yet recorded to **CMOS**. See **F10** key description above.

The cursor is currently illuminating a field within an **"Edit-Page"**. It may be moved to another field via these cursor keys.

Main BIOS setup

↵ TO EDIT

The cursor is currently illuminating a field within an Edit-Page. This particular field can be edited by keying-in numbers or letters. To invoke the editor, press **ENTER**. The field remains illuminated, and a small blinking underline (hardware cursor) will appear under the leftmost editable character in that field. In general, ←, →, **Space**, **BackSpace**, and **Alpha Numerics** are accepted in edit mode. **ESC** will restore the field to its pre-edit state and the blinking underline will disappear. **ENTER** will finalize the edit and the blinking underline will disappear. All "edit-mode" keystrokes are prompted.

+-SCROLLS CHOICES, SPACEBAR +- TO CHANGE, SPACEBAR +-SCROLLS CHOICES

The cursor is currently illuminating a field within the **"Edit-Page"** which may be changed. **SpaceBar** and "**+**" make visible (select) other available.

CMOS Setting Menu

MR BIOS (tm) Copyright (c) 1991, Microid Research Ver. xx.xx Port xxxxxxx

Summary | Clock | Video | Floppy | Fixed | Boot-Seq | Keyboard | More—

CPU Type	80486-04	Floppy 0	1.2M [5 1/4]
CPU Mhz	33.3 (2x)	Floppy 1	1.44M [3 1/2]
		Floppy 2	360K [5 1/4]
Coprocessor	Built-in	Floppy 3	2.8M [3 1/2]
		Fixed 80	42.5M [17]
RAM Cache	256K	Fixed 81	None
Shadow RAM	Enable	Boot Sequence	Prompt
Memory - Base	640K	Anti-Virus	Enable
Memory - Extended	15360K	Security	Disable
Memory - System	384K		
Memory - Total	16384K	Keyboard	PC/AT
		Numlock	Off
COM1 3F8 / LPT1 3BC		Typematic	30
COM2 2F8 / LPT2 378			
COM3 n/a / LPT3 n/a		Video - Primary	V/EGA-Color
COM4 n/a / LPT4 n/a		Video - Secondary	Monochrome

F10 to Record and Exit — Home End Moves Cursor

CPU Type BIOS will report the type of processor being installed on the system board, such as 80486, 80386, 80386*SX*, and as well as 80286.

Coprocessor It show a Built-In Coprocessor for the 80486 System Board.

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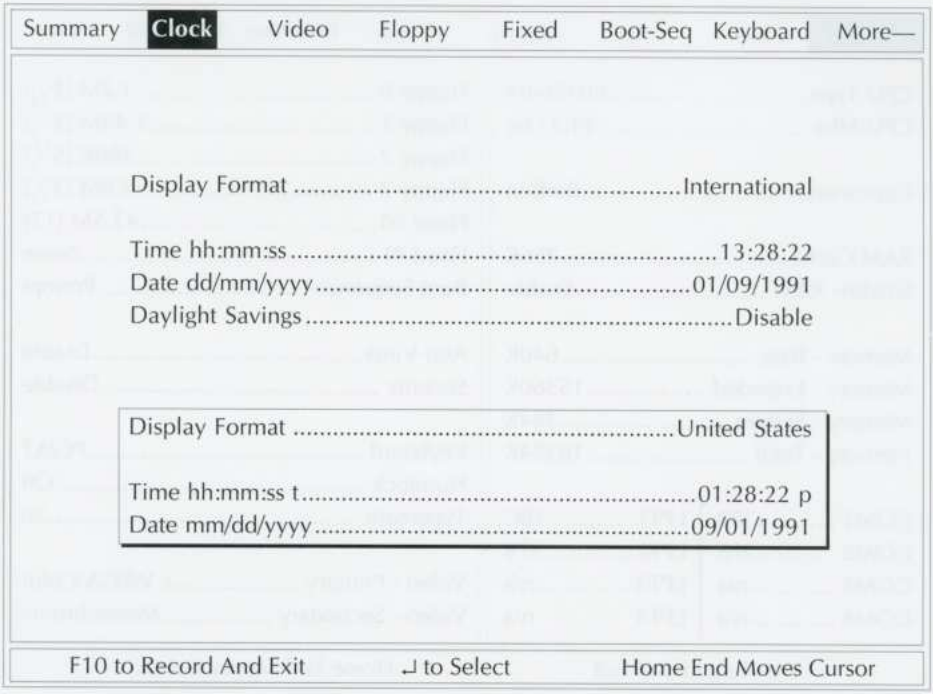

Daylight Saving (Enabled)

Automatically adjusted.

Changing the setting of any one field at 11:59:59pm may permit unexpected roll-over of another field, and especially unintended results may occur during daylight-savings transition periods, (On the last Sunday in April, the time increments from 1:59:59am to 3:00:00am. On the last Sunday in October, when the time first reaches 1:59:59am, it is rolled-back to 1:00:00am.)

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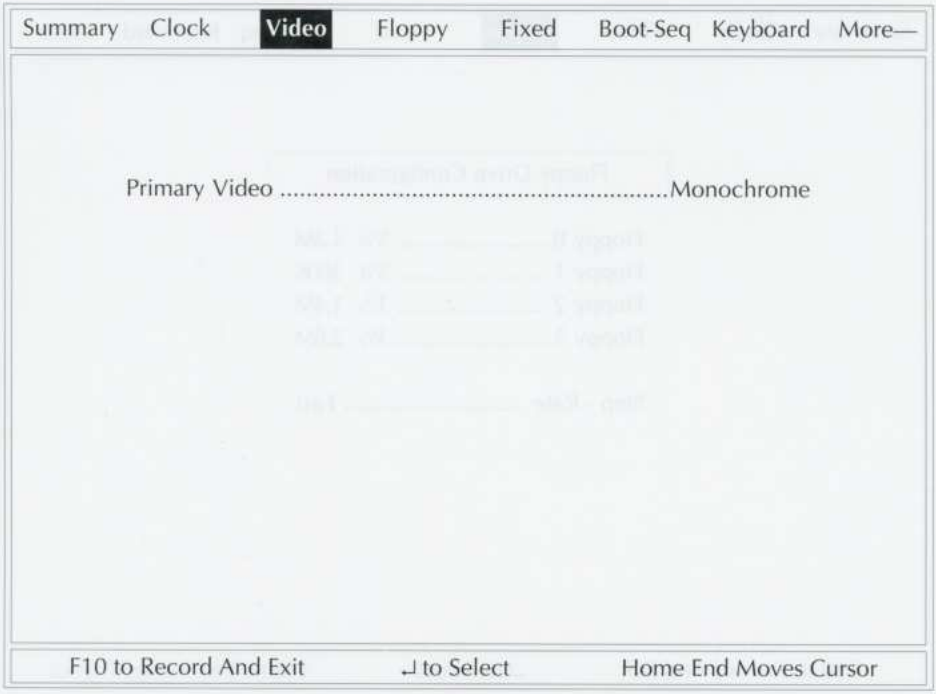

No jumper setting on Mother Board is required when using this BIOS. Also see Security Switch.

The BIOS also sense the type of Primary Display Card as Installed, and it change to right setting automatically.

2 Display Cards can be installed.

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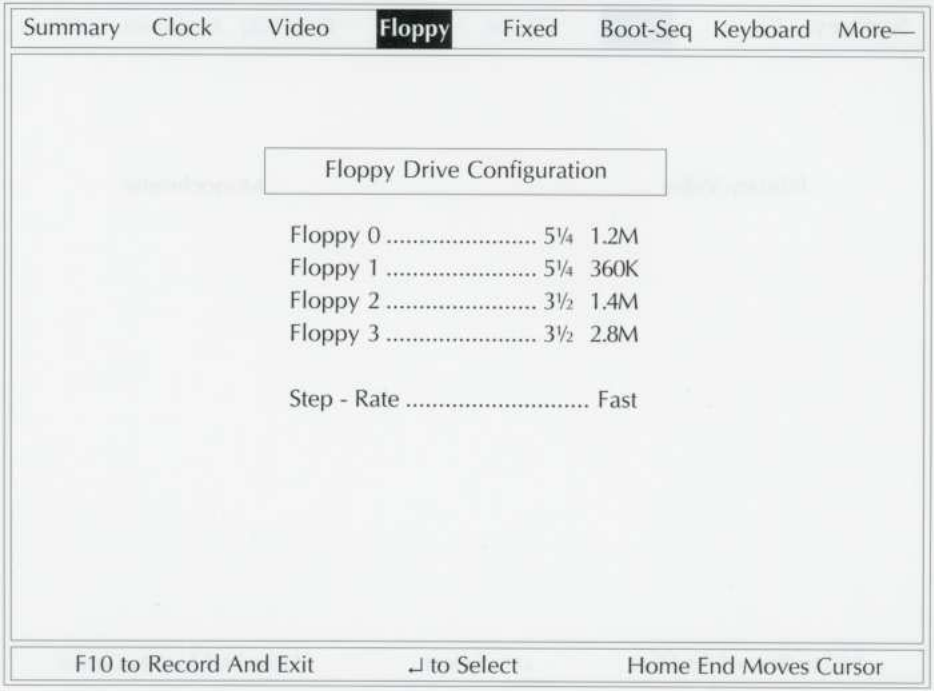

The Step - Rate of the drive step motor can be adjusted as per requested.

No setting is allowed if Floppy Controller is not installed. Floppy 2 & 3 is only valid when the secondary controller is installed.

Driver types are 360KB, 720KB, 1.2MB, 1.44MB & 2.88MB

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Summary Clock Video Floppy **Fixed** Boot-Seq Keyboard More—

Fixed Disk 80 (C:)		Fixed disk 81 (D:)
Size 42.5M	(Low Level) Format	Size ..... None
Type 17		Type ..... None
Cylinder 977	Drive (C/D) ..... *	Cylinders ..... n/a
Heads 5	Start Cyl ..... *	Heads ..... n/a
Precomp 300	Final Cyl ..... *	Precomp ..... n/a
Landing 977	Interleave ..... *	Landing ..... n/a
Sectors 17	Ready (y/n) ..... *	Sectors ..... n/a
Translate ..... No		Translate ..... n/a
Anti-Virus ..... Yes		

Programmable drives Types 46 & 47 are user programmable. The drive parameters (cylinders, heads, sectors, etc.) can be programmed individually for both drives. Cylinders beyond 1024. Up to 16K cylinders are supported via a translation algorithm, limited only by the capability of the drive adaptor card.

Hard Drive Table The drive table entry is standard, to maintain compatibility with non-DOS operating systems which may by pass BIOS. Refer to Hard Drive Table for further information.

Low Level Format Built-in low-level format with a selectable interleave (1:1 to Max. -1). A selectable range of cylinders may be formatted.

Special Features Programmable step rates will improve performance.

Compatibility MFM, RLL, IDE and ESDI compatibility.

Anti-Virus If Yes, Low level/DOS fomat Hard Drive will not be allowed.

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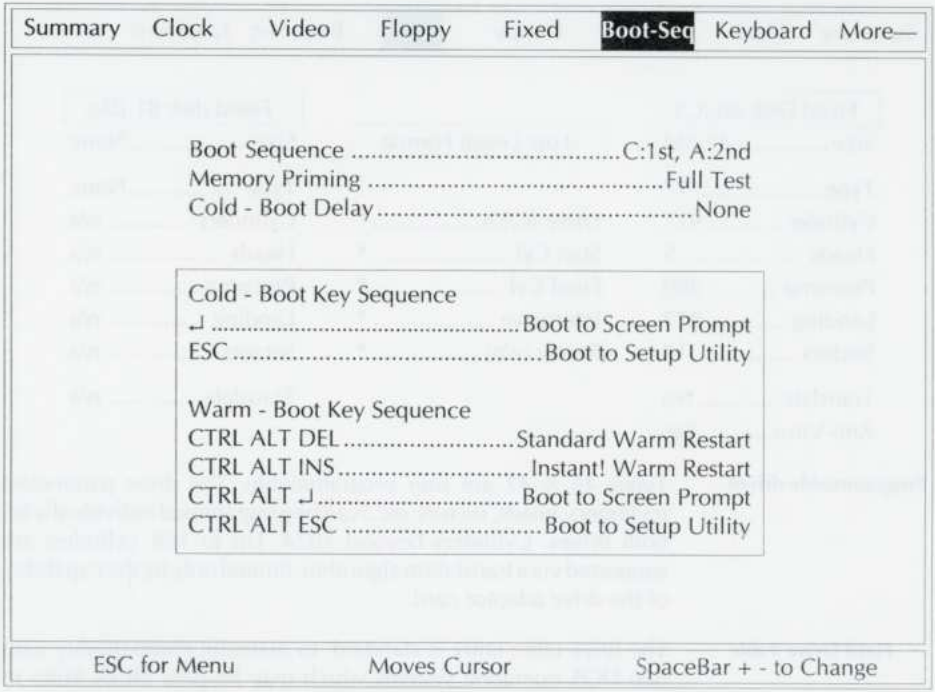

Boot Sequence Choice of C:1st A:2nd, A:1st C:2nd or Screen Prompt.

Screen Prompt
Press F1 to Boot A:
F2 to Boot C:

If **F1** and Floppy Drive is not ready or no Boot Disk in A:, system will not automatically to boot from C: and report **Error**, then return to Screen Prompt again.

Memory Priming Set to Quick Scan for speeding up to boot when perform a Cold Boot routine.

Note **CTRL ALT ESC** & **CTRL ALT** ↵ will not functioning when the system have been booted up. **Increase Cold Boot Delay when using slow reaction Hard Drive.**

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Summary	Clock	Video	Floppy	Fixed	Boot-Seq	Keyboard	More—

Power Numlock .....Disable

Typematic Repeat Rate .....30.0 cps

Delay Before Repeat .....0.50 sec

F10 to Record And Exit ↵ to Select Home End Moves Cursor

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—More **First - Aid** Cache Shadow DMA Chipset Security

Certain PC design advances may reveal/cause difficulties with existing software. These special options may correct/enhance system operation.

Novell Keyboard Management .....No

A20 - Gate Always Enabled .....No

Prevent Math Unit Access .....No

ESC for Menu Moves Cursor SpaceBar + - to Change

Problem with Novell Select the lowest numeric value allowing the keyboard to operate properly.

Problem with Gate A20 Select YES for fastest Extended-Memory/Protected-Mode access.

Problem with Math Unit/Co-Processor Select YES if math problems or mystery crashes occur. "Prevent Math Unit Access" is **not available for 80486 system board.**

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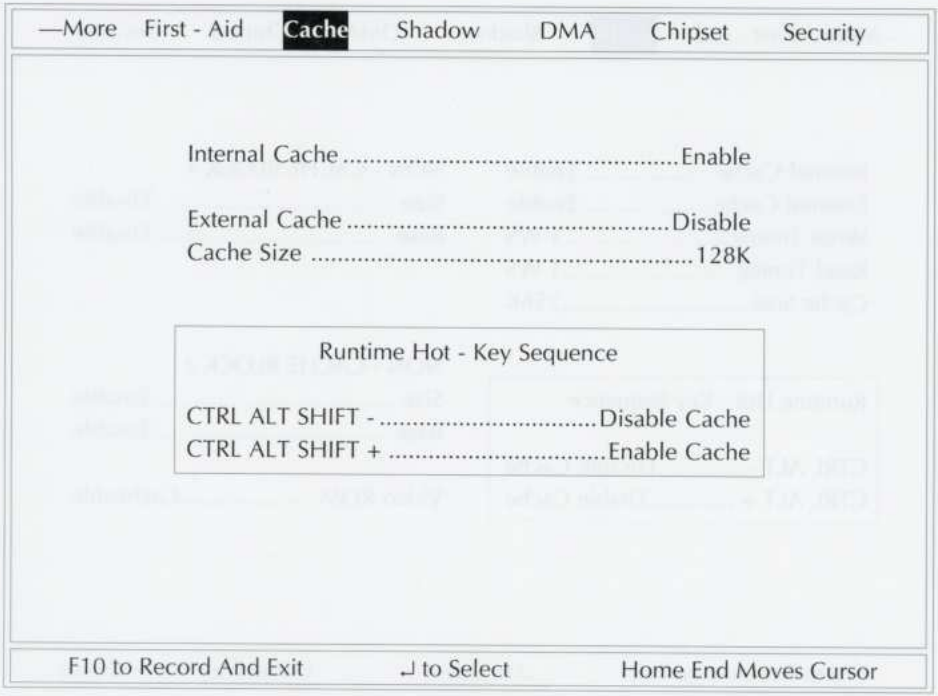

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—More First - Aid **Cache** Shadow DMA Chipset Security

Internal Cache .....Enable
External Cache .....Enable
Write Timing.....1 WS
Read Timing .....1 WS
Cache Size 256K

Runtime Hot - Key Sequence

CTRL ALT -.....Disable Cache
CTRL ALT +.....Enable Cache

NON - CACHE BLOCK 1
Size .....Disable
Base .....Disable

NON - CACHE BLOCK 2
Size .....Disable
Base .....Disable

Video ROM .....Cacheable

F10 to Record And Exit ↵ to Select Home End Moves Cursor

Note: For user using expanded memory on STO486WB, the use of the Runtime Hotkey is not recommanded, as it may cause the system hang.

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—More First - Aid Cache **Shadow** DMA Chipset Security

Shadow-RAM Disabled: Vacant = No ROM Found ROM #n = ROM is Present
Shadow-RAM Enabled: RW = Read-Write WP = Write-Protect
** Best performance is usually obtained by Shadowing indicated ROMs **

F000 BIOS ..... WP - Shadow
E000 ADAPTOR ..... Vacant
DC00 ADAPTOR ..... Vacant
D800 ADAPTOR..... Vacant
D400 ADAPTOR..... Vacant
D000 ADAPTOR..... Vacant
CC00 ADAPTOR..... Vacant
C800 ADAPTOR ..... Vacant
C400 VIDEO ..... Vacant
C000 VIDEO ..... Vacant

F000 UMB User Info

BIOS	FC1A-FFFF
UTILS	FBA1-FC19
POST	F76B-FBA0
SETUP	F191-F76A

AVAIL: F000-FB9E

F10 to Record And Exit ↵ to Select Home End Moves Cursor

Some add on card BIOS may not be recognized by the system when set to Shadow Ram function, for example some SCSI cards. If this is the case, then set those area as the ROM# as indicated.

For Upper Memory Block Application

When using **QEMM386**, **EMM386.EXE, EMM386.SYS.** Up to **144K**, UMB, is available depending on system configuration.

Reference as per Ver. 1.26:

STO486WB	**F000-FB9E**	**STO386WB**	**F000-FBBD**
STO386SXC	**F000-FBCA**	**STO386SXP**	**F000-FBEF**

Note:

Frame Address range should not set above EFFF, and Runtime Hot Key maybe disabled.

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—More First - Aid Cache Shadow **DMA** Chipset Security

Adjusting DMA parameters may increase throughput of Ethernet, SCSI and other BUS-Masters. Improved Floppy reliability could also result, but without performance gains. Default (*) settings are industry standard.

* DMA Clock ATCLK/2

* 8-Bit Waits .....1 WS
* 16-Bit Waits .....1 WS

* Command Width .....Normal
* MEMR# Signal .....Normal
* MEMW# Signal .....Normal

* Default

F10 to Record And Exit ↵ to Select Home End Moves Cursor

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—More First - Aid Cache Shadow DMA **Chipset** Security

DRAM TIMING
Read Waits 0
Write 0

REFRESH OPTIONS
* Method .....Hidden
Period 60uS

AT-BUS PARAMETERS
* Extra Wait .....No
* Bus-Conversion ALEs .....Multiple
* AT-Bus Clock Rate .....8.3 MHz

* Default

ESC for Menu Moves Cursor SpaceBar + - to Change

Hidden Refresh

Some DRAM SIMM Modules may require the **Refresh Option** to be set at **NORMAL** instead of the default Hidden, and also have the Refresh Period set at 60uS instead of 15 uS. (e.g. some 1MB x 9 SIMM Modules with 3 chip pieces instead of the normal 9 will require this setting.)

DRAM Wait State

Select default (*) Wait State for suggested DRAM speed. Decrease wait state when using faster DRAM.

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—More First - Aid Cache Shadow DMA **Chipset** Security

Chip Revision X

Reg 10 : Wait States - Write 1*
Reg 10 : Wait States - Read 1*

Reg 14 : AT-Bus Speed.....8.3 Mhz*

ESC for Menu Moves Cursor SpaceBar + - to Change

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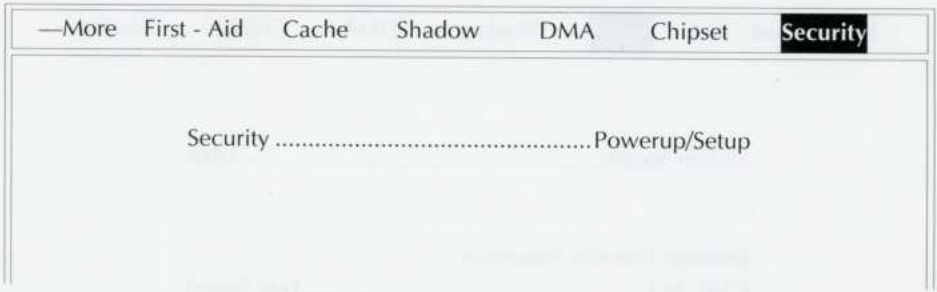

Security switch: This function requires Jumper to be closed to enable this feature. This feature only applies to MR BIOS. When the jumper is shorted on the board the Security Paging setup will allow you to choose between setup only and power up/setup.

Setup Only: If this option is chosen then the user is not allowed access to the setup menu unless they have the password.

Powerup/Setup: If this option is chosen the user cannot access the setup nor run the computer unless he enters the correct password. The system speaker will alarm if the user enters incorrect passwords 3 times.

Change Code: This facility allows you to set or to change the password and it also requires entires to be verified to ensure the entry is correct.

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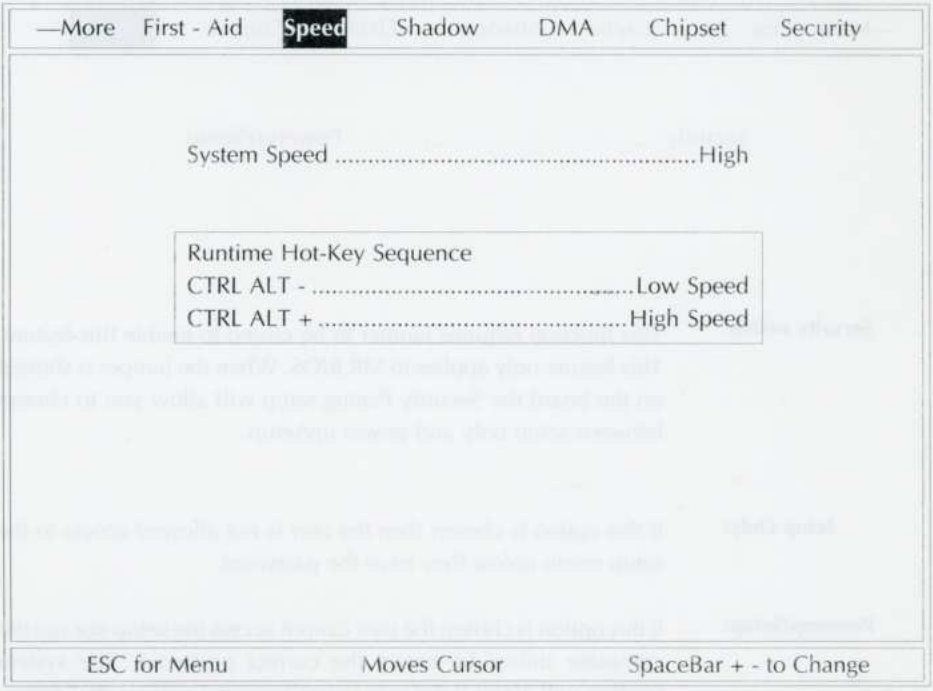

Software Turbo Switch To set initial processor speed of the system.

Fixed/Hard Disk Table

Type	Cylinders	Heads	Precomp	Landing	Sectors	Translate	Step-Rate	Examples
1	306	4	128	305	17	No	0	IBM, Miniscribe 1012
2	615	4	300	615	17	No	0	IBM,ST225,CDC,Wren119415-5-25 Miniscribe 8438F
3	615	6	300	615	17	No	0	IBM, PT338, Sequest SQ338F, ST-138
4	940	8	512	940	17	No	0	IBM
5	940	6	512	940	17	No	0	IBM
6	615	4	None	615	17	No	0	IBM, MS8425, ST-4026, Tandon TM262, TM702AT
7	462	8	256	511	17	No	0	IBM
8	733	5	None	733	17	No	0	IBM, ST-4038, CDC Wren 119415-5-38, TM703AT
9	900	15	None	901	17	No	0	IBM
10	820	3	None	820	17	No	0	IBM
11	855	5	None	855	17	No	0	IBM
12	855	7	None	855	17	No	0	IBM
13	306	8	128	319	17	No	0	IBM
14	733	7	None	733	17	No	0	IBM
15	0	0	None	0	0	No	0	
16	612	4	0	663	17	No	0	IBM, Mitsubishi MR522
17	977	5	300	977	17	No	0	IBM, ST151
18	977	7	None	977	17	No	0	IBM
19	1024	7	512	1023	17	No	0	IBM
20	733	5	300	732	17	No	0	IBM
21	733	7	300	732	17	No	0	IBM
22	733	5	300	733	17	No	0	IBM
23	306	4	0	336	17	No	0	IBM
24	805	4	None	805	26	No	0	Sector26
25	925	9	None	925	17	No	0	CDC94155-86
26	776	8	None	776	33	No	0	sector 33
27	1024	5	512	1024	17	No	0	Micropolis 1323A, Miniscribe 3053/6053, ST-4053
28	1024	8	None	1023	17	No	0	Maxtor XT-1085
29	823	10	None	823	17	No	0	
30	1224	15	None	1223	17	No	0	Maxtor XT-2190
31	1024	11	None	1024	17	No	0	
32	1024	15	None	1024	17	No	0	
33	1024	5	None	1024	17	No	0	Micropolis 1323A/1333A,Miniscribe3053/6053,ST4053
34	612	2	128	612	17	No	0	Miniscribe 6212/8212
35	1024	9	None	1024	17	No	0	Seagate ST-4096
36	1024	8	512	1024	17	No	0	Maxtor XT1085,CDC94155-85,Micropolis1324A/1335
37	615	8	128	615	17	No	0	NEC D5146H
38	823	10	256	823	17	No	0	
39	809	6	128	809	17	No	0	
40	820	6	None	820	17	No	0	Seagate ST-251, PT-351
41	977	5	None	977	17	No	0	Seagate ST-4051
42	981	5	None	981	17	No	0	
43	823	10	512	823	17	No	0	
44	830	10	None	830	17	No	0	
45	917	15	None	917	17	No	0	
46	User Programmable							
47	User Programmable							

AT Bus Hard Drive Table

Brand	Model	Cyclinders	Heads	Sectors
Areal	MD2060	1024	2	60
Corner	CP3000	977	5	17
Corner	CP30104	761	8	39
Corner	CP3204	971	11	38
Fujitsu	M2611	667	4	33
Fujitsu	M2612	667	8	33
Fujitsu	M2613	667	12	33
Fujitsu	M2614	667	16	33
Fujitsu	M2616	667	9	33
Maxtor	7040A	981	5	17
Maxtor	7060	1024	7	17
Maxtor	7080A	981	10	17
Maxtor	7120	1024	14	17
Maxtor	LXT213	683	16	38
Maxtor	LXT340	654	16	63
Maxtor	LXT535	1036	16	63
NEC	D3761	915	7	36
Quantum	LPS105	755	16	17
Quantum	LPS52	751	8	17
Quantum	PS120	814	9	32
Quantum	PS170	968	10	34
Quantum	PS210	873	13	36
Seagate	ST157A	977	5	17
Seagate	ST351A/X	820	6	17
Seagate	ST3096A	1024	10	17
Seagate	ST3120A	1024	12	17
Seagate	ST3144A	1024	15	17
Western Digital	AB130	1024	7	17
Western Digital	AC140	980	5	17
Western Digital	AC2120	872	8	35
Western Digital	AC280	980	10	17
Western Digital	AH260	1024	7	17
Western Digital	AP4200	987	12	35

For reference only

Beep Code and Error Message

Cause of Failure / Error 1 = High tone 0 = Low tone	Audio	System Status
ROM-BIOS Checksum	01-000	Halted
DMA Page Register	01-100	Halted
Keyboard Controller Selftest	01-010	Halted
Memory Refresh Circuitry	01-110	Halted
Master (16-bit) DMA Controller	01-001	Halted
Slave (8-bit) DMA Controller	01-101	Halted
Memory Bank 0 Pattern Test	01-0000	Halted
Memory Bank 0 Parity Circuitry	01-1000	Halted
Memory Bank 0 Parity	01-0100	Halted
Memory Bank 0 Data Bus	01-1100	Halted
Memory Bank 0 Address Bus	01-0010	Halted
Memory Bank 0 Block Access Read	01-1010	Halted
Memory Bank 0 Block Access Read/Write	01-0110	Halted
Master 8259 (Port 21)	01-1110	Halted
Slave 8259 (Port A1)	01-0001	Halted
Master 8259 (Port 20) Interrupt Address	01-1001	Halted
Slave 8259 (Port A0) Interrupt Address	01-0101	Halted
8259 (Port 20/A0) Interrupt Address	01-1101	Halted
Master 8259 (Port 20) Stuck Interrupt	01-0011	Halted
Slave 8259 (Port A0) Stuck Interrupt	01-1011	Halted
System Timer 8254 CHO / IRQ0 Interrupt	01-0111	Halted
8254 Channel 0 (System Timer)	01-1111	Halted
8254 Channel 2 (Speaker)	01-00001	Halted
8254 OUT 2 (Speaker Detect)	01-10001	Halted
CMOS RAM Read/Write Test	01-01001	Halted
RTC Periodic Interrupt / IRQ8	01-11001	Halted
Keyboard Controller Failure	01-1001	Halted
Memory Parity Error	01-01101	Halted
IO Channel Error	01-11101	Halted
A20 Test Failure Due to 8042 Timeout	01-00011	Halted
A20 Gate Stuck in Disabled State (A20=0)	01-10011	Halted
Real-Time-Clock (RTC) is Not Updating	01-01011	Halted
Video ROM Checksum Failure at Address XXXX	01-00101	Halted

Error Message with No Audio

Monochrome Card Memory Error at Address XXXX
Monochrome Card Address Line Error at Address XXX
Color Graphics Card Memory Error at Address XXXX
Color Graphics Card Address Line Error at Address XXXX
Real-Time-Clock (RTC) Battery is Discharged
Battery Backed Memory (CMOS) is Corrupt
RAM Pattern Test Failed at XXXX
Parity Circuitry Failure in Bank XXXX
Data Bus Test Failed: Address XXXX
Address Line Test Failed at XXXX
Block Access Read Failure at Address XXXX
Block Access Read/Write Failure at Address XXXX
Banks Decode to Same Location: XXXX and YYYY
Keyboard Error - Stuck Key
Keyboard Failure or Keyboard Not Present
A20 Gate Stuck in Asserted State (A20 Follows CPU)
Real-Time-Clock (RTC) Settings are Invalid
Diskette CMOS Configuration is Invalid
Diskette Controller Failure
Diskette Drive A: Failure
Diskette Drive B: Failure
Fixed Disk CMOS Configuration is Invalid
Fixed Disk C: (80) Failure
Fixed Disk D: (81) Failure
Please Wait For Fixed Disk to Spin Up
Fixed Disk Configuration Change
Diskette Configuration Change
Serial Port Configuration Change
Parallel Port Configuration Change
Video Configuration Change
Memory Configuration Change
Numeric Coprocessor Configuration Change
System Key is in Locked Position - Turn Key to Unlocked Position
Adaptor ROM Checksum Failure at Address XXXX

Performance Index