

80386DX

(A3865)

**OPERATION
MANUAL**



80386 – 33MHZ CACHE

(A3865)

OPERATION MANUAL

INSTALLING YOUR MOTHERBOARD

1

INSTALLATION

2

EASY SETUP

3

APPENDIX

4

TABLE OF CONTENTS

		1	Note
		2	Electrical Safety
		3	Trade Acknowledgement
Chapter	One	4	Installing Your Motherboard
		5	Features
		7	Jumper Settings
		8	Power Supply Connector
			Keyboard Connector
		9	Speaker Connector
			Keylock and Front Panel Power
			LED Connector
			External Battery Connector
Chapter	Two	10	Installing
		11	External Features
		13	The Tower Case
		14	The Slim Case
		15	Installing
		20	Math Co-Processor
		21	Diagram for Math Co-processor
Chapter	Three	22	Easy Setup
		23	Memory Configuration
		24	CMOS Setup
		25	Standard CMOS Setup
		27	The Advanced CMOS Setup
		30	The Advanced Chipset Setup
		31	MM.SYS EMS Driver
		32	Running the System
		34	Hard Disk Utility
Chapter	Four	39	Appendix
		40	System Memory Map
		42	I/O Channel Pin Assignment
		43	I/O Channel Signal Description
		47	Troubleshooting Your System
		50	Keyboard
		51	The Advanced 80386DX Chip Set
		52	Index

NOTE

NOTE

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
- Reorient the receiving antenna.
- Move the computer away from the receiver.
- Plug the computer into a different power outlet so that computer and receiver are on different branch circuits.
- If necessary, the user should consult with the dealer or an experienced radio/television technician for additional suggestions.

Product data and specification information herein are subject to change without prior notice for the sake of technical improvements in performance and reliability, since we are permanently endeavoring to supply the best products possible.

The manufacturer does not assume responsibility for customer product designs and for the fitness to any particular application, nor for patent rights or other rights of third parties and infringements thereof resulting from the use of this product.

The information furnished by us is believed to be accurate and reliable. However, no responsibility is assumed for inaccuracies that may not have been detected prior to printing, and for those which occur beyond our control.

This document may not, in whole or part be copied, photocopied, reproduced, translated, or converted to any machine readable form without prior written consent of the publisher.

Electrical Safety

This 80386 Cache system is equipped with a standard 220 watt power supply. Do not replace the power supply with another power supply lower than 220 watt.

This 80386 Cache uses a three-wire power cable which connects the chassis of the unit to the earth ground when it is connected to a three-wire ground receptacle. This power cable should not be longer than four feet.

CAUTION

Continuity of the ground circuit is vital for safe operation of the unit. Never operate this equipment with the grounding conductor disconnected.

Before you do anything, please check the AC voltage setting of your computer system, display monitor unit etc. The location of these settings should be close to the AC power cable inlet of your system. E.g. on the back panel of the 80386DX system.

This

-
-
-
-
-
-
-
-
-

All p
trade

DOC
REV
P/N M

NOTE

power supply. Do not use a power supply with less than 220 watt.

Remove the cover from the chassis of the computer and the power supply receptacle.

Never operate the computer with the cover removed.

Do not touch the internal components of your computer. The internal components should be close to the 80386DX.

NOTE

This manual uses the following trademarks:

- IBM, OS/2, IBM/PC, PC/AT are registered trademarks of International Business Machine Corporation.
- Intel and 386 are the registered trademarks of Intel Corporation.
- Weitek is a registered trademark of Weitek Corporation.
- Xenix and MS DOS are registered trademarks of Microsoft Corp.
- VLSI is a registered trademark of VLSI Technology Inc.
- Novell is a registered trademark of Novell, Inc.
- Unix is a registered trademark of AT & T.
- 3Com is a trademark of 3Com Corporation.
- Hercules is a trademark of Hercules Computer Technology, Incorporated.

All product names mentioned in this manual and not listed above are the registered trademarks of their respective companies.

DOC No. 910726
REV No. 1.0
P/N No. 990003561

80386 Cache

1

CHAPTER 1 INSTALLING YOUR MOTHERBOARD

- Features
- Jumper Setting
- Connector Pinouts

FEATURES

The Significant Features of 80386 Cache System:

- 80386 CPU running at 33MHz
- Support Coprocessor (Weitek 3167 or Intel 80387 Synchronous)
- Support Asynchronous mode of Coprocessor (Intel 80387)
- Intel Smart Cache Controller 82395DX with 1K TAG RAM, 16KB Data RAM, Advanced Control Logic, Coprocessor Support Logic, 4DW Write Buffer posted, Dual bus structure, and A20 Logic.
- 4 way set associative
- Intel/ VLSI 82340DX TOPCAT Chip Set
- Support 8-bit ROM BIOS
- LIM EMS V4.0 Driver included
- Support Shadow RAM for System and Video BIOS
- Page mode operation on any bank
- 2/4-Way interleaving on same density of RAM on same or different types
- Page mode operation on any number of bank
- Support mix RAM types on different banks (SIP and DIP)
- Transparent memory remapping of banks
- Programmable DRAM timing for optimum system performance
- Fast gate A20 and Reset supports
- Legal AMI BIOS with built-in system setup utilities
- 1MB RAM (Expandable to 40MB RAM on board)
- Five 16-bit and three 8-bit slots
(synchronous/asynchronous Bus Clock)
- Display Mode supported: 8514/A, VGA, EGA, CGA, MDA, and Hercules

- Operation System supported: MS DOS, OS/2, XENIX, and UNIX
- Network supported: Novell, 3Com, and D-Link
- Board Size: 8.62" x 12.97"

The Advanced Features of 80386 Cache System:

- Dual speed selectable via keyboard
- On-board Real Time Clock/ Calendar with rechargeable battery
- On-board power good logic, active reset circuitries for stable power-on and power-off operations

System Performance

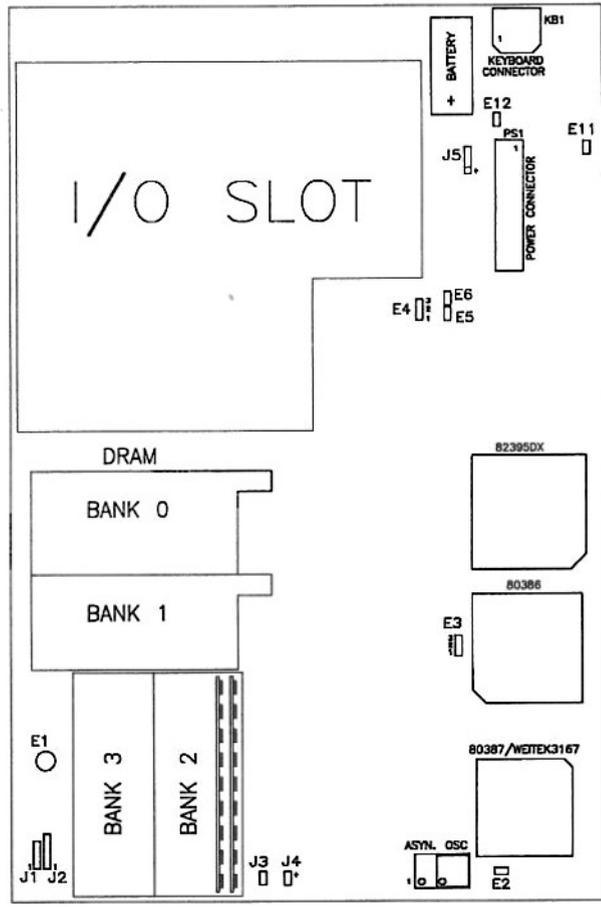
The 80386 Cache System is designed to bring you uncompromising quality and reliability in the super microcomputer technology. Through superior engineering and precise adherence to open 386 Intel Standards, the Powerstation has achieved unmatched performance and compatibility, with optimum hardware technology for the most demanding environments such as: CAD/CAM, Desktop Publishing, Networking, and Unix Multiuser Applications.

JUMPER SETTINGS

JUMPER SETTINGS

JUMPER SETTING OF A3865-XX V2.0

1



- J1 : SPEAKER
- J2 4,5: KEYBOARD LOCK
- 1,3: FRONT PANEL POWER LED
- J3 : RESET
- J4 : TURBO LED
- J5 : EXTERNAL BATTERY(6V)
- E1 : ON BOARD LED
- E2 ON: 80387 IN ASYNCHRONOUS MODE
- OFF: 80387 IN SYNCHRONOUS MODE(DEFAULT)
- E3 1,2: NO COPROCESSOR(DEFAULT)
- 2,3: COPROCESSOR PRESENT(80387/WEITEK3167)
- E4 1,2: RESET VALID AFTER KEYBOARD IS LOCKED
- 2,3: RESET VALID AT ALL TIME
- E5 ON: NORMAL OPERATION(DEFAULT)
- OFF: RESET CMOS SETUP
- E6 ON: RESET CMOS SETUP
- OFF: NORMAL OPERATION(DEFAULT)
- E11 ON: SYSTEM BURN-IN TEST
- OFF: NORMAL OPERATION(DEFAULT)
- E12 ON: COLOR DISPLAY(DEFAULT)
- OFF: MONO DISPLAY

	E5	E6
RESET CMOS	OFF	ON
NORMAL	ON	OFF

CONNECTOR PINOUTS

Power Supply Connector (PS1)

Pin	Description
1	Power Good
2	+5 Vdc
3	+12 Vdc
4	-12 Vdc
5	Ground
6	Ground
7	Ground
8	Ground
9	-5 Vdc
10	+5 Vdc
11	+5 Vdc
12	+5 Vdc

Keyboard Connector (KB1)

The keyboard cable connects to the system board through a 5-pin din connector. The following table lists the connector pins and their signal names.

Pin	Description
1	Keyboard Clock
2	Keyboard Data
3	Keyboard Reset
4	Ground
5	+5 Vdc

CONNECTOR PINOUTS

Speaker Connector (J1)

This is a 4-pin header.

Pin	Description
1	Speaker Signal
2	+5 Vdc
3	Ground
4	+5 Vdc

Keylock and Front Panel Power LED Connector (J2)

This is a 5-pin header.

Pin	Description
1	LED Power
2	Not used
3	Ground
4	Keyboard inhibit
5	Ground

External Battery Connector (J5)

This is a 4-pin header.

Pin	Description
1	+6 Vdc
2	Not used
3	Ground
4	Ground

80386 Cache

CHAPTER

2

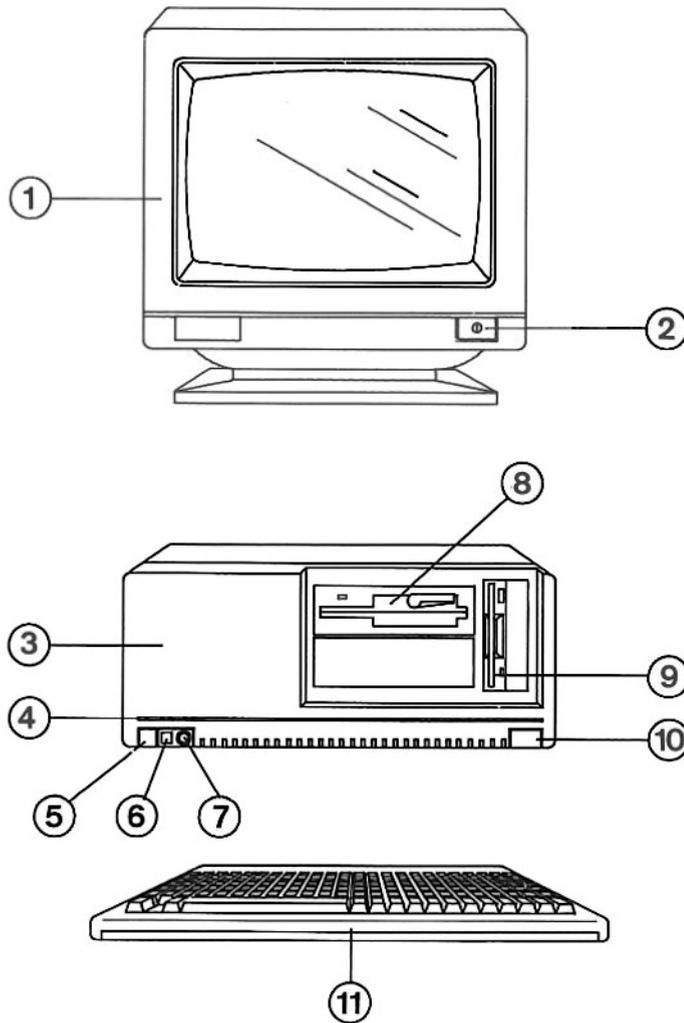
INSTALLATION

- External Features
- Installing
- Math Coprocessor

2

EXTERNAL FEATURES

EXTERNAL FEATURES



Descriptions are shown in next page.

EXTERNAL FEATURES

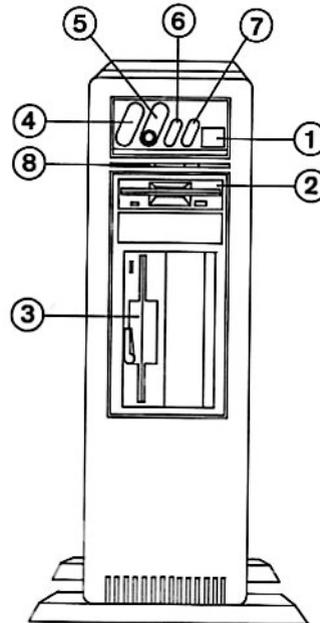
1. **Display Monitor**
It is used to display data and the status of the computer.
2. **Monitor Power Switch**
It is used to turn the screen on and off.
3. **Case**
The main unit contains the system board, power supply, one or two floppy-disk drive(s), hard-disk, display board (e.g. color graphic adapter, monochrome display adapter, enhanced or professional graphic adapter), a whole range of memory expansion board and Input/Output interface boards etc., depending on user's requirement.
4. **Indicator Lights**
For harddisk, power, & turbo.
5. **Turbo Switch**
It is for dual speed system. Turbo light turns on when the system runs at high speed, otherwise the light turns off.
6. **Reset Button**
It is used to reset/reboot the system.
7. **Keyboard Lock**
It is used to lock the keyboard avoiding from being accidentally pressed.
8. **5 1/4" Floppy-disk Drive**
It is used to read the data from or write the data to a 360KB/1.2MB formatted diskette.
9. **3 1/2" Floppy-disk Drive**
It is used to read the data from or write the data to a 720KB/1.44MB formatted diskette.
10. **System Power Switch**
It is used to turn the system On and Off.
11. **Keyboard**
It is the primary input device and connected to the computer via a connector at the back of the main unit.

EXTERNAL FEATURES

TOWER CASE

(Case design varies, here are two typical cases for your reference.)

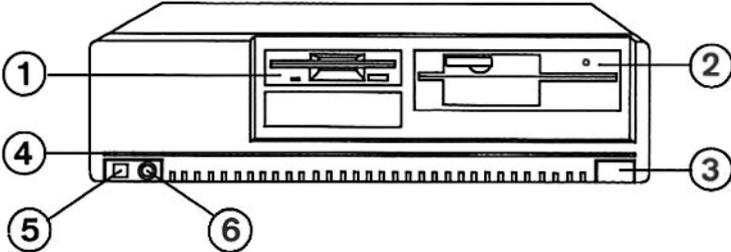
1. CPU speed
It shows the running speed of the Central Processing Unit.
2. 3 1/2" Floppy-disk Drive
It is used to read the data from or write the data to a 720KB/1.44MB formatted diskette.
3. 5 1/4" Floppy-disk Drive
It is used to read the data from or write the data to a 360KB/1.2MB formatted diskette.
4. Power Switch
It is used to turn the system On and Off.
5. Keyboard Lock
It is used to lock the keyboard avoiding from being accidentally pressed.
6. Reset Button
It is used to reset/reboot the system.
7. Turbo Switch
It is for dual speed system.
The Turbo light turns on when the system runs at high speed, otherwise the Turbo light turns off.
8. Indicator Light
For Harddisk & Turbo



SLIM CASE

- 1. 3 1/2" Floppy-disk Drive
It is used to read the data from or write the data to a 720KB/1.44MB formatted diskette.
- 2. 5 1/4" Floppy-disk Drive
It is used to read the data from or write the data to a 360KB/1.2MB formatted diskette.
- 3. Power Switch
It is used to turn the system On and Off.
- 4. Indicator Light
For Power, Turbo, & Harddisk.
- 5. Reset Button
It is used to reset/ reboot the system.
- 6. Keyboard Lock
It is used to lock the keyboard avoiding from being accidentally pressed.

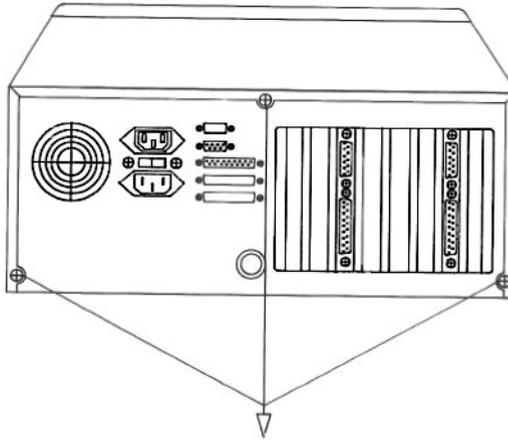
2



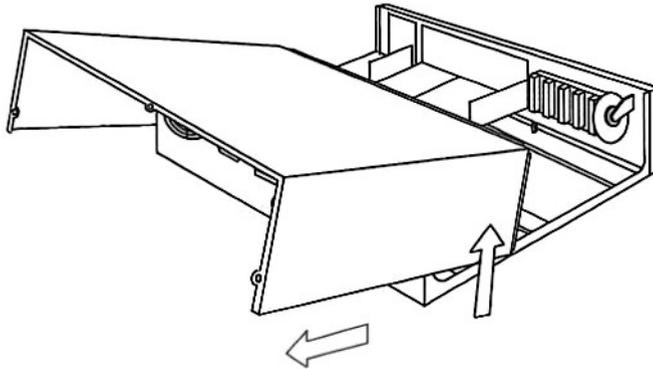
INSTALLING

INSTALLING

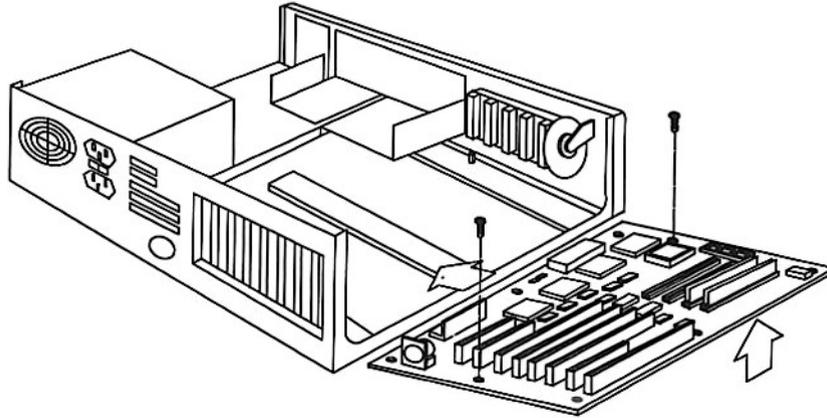
- Step 1: Before starting the installation, please make sure the power is OFF. Remove the cover mounting screws at the rear of the unit and retain all the screws for use later.



- Step 2: Slide cover toward you, then up and away from chassis as figure shown.

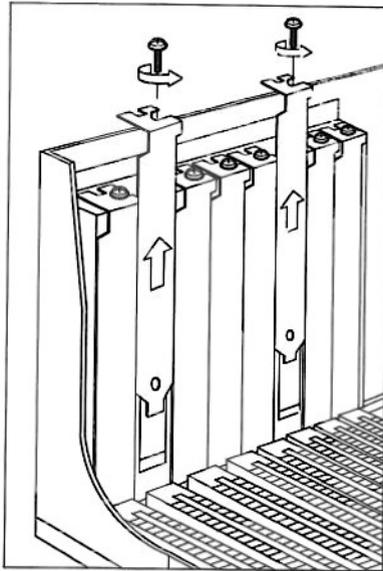


Step 3: Grasp the motherboard in both hands and slide it into the the chassis, then fasten with screws as figure shown.



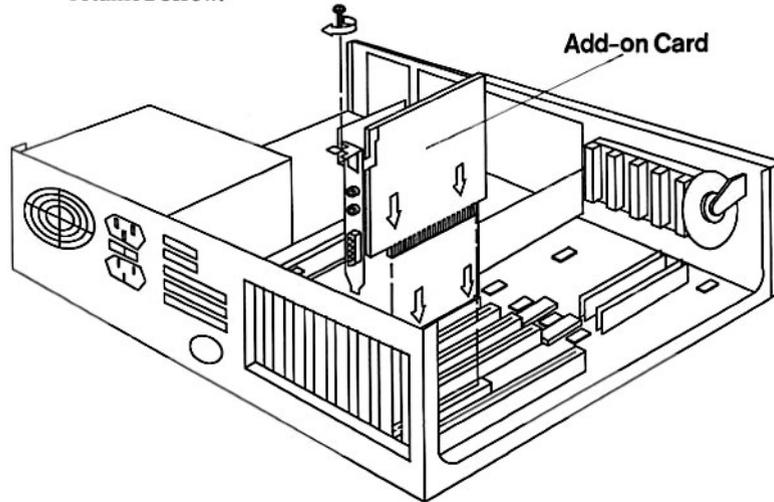
2

Step 4: Locate the vacant expansion slots and remove the slot covers as figure shown.



INSTALLING

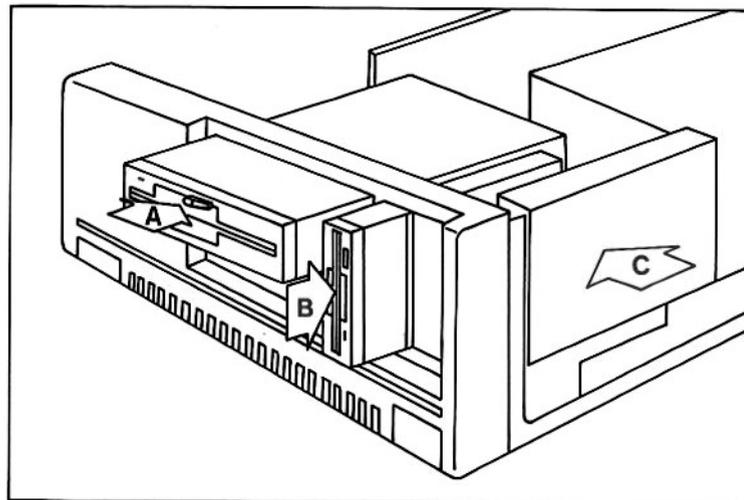
- Step 5: Plug the Add-on Card vertically into expansion slot, then fasten it with retained screw.



- Step 6: You need a Philips screw-driver, a flat-head screw-driver, and some spare screws to install the drives (Floppy-disk Drive and Hard-disk Drive).

Slide the Floppy-disk Drive(s) you want to install into the slots as arrow A & B shown in the figure below.

Plug the Hard-disk vertically into the slot as arrow C shown in the figure below.



INSTALLING

Note: Some casing may accommodate Floppy-disk drives and Hard-disk drive differently. It does not affect the performance of your computer if cable connections have been done correctly as figure in step 7 shown.

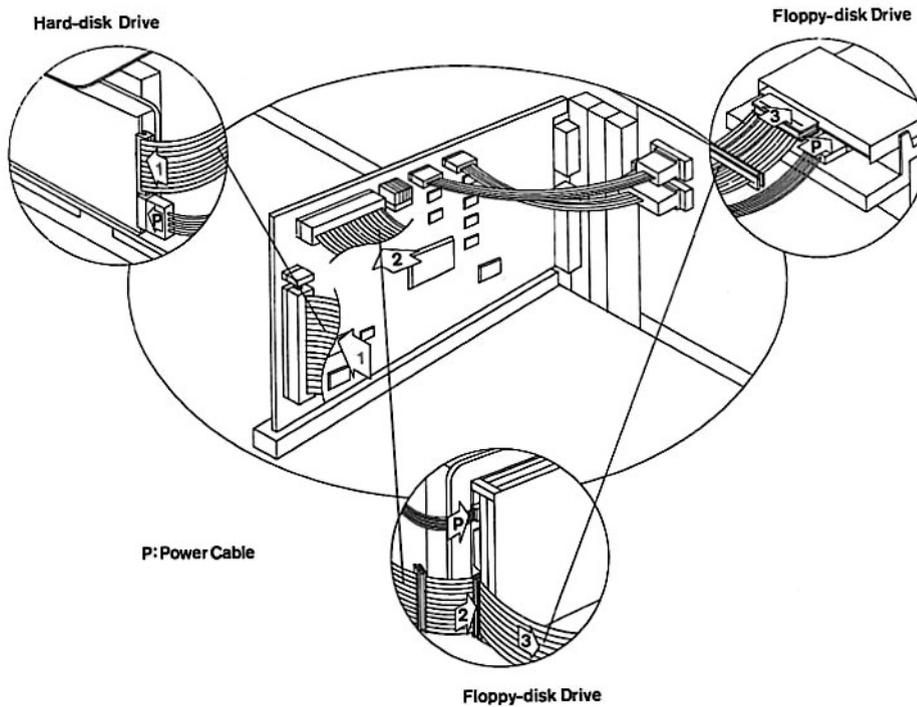
Step 7: Connect the 40-pin connector to the 40-pin edge connector of the Hard-disk Drive.

Connect the power cable to the edge connector of the Hard-disk Drive.
Connect the 34-pin connector to the 34-pin edge connector of the Floppy-disk Drive.

Connect the power cable to the edge connector of the Floppy-disk Drive.

Connect the serial ports with 9-pin & 25-pin connectors from I/O card to back panel.

Finally, secure the Hard-disk Drive and Floppy-disk Drive in position with mounting screws and clips.



Note: Universal Floppy-disk Cable is highly recommended.

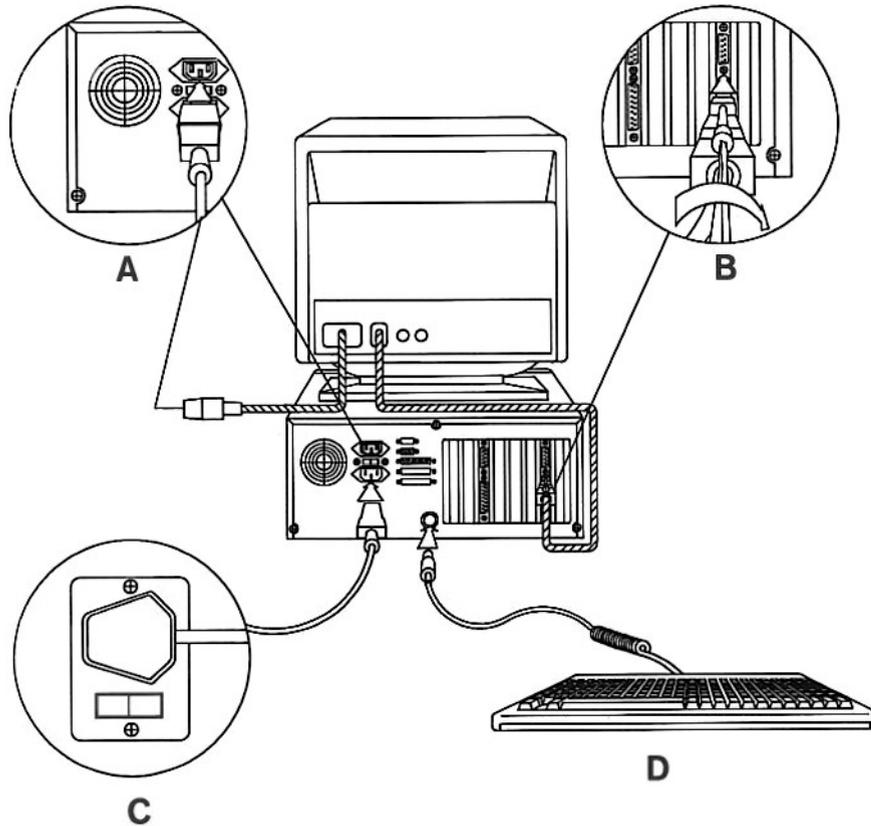
INSTALLING

Step 8: Plug the power cable into the rear of the display monitor and the other end into the back panel of the system unit as part (A) shown.

Plug the video signal cable into the rear of the display monitor and the other end into the back panel of the system unit, then screw the connector down securely with a screw-driver as part (B) shown.

To connect the power cable of the system unit, plug one end into the back panel and the other end into the electric outlet as part (C) shown.

Plug the keyboard connector cable into the back panel of the system unit as part (D) shown.



MATH CO-PROCESSOR

System in Synchronous Mode and Asynchronous Mode

Switch off the system, open casing & remove motherboard similar to steps shown in installation procedure in page 15 - 16. Then plug the math co-processor (Intel 80387/ Weitek 3167) into socket left for it as the figure shown in next page. (Make sure the coprocessor is in the correct orientation and all pins are inserted into the socket properly). Switch on the system and run the built-in setup program.

i) Using Coprocessor – Intel 80387:

- Short E3 (2,3)
- Support both Synchronous mode of 80387 & Asynchronous mode of 80387 within external oscillator.
- While system running in Asynchronous mode with CPU speed at 33MHz, the following combination should be noticed and refer to the diagram in next page. (Make sure the external oscillator is in the correct orientation and short E2)

- 50MHz oscillator for coprocessor speed at 25MHz (i.e. 80387-25)

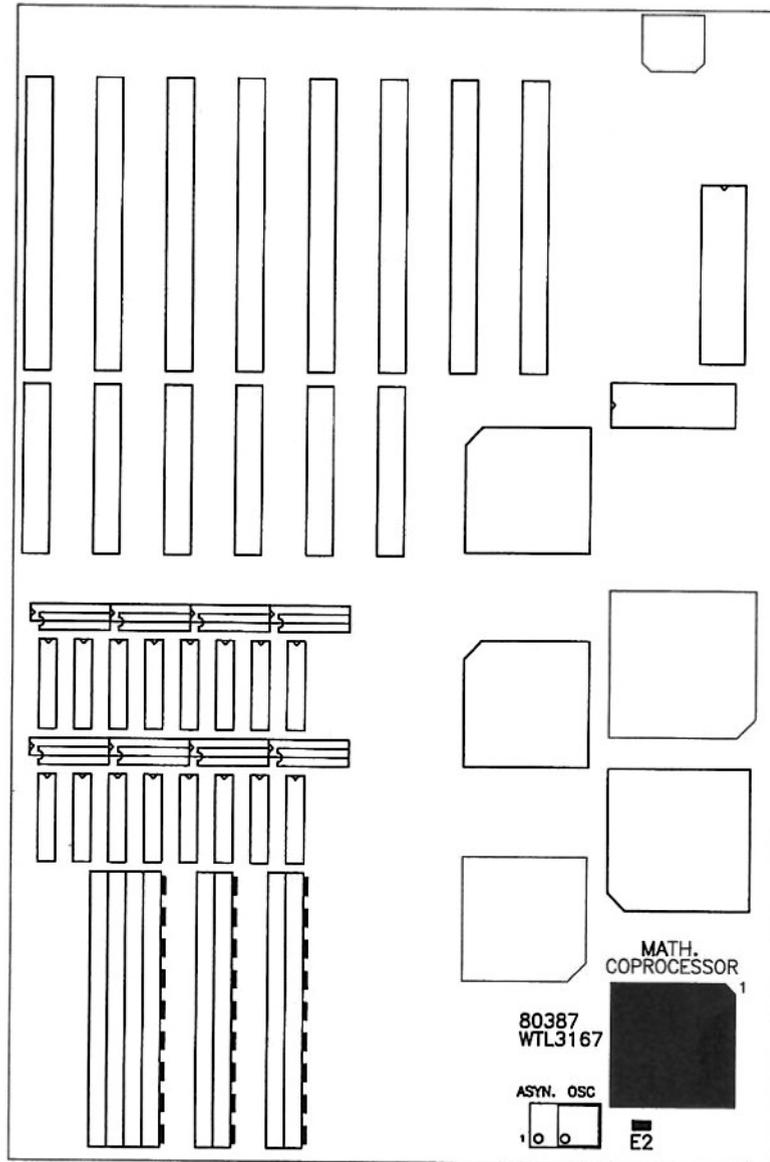
ii) Using Coprocessor – Weitek 3167:

- Short E3 (2,3)
- Support Synchronous mode of Weitek 3167

MATH CO-PROCESSOR

Diagram for Math Co-processor

2



80386 Cache

CHAPTER 3 EASY SETUP

- Easy Setup of 80386 Cache System
- CMOS Setup
- Standard CMOS Setup
- The Advanced CMOS Setup
- EMS Base Address
- MM.SYS Driver
- Running the System
- Hard Disk Utility

EASY SETUP

EASY SETUP

Memory Configurations

The memory system is organized into 4 banks, with each bank consists of either 4 DIP RAM or 4 SIP RAM modules.

The following memory configurations are now supported:

DIP RAM		SIP RAM		Total
Bank 0	Bank 1	Bank 2	Bank 3	
256Kx4	0	0	0	1.0MB
0	0	256Kx9	0	1.0MB
256Kx4	256Kx4	0	0	2.0MB
0	0	256Kx9	256Kx9	2.0MB
256Kx4	256Kx4	256Kx9	0	3.0MB
256Kx4	256Kx4	256Kx9	256Kx9	4.0MB
1Mx4	0	0	0	4.0MB
0	0	1Mx9	0	4.0MB
256Kx4	1Mx4	0	0	5.0MB
256Kx4	256Kx4	1Mx9	0	6.0MB
1Mx4	1Mx4	0	0	8.0MB
0	0	1Mx9	1Mx9	8.0MB
1Mx4	1Mx4	256Kx9	0	9.0MB
256Kx4	256Kx4	1Mx9	1Mx9	10.0MB
1Mx4	1Mx4	1Mx9	0	12.0MB
1Mx4	1Mx4	1Mx9	1Mx9	16.0MB
0	0	4Mx9	0	16.0MB
256Kx4	256Kx4	4Mx9	0	18.0MB
1Mx4	1Mx4	4Mx9	0	24.0MB
0	0	4Mx9	4Mx9	32.0MB
256Kx4	256Kx4	4Mx9	4Mx9	34.0MB
1Mx4	1Mx4	4Mx9	4Mx9	40.0MB

- Remark
1. 70ns of DRAM is recommended.
 2. 256Kx4 = 44256 DIP RAM.
1Mx4 = 441000 DIP RAM.
 3. 256Kx9 = 256KB SIP RAM module.
1Mx9 = 1MB SIP RAM module.
4Mx9 = 4MB SIP RAM module.
0 = None

Easy Setup for 80386 Cache Main Board System

The main board is configured to attain the best performance and stability before leaving the factory. These settings are stored as BIOS defaults in the system. When the system is first powered on and the Power-On Self Test (POST) routines are completed, you can press (when you are prompted) and select:

"Auto Configuration with BIOS Defaults"

The system will then be auto configured to the factory default settings.

CMOS SETUP

When the system is powered on, the BIOS will enter the Power-On Self Test (POST) routines. These routines are divided into two phases:

System Test and Initialization

(test and initialize system boards for normal operations) and

System Configuration Verification

(compare defined configuration with hardware actually installed).

After the POST routines are completed, the following message appears:

"Hit If you want to run SETUP"

To access the AMI BIOS SETUP program, press the key.

Do not press key for Setup unless you are going to modify your system configuration under the following occasions:

1. CMOS setup lost.
2. Setup the hard disk.
3. Adjust the real time clock.
4. Enable/Disable shadow RAM.
5. The first time to setup the system

STANDARD CMOS SETUP

STANDARD CMOS SETUP

Standard CMOS Setup is the first option on the main setup menu. Press at the highlighted selection to access this option. The screen will appear as follows:

BIOS SETUP PROGRAM – STANDARD CMOS SETUP						
(C) 1990 American Megatrends Inc., All Rights Reserved						
Date (mm/date/year)	:Wed, Mar 6, 1991	Base memory	:640 KB			
Time (hour/min/sec)	:13:29:34	Ext. memory	:3072 KB			
Daylight saving	:Disabled	Cyln	Head	WPcom	LZone	Sect Size
Hard disk C:type	:47 = USER TYPE	1314	7	1314	1314	17 76MB
Hard disk D:type	:Not Installed					
Floppy drive A:	:1.2 MB, 5 1/4"					
Floppy drive B:	:360 KB, 5 1/4"					
Primary display	:VGA/PGA/EGA					
Keyboard	:Installed					

Sun	Mon	Tue	Wed	Thu	Fri	Sat
24	25	26	27	28	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

Month	: Jan, Feb,.....Dec
Date	:01, 02, 03,.....31
Year	: 1901, 1902,.....2099

ESC:Ext ↓ → ↑ ← Select F2/F3: Color PU/PD: Modify

NOTE: Listed below is an explanation of the key conventions displayed at the bottom of the screens accessed through the BIOS SETUP program:

ESC: Exit to previous screen.

Arrow Keys: Use arrow keys to move cursor to desired selection.

PageUp/PageDown/Ctrl-PageUp/Ctrl-PageDown: Modify the default value of the options for the highlighted feature. If there are less than 10 available options, the Ctrl PageUp and PageDown keys function the same as the PageUp and PageDown Keys.

The Standard CMOS Setup utility is used to configure the following features:

- **Date:** Month, Date, and Year.
- **Time:** Hour, Minute, and Second. Uses 24 hour clock format, i.e. for PM number, add 12 to the hour. You would enter 4:30 P.M. as 16:30:00.
- **Daylight Savings:** Disabled or Enabled.
- **Hard Disk C and Hard Disk D:** Hard disk types from 1 to 46 are standard ones; type 47 user definable. The user must enter the hard disk parameters for each drive

STANDARD CMOS SETUP

NOTE: The USER definition entry allows you to perform a test on a disk drive not defined in ROM. The USER definition entry is valid only during the period that the test is performed.

The drive types are identified by the following characteristics:

- Type** This is the number designation for a drive with certain identification parameters.
- Cyl.** This is the number of cylinders found in the specified drive type.
- Heads** This is the number of heads found in the specified drive type.
- WPcom** WPcom is the read delay circuitry which takes into account for the timing differences between the inner and outer edges of the surface of the disk platter. The number designates the starting cylinder of the signal.
- L-zone** L-zone is the landing zone of the heads. This number determines the cylinder location where the heads will normally park when the system is shut down.
- Capacity** This is the formatted capacity of the drive based on the formula:
(# of heads) x (# of cylinders) x (17 secs/cyl.) x (512 bytes/sec)

"Not Installed"

This is available for use as an option. This option could be used for diskless workstations and SCSI hard disks. Type 47 may be used for both hard disks C: and D:.

The parameters for type 47 under Hard Disk C: and Hard Disk D:

They may be different, which effectively allows 2 different user-definable hard disk types.

- **Floppy Drive A and Floppy Drive B:** The options are 360 KB 5-1/4", 1.2MB 5-1/4", 720KB 3-1/2", 1.44MB 3-1/2", and Not Installed. Not Installed could be used as an option for diskless workstations.
- **Primary Display:** Options are Monochrome, Color 40x25, VGA/PGA/EGA, Color 80x25, and Not Installed. The Not Installed option could be used for network file servers.
- **Keyboard:** Options are Installed or Not Installed

THE ADVANCED CMOS SETUP

THE ADVANCED CMOS SETUP

The Advanced CMOS Setup program is equipped with a series of help screens, accessed by the key, which will display the options available for a particular configuration feature and special help for zone of the options.

Figure displays the options which will appear on the Advanced CMOS Setup screen when the F1 Help is pressed.

BIOS SETUP PROGRAM - ADVANCED CMOS SETUP (C) 1990 American Megatrends Inc., All Rights Reserved	
Hit Message Display	: Enabled
Hard Disk Type 47 RAM Area	: 0.300
Numeric Processor Test	: Disabled
Weitek Processor	: Absent
System Boot Up Sequence	: A, C:
Cache Memory	: Enabled
Password Checking Option	: Disabled
Shadow RAM Option	: Both
384K Memory Relocation	: Disabled

ESC:Exit ↓ → ↑ ←:Sel (Ctrl) Pn/Pd:Modity F1:Help F2/F3:Color
F5:Old Values F6:BIOS Setup Defaults F7:Power-On Defaults

3

Hit Message Display

Disabling this option, will prevent the message:

"Hit if you want to run SETUP"

from appearing on the screen when the system boots-up.

Hard Disk Type 47 Data Area

The AMI BIOS SETUP features two user-definable hard disk types. Normally, the data for these disk types are stored at 0:300 in lower system RAM. If a problem occurs with other software, this data can be located at the upper limit of the DOS shell (640KB). If the option is set to "DOS 1KB", the DOS Shell is shortened to 639KB, and the top KB is used for the hard disk data storage.

THE ADVANCED CMOS SETUP

Numeric / Weitek Processor(s)

These options allow the user to mark the numeric processor (Intel 80387 or compatible) as enabled or disabled, and the Weitek numeric processor (WTL3167) as present or absent, but these cannot automatically be detected by BIOS.

System Boot Up Sequence

The AMI BIOS will normally attempt to boot from floppy drive A: (if present), and if unsuccessful, it will attempt to boot from hard disk C:. This sequence can be switched using this option. If the option is set to "C:, A:," the system will attempt to boot from the hard drive C:, and then A:. If the option is set to "A:, C:," the sequence is reversed.

Cache Memory

Available Options are:- Disabled/ Enabled.

Password Check Option

Controlled by the system manufacturer's preferences, the password feature can be used to prevent unauthorized system boot-up or unauthorized use of BIOS SETUP. The option in the BIOS SETUP only allows the user to enable the password check option every time the system boots or upon entering SETUP only. A third option is to disable the password option entirely.

The default option is "Disabled". The prompt for the password will not appear when the system is re-booted.

If the "always" option is chosen at Setup, each time the system is turned on, i.e. "booted", the prompt for user password will appear.

If the "Setup" option is chosen at Setup, the password prompt will not appear when the system is turned on, but will appear if the user attempts to enter the Setup program.

The program allows three attempts to key in the correct password. After each incorrect attempt, the prompt to enter the current password will appear, followed by an "X". After the third incorrect attempt, the system will lock and it will be necessary to reboot. The screen will not display the characters entered.

THE ADVANCED CMOS SETUP

To change the user password, select the Change Password option from the main Setup screen by using the arrow keys to move the cursor to that selection and pressing <ENTER>. For the first time you select this option, please enter the default password <AMI>, or the default password specified in your system documentation, then press <ENTER> to complete your selection.

NOTE: 1. Your system hardware may not be equipped with some or all of the following options and, therefore, may or may not appear on the BIOS SETUP Program screen. The default password is <AMI>.

2. In case of current password missing (rather than AMI), you can enter the system by resetting CMOS content with jumper – E6 & E7, please also refer to the Jumper Setting diagram in page 7.

Shadow RAM Option

Available Options are:- Disabled/ Video/ Main/ Both

Disabled :Disable all shadow RAM.

Video :Enable video ROM shadow only.

Main :Enable system ROM shadow only.

Both :Enable all shadow RAM.

384K Memory Relocation

If enabled the 384K of memory above 640K is mapped as extended memory, it will only be possible when one or two banks of 256K DRAM are installed on the main board.

ADVANCED CHIPSET SETUP

EMS Base Address

This is to set the 64K boundary above which CPU addresses are directed to the AT slot bus. Any system board memory from 1MB up to the setting here is accessible as on-board extended memory. When used with the mm.sys EMS driver, EMS memory size can be adjusted by setting the EMS base address properly.

(Please also refer to the paragraph concerning the mm.sys device driver in the following page)

MM.SYS EMS DRIVER

MM.SYS EMS DRIVER

This section explains the MM.SYS EMS 4.0 device driver.

The EMS driver conforms to version 4.00 of the Expanded Memory Specification (EMS). Version 4.00 of the Lotus/Intel/Microsoft specification is upward compatible with the version 3.20 and will run programs written for that version of the memory manager.

The driver was designed to take advantages of the hardware EMS registers available on the chip set of your motherboard. Hardware EMS always provides superior performance to a software-only EMS emulator.

The memory manager should be installed in the CONFIG.SYS file as the first driver. After being loaded, the memory manager will determine the amount of expanded memory in the system and perform any required initialization.

In general the CONFIG.SYS should look as below:

```
device = mm.sys F T S = D000
```

E.g. if you have a motherboard with 2048KB memory,
VGA with 32KB video BIOS, and 64KB system BIOS:

```
EMS Base Address set at : 1536KB
```

```
You can have totally: (384-64-32) + (2048-1536)  
= 288 + 512  
= 800KB EMS memory.
```

RUNNING THE SYSTEM

Once you turn on the system, the system will go through a self-test routine which checks all of its internal devices. Any error encountered will be reported on the screen.

In the unlikely event that errors are encountered, you might need to troubleshoot your system.

When the self-test is completed, the system will search for the DOS (Disk Operating System) system file in the drive A first. If no system diskette is put in drive A, it will check the fixed disk (if installed).

If no fixed disk is installed or it has not been formatted the following message will be displayed:

Insert system disk in drive A,
strike any key when ready.

After you have done so, DOS is loaded and ready.

Note: The system will boot up in drive C (fixed drive), if it is installed and no system disk is found in drive A.

After DOS has been loaded, the following message is displayed:

Current date is Tue 1-01-1980
Enter new date (mm-dd-yy):

After you have entered the new date (or strike enter if current date is correct), the screen will display the time:

Current time is : 01:01:15.47
Enter new time:

After you have entered the new time (or strike enter if current time is correct), the system will display the DOS prompts.

A >

Note: If you have loaded DOS from a fixed disk, C is the prompt to be displayed.

RUNNING THE SYSTEM

Now you can use any DOS command contained in your system disk. The following is a list of commands that are useful:

- (1) `A > dir <ENTER>`
Display the directory in Drive A.

`A > dir b: <ENTER>`
display the directory in Drive B.
- (2) `A > format b: <ENTER>`
Format a 360K double-sided double-density diskette in Drive B.
(Drive B must be a 360K double side diskette).

Note: Use a format b:/s if you want the formatted diskette be a system diskette.

CAUTION

All previous data on the diskette will be destroyed by the above operation.

- (3) `A > copy b:*. * <ENTER>`
Copy all the files contained in diskette B into the diskette of drive A.
- (4) `A > del filename.xxx <ENTER>`
Delete the file named filename.xxx in drive A.
- (5) `A > type filename.xxx <ENTER>`
Display a document file on the screen.

Remember to press the `<ENTER>` key every time you type in a command. For more details, please refer to the MS-DOS/PC-DOS user's manual.

The system is default to run in high speed, but the speed can also be changed. E.g. you can run your computer in non-turbo speed by holding the "Ctrl", "Alt" and "-" key on the numeric pad altogether. The turbo LED light will be off to show your computer is now in low speed mode. Conversely, you can change the computer to high speed mode by holding the "Ctrl", "Alt" and "+" key on the numeric pad altogether.

HARD DISK UTILITY

If you have just installed a hard disk in your system, you need to format it before using in your system. The general procedure of formatting can be divided into five sections.

Performing the Hard Disk Format, Auto Interleave, and/or Media Analysis will destroy any data on the hard disk being tested. Back up the hard disk(s) BEFORE actually performing any of these routines and these routines are not valid for a SCSI Disk Drive.

The Hard Format Option

It performs a "low level" format of the hard drive(s). The user should check with the system or hard drive manufacturer to determine if this option should be taken.

The Auto Interleave Option

It performs an analysis of each track of the hard drive to determine whether it is usable. If it is not usable, the track is marked as "bad" so that data cannot be stored there in the future.

If you are installing a brand new hard disk (drive), the manufacturer of the hard drive usually provides a list of "bad tracks" with the hard drive. Your system documentation might also include the optimum interleave factor.

In this case, assuming that you have a list of bad tracks and know the interleave factor, it will not be necessary to take the auto interleave and media analysis options. Simply follow the instructions in the Hard Disk Format section below. If you have a bad track list but have not been provided with the optimum interleave factor, follow the instructions in the Auto Interleave section.

If you are installing a used hard disk or reformatting an existing hard disk, perform the Media Analysis and then follow the instructions in the Auto Interleave section.

HARD DISK UTILITY

Once the Hard Disk Diagnostics option is taken by pressing at the Main Setup Menu, the screen as the figure will appear.

Hard Disk Utility Setup Screen

BIOS SETUP PROGRAM - HARD DISK UTILITY							
(C) 1990 American Megatrends Inc., All Rights Reserved							
		Cyln	Head	UPcom	LZone	Sect	Size
Hard Disk C: Type :	47 = USER	1314	7	1314	1314	17	76(MB)
Hard Disk D: Type :	Not Installed						

Hard Disk Type can be changed from the STANDARD CMOS SETUP option in Main Menu

Hard Disk Format
Auto Interleave
Media Analysis

ESC:Exit ↓ → ↑ ←:Sel F2/F3:Color

3

(1) Hard Disk Format Utility

WARNING

Make sure you have backed up the hard disk(s) BEFORE actually performing any of these routines which are not valid for a SCSI Disk Drive.

Use the Hard Disk Format option to integrate a new hard disk to the system, or to reformat a used hard disk which has developed some bad patches as a result of aging or poor handling. To find these bad patches on a used drive, you may select the Media Analysis option.

When you press at the Hard Disk Format option, you will see a box on the left of the screen contains a series of questions (prompts) which must be answered before performing the Hard Disk Format. The first two questions may already have been answered for you if the value was previously entered for one disk only at the Standard CMOS Setup screen.

The value for Disk Drive is C for a C: Drive or D for a D: Drive. If two disk drives have been previously entered at the Standard CMOS Setup Screen, then the ID (C/D) will appear to the right of the question mark following the Disk Drive field. Choose which driver you wish to format by selecting the appropriate letter and pressing. If only one drive was selected at the Standard CMOS Setup screen, the cursor will automatically be placed at the interleave prompt.

The Disk Drive type is read from the CMOS. The Interleave factor can be selected manually, or can be determined with the Auto Interleave feature of SETUP program.

The manufacturer of the hard drive usually provides a list of "bad" tracks with the hard drive. These tracks should be entered with this option, and they will then be marked as "bad" in order to prevent data from being stored there in the future.

When the prompt to Mark Bad Tracks is changed to <Y> and the key is pressed and an option to add, delete, revise, or clear is selected from the Bad Track Edit Menu.

When the Proceed prompt is changed to <Y> and the key pressed, a warning message will be displayed in screen.

The default for the Continue prompt is to prevent accidental formatting of the hard drive and subsequent loss of data. Once this prompt is changed to <Y> and the key pressed any data residing on the hard drive will be irrevocably lost.

(2) Media Analysis Utility

WARNING

Make sure you have backed up the hard disk(s) BEFORE actually performing this routine which is not valid for a SCSI Disk Drive.

HARD DISK UTILITY

The Media Analysis utility performs a series of tests to locate bad or damaged patches on the hard disk as a result of aging or poor handling. This utility locates all bad tracks on the hard disk and lists them in the Bad Track List Box. Since this test writes to all cylinders and heads on the hard disk to verify and bad tracks, the test may require several minutes to complete. For best results, run this in its entirety.

To run the Media Analysis utility, use your arrow keys to select the option from the main Hard Disk Utility Menu and press <ENTER>.

The cursor will appear at the Proceed prompt. When you press, a warning message will appear in screen.

If you do not wish to proceed at this point, press the key and you will be returned to the main Hard Disk Utility screen. If you wish to proceed with the analysis, change the prompt to <Y> and press <ENTER>.

(3) Auto Interleave Utility

WARNING

Make sure you have backed up the hard disk(s) BEFORE actually performing this routine which is not valid for a SCSI Disk Drive.

The Auto Interleave utility calculates the optimum interleave value 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 sector formatted for each value will be displayed in the activity box on the screen.

To begin the Auto Interleave process, use your arrow keys to select this function on the main Hard Disk Utility Screen. Press <ENTER> to select this option.

The cursor will be placed at the Mark Bad Tracks prompt. The default for this prompt is <N>. To mark additional bad tracks, change the prompt to <Y> and press <ENTER>.

After you have made the desired selections at the Bad Tracks Edit Menu, press <ESC>. The cursor will be moved to the Proceed prompt.

To proceed with the Auto Interleave process, change the prompt to <Y> and press <ENTER>. A warning message will appear in screen.

If you do wish to proceed, press <ENTER> and you will return to the main Hard Disk Utility screen. To proceed, change the warning prompt to <Y> and press <ENTER>.

4) DOS Format

The last step is to format your fixed drive for DOS. When the system displays the prompt (A>) and your system disk is in drive A, enter the command as follows:

```
A>format C:/s
```

After DOS has completed formatting your fixed disk, all the format procedures have been completed. Your fixed drive is now ready to run any DOS command defined by the version of DOS you used to format the fixed disk.

CAUTION

All the data stored in the fixed disk will be lost after running the format command shown above.

80386 Cache

CHAPTER

4

APPENDIX

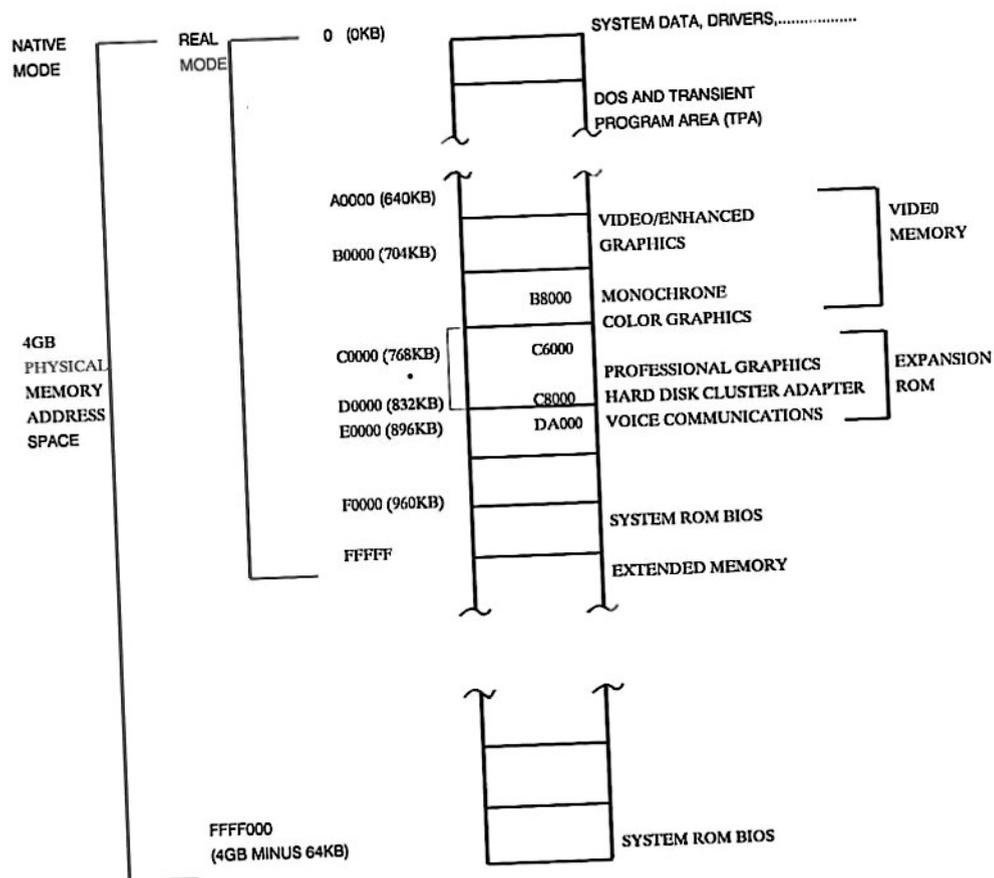
- **System Memory Map**
- **I/O Channel Pin Assignment**
- **I/O Signal Description**
- **Troubleshooting Your System**
- **Keyboard**
- **The Advanced 82395DX Chip Set**

4

SYSTEM MEMORY MAP

SYSTEM MEMORY MAP

a) Real-addressing Environment Address Slice of 80386



Note: * Video or Enhanced Graphics

SYSTEM MEMORY MAP

b) I/O Address Map

Hex Range	Devices	Usage
000-01F	DMA Controller 1,	System
020-03F	INT Controller 1, Master	System
040-05F	Timer	System
060-06F	8042 (Keyboard)	System
070-07F	Real-Time Clock, NMI Mask	System
080-09F	DMA Page Register	System
0A0-0BF	INT Controller 2	System
0C0-0DF	DMA Controller 2	System
0F0	Clear Math Coprocessor Busy	System
0F1	Reset Coprocessor	System
0F8-0FF	Arithmetic Processor	System
1F0-1F8	Fixed Disk	I/O
200-207	Game I/O	I/O
278-27F	Parallel Printer Port 2	I/O
2F8-2FF	Serial Port 2	I/O
300-31F	Prototype Card	I/O
360-36F	Reserved	I/O
378-37F	Parallel Printer Port 1	I/O
380-38F	SDLC, Bisynchronous 2	I/O
3A0-3AF	Bisynchronous 1	I/O
3B0-3BF	Monochrome Display and Printer Adapter	I/O
3C0-3CF	Reserved	I/O
3D0-3DF	Color/Graphic Monitor Adapter	I/O
3F0-3F7	Floppy Diskette Controller	I/O
3F8-3FF	Serial Port 1	I/O

VIDEO
MEMORY

EXPANSION
ROM

I/O CHANNEL PIN ASSIGNMENT

I/O CHANNEL PIN ASSIGNMENT

Pin No	Signal Name	I/O	Pin No.	Signal Name	I/O
A1	-I/O CH CK	I	B1	Ground	
A2	SD7	I/O	B2	Reset Drive	O
A3	SD6	I/O	B3	+5 Vdc	
A4	SD5	I/O	B4	IRQ9	I
A5	SD4	I/O	B5	-5 Vdc	
A6	SD3	I/O	B6	DRQ2	I
A7	SD2	I/O	B7	-12 Vdc	
A8	SD1	I/O	B8	0 WS	I
A9	SD0	I/O	B9	+12 Vdc	
A10	-I/O CHR DY	I	B10	Ground	
A11	AEN	O	B11	-SMEMW	O
A12	SA19	I/O	B12	-SMEMR	O
A13	SA18	I/O	B13	-IOW	I/O
A14	SA17	I/O	B14	-IOR	I/O
A15	SA16	I/O	B15	-DACK3	O
A16	SA15	I/O	B16	DRQ3	I
A17	SA14	I/O	B17	-DACK1	O
A18	SA13	I/O	B18	DRQ1	I
A19	SA12	I/O	B19	-Refresh	I/O
A20	SA11	I/O	B20	CLK	O
A21	SA10	I/O	B21	IRQ7	I
A22	SA9	I/O	B22	IRQ6	I
A23	SA8	I/O	B23	IRQ5	I
A24	SA7	I/O	B24	IRQ4	I
A25	SA6	I/O	B25	IRQ3	I
A26	SA5	I/O	B26	-DACK2	O
A27	SA4	I/O	B27	T/C	O
A28	SA3	I/O	B28	BALE	O
A29	SA2	I/O	B29	+5 Vdc	
A30	SA1	I/O	B30	OSC	O
A31	SA0	I/O	B31	Ground	

4

I/O CHANNEL SIGNAL DESCRIPTION

I/O CHANNEL SIGNAL DESCRIPTION

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
C1	SBHE	I/O	D1	-MEM CS16	I
C2	LA23	I/O	D2	-I/O CS16	I
C3	LA22	I/O	D3	IRQ10	I
C4	LA21	I/O	D4	IRQ11	I
C5	LA20	I/O	D5	IRQ12	I
C6	LA19	I/O	D6	IRQ15	I
C7	LA18	I/O	D7	IRQ14	I
C8	LA17	I/O	D8	-DACK0	O
C9	-MEMR	I/O	D9	DRQ0	I
C10	-MEMW	I/O	D10	-DACK5	O
C11	SD8	I/O	D11	DRQ5	I
C12	SD9	I/O	D12	-DACK6	O
C13	SD10	I/O	D13	DRQ6	I
C14	SD11	I/O	D14	-DACK7	O
C15	SD12	I/O	D15	DRQ7	I
C16	SD13	I/O	D16	+5Vdc	
C17	SD14	I/O	D17	-Master	I
C18	SD15	I/O	D18	Ground	

I/O CHANNEL SIGNAL DESCRIPTION

All signal lines are TTL-compatible with a maximum loading of two low-power (LS) devices.

CLK (Output)

This is the bus clock and synchronous CPU cycle clock, this clock has a 50% duty cycle. This signal should only be used for synchronization, it is not intended for uses requiring a fixed frequency.

RESET DRV (Output)

This signal goes high momentarily during power up, low line-voltage or hardware reset.

SA0-19 (Input/Output)

System address lines bit 0 to 19. These are latched on the falling edge of 'BALE'.

LA17-23 (Input/Output)

Latched address lines from bit 17 to 23.

SD0-15 (Input/Output)

System data bit 0 to 15.

BALE (Output)

Buffered address latch enable is used to latch SA0-19 on the falling edge. This signal is forced high during DMA cycles.

-I/O CH CK (Input)

I/O channel check is an active low signal which indicates a parity error occurred on an I/O board.

I/O CH RDY (Input)

This signal lengthens the I/O or memory read/write cycle. It can be held low for a maximum of 2.5 microseconds.

IRQ3-7, 9-12, 14-15 (Input)

Interrupt request signals indicate I/O service requests.

They are prioritized as following sequences:

Highest IRQ 9,10,11,12;14,15

Lowest IRQ 3,4,5,6,7

-IOR (Input/Output)

-I/O Read signal is an active low signal which instructs I/O device to read data from the data bus.

I/O CHANNEL SIGNAL DESCRIPTION

-SMEMR (Output)

System Memory Read is low when any memory location is being read.

-SMEMW (Output)

System Memory Write is low when the low 1 megabyte of memory is being written.

-MEMW (Input/Output)

Memory Write is low when any memory location is being written.

DRQ0-3, 5-7 (Input)

DMA Request channel 0 to 3 are for 8 bit data transfer.

DMA Request channel 5 to 7 are for 16 bit data transfer.

DMA Request channel 4 is used internally on the system board.

DMA Request should be held high until the corresponding 'DMA Request Acknowledge' (DACK) line goes active.

They are prioritized in the following sequence:

Highest DRQ 0,1,2,3,

Lowest DRQ 5,6,7.

-DACK 0-3, 5-7 (Output)

-DMA Acknowledge 0 to 3, 5 to 7 are the corresponding acknowledge signals for DRQ 0 to 3, 5 to 7. Acknowledge (ACK) goes active low.

AEN (Output)

DMA address enable is high when the DMA controller is driving the address bus. It is low when the 80386 CPU is driving the address bus.

-REFRESH (Input/Output)

This signal indicates a memory refresh cycle in progress.

T/C (Output)

Terminal Count provides a pulse when the terminal count for any DMA channel is reached.

SBHE (Input/Output)

System Bus High Enable indicates the high byte (SD 8-15) is on the data bus.

-MASTER (Input)

Master is pulled low by the I/O processor for controlling the system address, data and control lines. It should be held low for a maximum of 15 microseconds, otherwise, system memory may be lost due to a lack of refresh.

I/O CHANNEL SIGNAL DESCRIPTION

-MEM CS16 (Input, Open collector)

I/O Chip Select indicates the present data transfer is an 1 wait state, 16 bit data I/O operation.

OSC (Output)

Oscillator is a 14.31818 MHz signal used for the color graphic board.

OWS (Input, Open collector)

Zero wait state indicates to the microprocessor that the present bus cycle can be completed without inserting any additional wait cycles.

Troubleshooting Your System

Display Problem	Action
"Blank screen " plus no beep	Check to find out if: 1. The system unit power cord is plugged into a working electrical outlet. 2. The cable connected to the system is tight. 3. The system unit and power unit are switched ON.
"Blank screen or distorted display plus 1 beep"	Check to find out if: 1. Display power cord is plugged into a working electrical outlet and the display properly. 2. Display is turned ON, the brightness, and contrast controls are turned UP also. 3. Display signal cable is plugged into the correct connection of the system unit. 4. The small slide switch on the Monochrome Graphics/ Color Graphics Card is set Correctly. Set to "MDA" for monochrome TTL monitors, or "CGA" for RGB color monitors.

Troubleshooting Your System

Error Message on Screen	Action
"System option not set"	1. Run the set-up program that comes with this manual and set the options for the system.
"Keyboard error"	1. Check if the keyboard is plugged into the system unit. 2. Run the AT Diagnostic program to check for any defect in the keyboard.
"Memory size error"	1. Set the right memory size by running the set-up program.
"Parity error"	1. Your system unit needs service, please contact your dealer
"Disk error"	1. Check the power cable and data cable connections of your drives. 2. Run the "setup" program to check if the option is set correctly. 3. Check if the latch on the disk drive is closed properly.
"No response from the keyboard"	1. Check if the keyboard lock is locked. 2. System crash. Restart your system unit by pressing the reset button. If necessary, turn your unit off, then on again. 3. keyboard cable not properly connected. Check to make sure it is plugged in properly on the back of the system unit.

Problem in Internal Feature	Action
<p>"Diskette Drive problem" (cannot read or write data)</p>	<ol style="list-style-type: none"> 1. Replace the drive with another working diskette drive. 2. Your system needs service if the working diskette drive still does not function in the system. 3. Check if the latch on the disk drive is closed properly. 4. The diskette was not placed in the drive correctly. Make sure the label points up with the write-protect notch printing to the left. 5. The diskette is damaged. Try to use a different diskette. 6. Check if the diskette is unformatted.
<p>"Printer problems"</p>	<ol style="list-style-type: none"> 1. Check the specification of the printer to see if it is IBM PC compatible. 2. Check the cable connections and then configure your printer.
<p>"Light on the front panel does not work"</p>	<ol style="list-style-type: none"> 1. Change the light that does not light up when it should be.
<p>"Cannot reset the computer while pressing the 'reset' button"</p>	<ol style="list-style-type: none"> 1. Turn off your system. Turn it back on after a few seconds. 2. Your system needs service if item 1 cannot solve the problem. Contact your dealer

Note: If the above suggestions do not solve your problem, you should contact your dealer.

KEYBOARD

KEYBOARD

There are different types of enhanced keyboard besides the standard 84-key keyboard. They are the 101-key keyboard and the 102-key keyboard.

For countries outside the U.S., the 102-key keyboard should be used.

The following table can be taken as a reference.

Keyboard Type	Keyboard Layout
101-key keyboard	U.S. English
102-key keyboard	Belgian Canadian French Danish Dutch French German Italian Latin American Norwegian Portuguese Spanish Swedish Swiss U.K. English

Templates are used to locate character positions on the keyboard. Different characters can appear in different positions, depending on the national language selected with the KEYB command under DOS3.3. Both 101-key and 102-key keyboards should match with the templates for different keyboard layouts under DOS3.3.

THE ADVANCED 82395DX CHIP SET

The 82395DX is a single chip cache subsystem specifically designed for use with the 386 DX Microprocessor. The 82395 DX integrates 16KB cache. The cache is unified for code and data and is transparent to application software. The 82395DX provides a cache consistency mechanism which guarantees that the cache has the most recently updated version of the main memory. Consistency support has no performance impact on the 386 DX Microprocessor.

The 82395DX cache architecture is similar to the i486 Microprocessor cache. The cache is four way set associative with Pseudo LRU replacement algorithm. The line size is 16B and a full line is retrieved from the memory every cache miss. A TAG is associated with every 16B line.

82395DX architecture allows for cache read hit cycles to run on the Local Bus even when the System Bus is not available. 82395DX incorporates a new write buffer cache architecture, which allows the 386 DX Microprocessor to continue operation without waiting for write cycles to actually update the main memory.

The 82395DX has an interface to two electrically isolated buses. The interface to the 386 DX Microprocessor bus is referred to as the Local Bus (LB) interface. The interface to the main memory and other system devices is referred to as the 82395DX System Bus (SB) interface. The SB interface emulates the 386 DX Microprocessor. The SB interface, as does the 386 DX Microprocessor, can be pipelined.

In addition, it is enhanced by an optional burst mode for Line Fills. The burst mode for Line Fills. The burst mode provides faster line fills by allowing consecutive read cycles to be executed at a rate of up to one DW per clock cycle.

Cache consistency is maintained by the SAHOLD/SEADS# snooping mechanism, similar to the i486 Microprocessor. The 82395DX is able to run a zero wait state 386 DX Microprocessor non-pipelined read cycle if the data exists in the cache. Memory write cycles can run with zero wait states if the write buffer is not full.

The 82395DX cache organization provides a higher hit rate than other standard configurations. The 82395DX, featuring the new high performance write buffer cache architecture, provides full concurrence between the electrically isolated Local Bus and System Bus. This allows the 82395DX to service read hit cycles on the Local Bus while running line fills or buffered write cycles on the System Bus.

INDEX

INDEX

A

Appendix 39

C

CMOS Setup 24
Connector Pinouts 8
Create DOS Partition 38

D

Diagram for Jumper Setting 7
Diagram for Math Co-processor 21
Display Problem 47
DOS Format 38

E

Easy Setup 22
Electrical Safety 2
Error Message on Screen 48
External Battery Connector 9
External Features 11

F

Features 5

H

Hard Disk Utility 34

INDEX

I

I/O Channel Pin Assignment 42
I/O Channel Signal Description 43
Installation 10
Installing 15
Installing Your Motherboard 4

J

Jumper Setting 7

K

Keyboard 50
Keyboard Connector 8
Keylock and Front Panel Power LED Connector 9

M

Math Co-processor 20
Memory Configuration 23
MM.SYS EMS Driver 31

N

Note 1

P

Power Supply Connector 8
Problem in Internal Feature 49

R

Running the System 32



INDEX

S

Slim Case	14
Speaker Connector	9
Standard CMOS Setup	25
System Memory Map	40
System Performance	6

T

The Advanced 80386DX Chip Set	51
The Advanced CMOS Setup	27
The Advanced Chipset Setup	30
Tower Case	13
Troubleshooting Your System	47

