

SUPER 286

ACT CHIP

USER'S MANUAL

CONTENTS

1. INTRODUCTION

- 1.1 CHECK LIST
- 1.2 LAYOUT OF THE SYSTEM BOARD
- 1.3 INSTALLATION OF THE SYSTEM BOARD

2. FEATURES

- 2.1 CPU
- 2.2 RAM
- 2.3 RAM SPEED
- 2.4 ROM SUBSYSTEM
- 2.5 COPROCESSOR
- 2.6 SYSTEM TIMER
- 2.7 SYSTEM INTERRUPTS
- 2.8 DMA
- 2.9 REAL TIME CLOCK
- 2.10 KEYBOARD CONTROLLER
- 2.11 I/O SLOTS

3. DIP SWITCH AND JUMPER SETTINGS

- 3.1 SW1 - RAM SIZE AND WAIT STATE
- 3.2 JP20 - RAM PARITY SELECTION
- 3.3 JP6 - ROM SIZE SELECTION
- 3.4 JP9 - DISPLAY TYPE SELECTION
- 3.5 JP12 - BATTERY SELECTION
- 3.6 JP13 - POWER GOOD SELECTION
- 3.7 JP17 - SPEED OF I/O SLOTS

4. CONNECTOR PIN ASSIGNMENTS

- 4.1 JP1 - POWER CONNECTOR
- 4.2 JP5 - KEYBOARD CONNECTOR
- 4.3 JP11 - EXTERNAL BATTERY CONNECTOR
- 4.4 JP10 - RESET CONNECTOR
- 4.5 JP2 - TURBO LED CONNECTOR
- 4.6 JP14 - SPEAKER CONNECTOR
- 4.7 JP7 - POWER LED AND KEYBOARD LOCK CONNECTOR
- 4.8 JP19 - TURBO SWITCH CONNECTOR
- 4.9 JP27 - JP39 - I/O SLOTS

5. UTILITY PROGRAMS

- 5.1 SATSW
- 5.2 SHADOW
- 5.3 EMS DRIVER

1. INTRODUCTION

1.1 CHECK LIST

You should have :

- * The system board
- * This manual
- * The System BIOS user's manual
- * A diskette storing the utility programs
- * For some models a battery is included on the system board. For some other model there is no battery on the board and an external battery box will be included.

You will need :

- * DRAM
- * 4 "AA" size batteries if you choose the external battery box (please refer to chapter 3,jpl2)

1.3 INSTALLATION OF THE SYSTEM BOARD

2 FEATURES

The HAT-12/8S is a system board based on the powerful 80286 CPU. All IBM AT software can be run on this system board. In addition, the system board has 8 I/O slots which can accept peripheral cards built for the IBM AT.

The HAT-16/8S and HAT-25/8S have the same features as the HAT-12/8S except that they are running at 16 Mhz and 25 Mhz respectively.

2.1 CPU

80286 is used as the CPU of the HAT-12/8S. The CPU can be operated at 12 Mhz or 8 Mhz. The speed is selected by using the turbo switch (JP19, please refer to chapter 4) or keyboard command. The CPU is operated at 16 Mhz or 8 Mhz for at 25 Mhz or 8 Mhz.

To toggle the speed between 12 Mhz and 8 Mhz for HAT-12/8S, (16 Mhz and 8 Mhz for HAT-16/8S, 25 Mhz and 8 Mhz for HAT-25/8S), press

CTRL ALT *

simultaneously.

The system board supports dynamic clock switching. When accessing slower devices on the I/O slots, the CPU will be slowed down to 8 Mhz. This ensures that all IBM AT peripheral cards are supported even when the CPU is running much faster than the IBM AT.

The CPU have two modes : real address mode and protected mode. In real address mode the CPU can run all program written for the 8088 CPU. Most of the software for the IBM PC/XT can be run on the system board.

In protected mode the CPU support virtual address and multitasking. This feature is employed in some advanced software such as OS/2.

2.2 RAM

The system board supports the following RAM configuration :

512 K	: 44256 X 4 + (41256 X 2 parity) or 256K X 9 SIMM X 2
640 K	: 44256 X 4 + 4464 X 4 + (41256 X 2 parity) + (4164 X 2 parity) or 256K X 9 SIMM X 2 + 4464 X 4 + (4164 X 2 parity)
1 M	: 44256 X 8 + (41256 X 4 parity) or 256K X 9 SIMM X 4
2 M	: 1M X 9 SIMM X 2
4 M	: 1M X 9 SIMM X 4

41256 or 4164 are used as parity RAM. However, the RAM parity check function can be disabled (JP20, please refer to chapter 3).

The four-pole DIP switch SW1 is used to set the memory size.

SW1 1	SW1 2	SW1 3	RAM size	system RAM	extend RAM	RAM 44256	Parity 41256	SIMM 256K X9	RAM 1M X9
ON	ON	ON	512K	512K	OK	U37,U38 U39,U40	U41,U42		
						or		JP23 JP24	
ON	OFF	ON	1M	640K	384K	U37,U38 U39,U40 U44,U45 U47,U48	U41,U42 U43,U46		
						or		JP23 JP24 JP25 JP26	
OFF	ON	ON	2M	640K	1408K			JP23 JP24	
OFF	OFF	ON	4M	640K	3456K			JP23 JP24 JP25 JP26	

For 640 K configuration, set SW1 as follows :

SW1 1	SW1 2	SW1 3	RAM size	system RAM	extend RAM	RAM 44256	location 4464	Parity 41256		4164
ON	ON	OFF	512K	512K	OK	U37,U38 U39,U40		U41 U42		
ON	OFF	OFF	640K	640K	OK	U37,U38 U39,U40	U49,U50 U51,U52	U41 U42	U43 U46	
OFF	ON	OFF	Not Allowed							
OFF	ON	OFF	Not Allowed							

The extended RAM can also be used as expanded memory (EMS). Utility program will be supplied on diskette to support EMS.

Normal page mode and nibble mode DRAM can be used. most of the DRAM you can find is page mode DRAM.

Page mode DRAM :

Hitachi	HM51256 HM51256 HM50464 HM514256 HM511000	*
NEC	uPD41256 uPD41464 uPD421000 uPD424256	*
Texas Instruments	TMS4256 TMS44C256 TMS4C1024	*
Toshiba	TMM41256 TMM41464 TC511000 TC514256	*

Nibble mode DRAM

Hitachi	HM50257	
	HM50465	*
	HM511001	*
NEC	uPD41257	
	uPD421001	*
Texas Instruments	TMS4257	
	TMS44C257	
	TMS4C1025	*
Toshiba	TMM41257	
	TC511001	*

Those that are marked with '*' are not supported by this system board.

Static column mode DRAM are not supported So avoid using the following :

Hitachi	HM51258
	HM514258
	HM511002S
NEC	uPD421002
	uPD424258
Texas Instruments	TMS4C1027
Toshiba	TC511002
	TC514258

This list does not cover all the manufacturer in the market. If the user has any question, he should consult the corresponding data book for that DRAM.

Static column mode DRAM is rare and expensive So we do not expect user to use them.

2.3 RAM SPEED

The number of wait state for RAM access can be selected by SW1-4 The CPU will run faster at 0 wait state However, you need faster RAM.

SW1-4	Wait state	RAM speed required		
		HAT-12/8S	HAT-16/8S	* HAT-25/8S
ON	1	120 ns	100 ns	70 ns
OFF	0	100 ns	70 ns	

* SW1-4 must be set to ON for HAT-25/8S. And most good 80ns RAM also work for it.

2.4 ROM SUBSYSTEM

Two BIOS (Basic Input Output Services) ROM are included in the system board The size of the BIOS is 64 K.

The system board supports shadow RAM feature The contents of the BIOS can be copied to RAM In this way the program can be executed much faster Utilities program will be supplied on diskette to support shadow RAM.

2.5 COPROCESSOR

To speed up floating point calculation, a coprocessor 80287-8 can be added in the socket U11.

The coprocessor is operated at 8 Mhz

When installing the 80287, please make sure the notch on the IC is pointing towards the left side of the system board.

2.6 SYSTEM TIMER

The system board has three programmable timer/counters.

Channel 0 is used as the system timer, which is connected to the interrupt controller IRQ0. There are about 18.2 ticks per second.

Channel 1 is programmed as a 15 microsecond period refresh request signal.

Channel 2 is used as the tone generator for speaker.

2.7 SYSTEM INTERRUPTS

The 80286 CPU NMI and the interrupt controller provide 16 levels of system interrupts.

Any or all interrupts may be masked.

The following shows the interrupt-level assignment in decreasing priority.

Level	Function
NMI	parity or I/O channel check
Interrupt controllers	
CTRL1	CTRL2
IRQ0	timer output 0
IRQ1	keyboard buffer full
IRQ2	
	IRQ8
	IRQ9
	IRQ10
	IRQ11
	IRQ12
	IRQ13
	IRQ14
	IRQ15
IRQ3	real time clock
IRQ4	software redirected to INT OAH
IRQ5	reserved
IRQ6	reserved
IRQ7	reserved
	80287
	hard disk
	reserved
	COM2
	COM1
	printer port 2
	FDC
	printer port 1

2.8 DMA

The system board supports seven DMA channels.

Channels 0 to 3 supports 8 bit data transfers while channels 5 to 7 support 16 bit data transfers.

Channel 1 is for SDLC (Synchronous Data Link Control).

Channel 2 is for floppy diskette controller.

The other DMA channels are available at the I/O slots.

2.9 REAL TIME CLOCK

The system board includes a real time clock with battery backup. The IC used is a Motorola MC146818P, which contains the real-time clock and 64 bytes of CMOS RAM. The CMOS RAM stores system configuration parameters.

For some models there is a rechargeable battery on the system board. However, some models will not have that. In the latter case an external battery box is included which houses four "AA" size batteries. The battery box should be connected to connector JP11.

2.10 KEYBOARD CONTROLLER

The keyboard controller is a single-chip microcomputer 8042. It receives serial data from the keyboard, checks the parity of the data, translates scan codes, and presents the data to the system by interrupt. The status register contains error bits.

2.11 I/O SLOTS

On the system board there are five 16 bit I/O slots and three 8 bit slots. They are used for expansion purposes.

For compatibility with IBM AT peripheral cards, the I/O slots are running at 8 Mhz. Therefore there should be no compatibility problems.

3. DIP SWITCH AND JUMPER SETTINGS

3.1 SW1 - RAM SIZE WAIT STATE

SW1-1, SW1-2, SW1-3, are used to set the memory size.

SW1-1	SW1-2	SW1-3	RAM	size
ON	ON	ON	512	K
ON	OFF	ON	1	M
OFF	ON	ON	2	M
OFF	OFF	ON	4	M
ON	ON	OFF	512	K
ON	OFF	OFF	640	K
OFF	ON	OFF	Not	Allowed
OFF	OFF	OFF	Not	Allowed

SW1-4 is used to set number of RAM wait states.

SW1-4

ON	1 wait state
OFF	0 wait state

Note : SW1-4 must be set to on for HAT-25/8S.

3.2 JP20 - RAM PARITY SELECTION

Parity RAM are used to ensure that the memory contents are valid. However, the user may choose to reduce the cost by disabling parity check.

JP20

2-3	Parity check disabled
1-2	Parity check enabled

3.3 JP6 - ROM SIZE SELECTION

The system board supports both 32 K BIOS and 64 K BIOS

JP6

1-2	32 K BIOS (27128 X 2)
2-3	64 K BIOS (27256 X 2)

3.4 JP9 - DISPLAY TYPE SELECTION

JP9

1-2	Monochrome display adapter , Hercules Graphics Card, EGA or VGA
2-3	Color Graphics Card

3.5 JP12 - BATTERY SELECTION

JP12

1-2	External battery for real time clock
2-3	Internal battery for real time clock

3.6 JP13 - POWER GOOD SELECTION

JP13

2-3	Internal power good generator
1-2	power good signal from power supply

3.7 JP17 - SPEED OF I/O SLOTS

JP17

1-2	I/O Slots running at 8 Mhz
2-3	I/O Slots running at 6 Mhz

JP 16

1-2	12 MHz
2-3	16 MHz

4 CONNECTOR PIN ASSIGNMENTS

4.1 JP1 - POWER CONNECTOR

Pin	Function
1	Power good
2	not used
3	+12 volt
4	-12 volt
5	GND
6	GND
7	GND
8	GND
9	-5 volt
10	+5 volt
11	+5 volt
12	+5 volt

4.2 JP5 - KEYBOARD CONNECTOR

Pin	Function
1	Keyboard clock
2	Keyboard data
3	not used
4	GND
5	5 volt

4.3 JP11 - EXTERNAL BATTERY CONNECTOR

Pin	Function
-----	----------

1	6 volt
2	not used
3	GND
4	GND

4.4 JP10 - RESET CONNECTOR

1-2

short	reset the system
open	normal

4.5 JP2 - TURBO LED CONNECTOR

Pin	Function
-----	----------

1	LED anode
2	LED cathode

4.6 JP14 - SPEAKER CONNECTOR

Pin Function

- | | |
|---|-----------|
| 1 | Speaker + |
| 2 | not used |
| 3 | GND |
| 4 | Speaker - |
-

4.7 JP7 - POWER LED AND KEYBOARD LOCK CONNECTOR

Pin Function

- | | |
|---|---------------|
| 1 | LED anode |
| 2 | not used |
| 3 | GND |
| 4 | Keyboard lock |
| 5 | GND |
-

4.8 JP19 - TURBO SWITCH CONNECTOR

For the HAT-12/8S system board,

1-2

Short	8 Mhz
Open	12 Mhz

For the HAT-16/8S system board,

1-2

Short	8 Mhz
Open	16 Mhz

For the HAT-25/8S system board,

1-2

Short	8 Mhz
Open	25 Mhz

Note : The Speed of the CPU can also be toggled by keyboard command.

4.9 JP27-JP39 - I/O SLOTS

Pin	Function	Pin	Function
A1	I/O channel check	B1	GND
A2	SD7	B2	RESET
A3	SD6	B3	+5 VOLT
A4	SD5	B4	IRQ9
A5	SD4	B5	-5 VOLT
A6	SD3	B6	DREQ2
A7	SD2	B7	-12 VOLT
A8	SD1	B8	OWS
A9	SD0	B9	+12 VOLT
A10	I/O channel ready	B10	GND
A11	AEN	B11	SMEMW
A12	SA19	B12	SMEMR
A13	SA18	B13	IOW
A14	SA17	B14	IOR
A15	SA16	B15	DACK3
A16	SA15	B16	DREQ3
A17	SA14	B17	DACK1
A18	SA13	B18	DREQ1
A19	SA12	B19	REFRESH
A20	SA11	B20	CLK
A21	SA10	B21	IRQ7
A22	SA9	B22	IRQ6
A23	SA8	B23	IRQ5
A24	SA7	B24	IRQ4
A25	SA6	B25	IRQ3
A26	SA5	B26	DACK2
A27	SA4	B27	TC
A28	SA3	B28	ALE
A29	SA2	B29	+5 VOLT
A30	SA1	B30	OSC
A31	SA0	B31	GND

Pin	Function	Pin	Function
C1	SBHE	D1	MEMCS16
C2	LA23	D2	IOCS16
C3	LA22	D3	IRQ10
C4	LA21	D4	IRQ11
C5	LA20	D5	IRQ12
C6	LA19	D6	IRQ13
C7	LA18	D7	IRQ14
C8	SA17	D8	DACK0
C9	MEMR	D9	DREQ0
C10	MEMW	D10	DACK5
C11	SD8	D11	DREQ5
C12	SD9	D12	DACK6
C13	SD10	D13	DREQ6
C14	SD11	D14	DACK7
C15	SD12	D15	DREQ7
C16	SD13	D16	+5 VOLT
C17	SD14	D17	MASTER
C18	SD15	D18	GND

5 UTILITY PROGRAMS

The following utility programs are included in the diskette shipped :

5.1 SATSW

SATSW is a utility program which serves the following purposes :

- * change the CPU speed.
- * change the number of wait states during RAM access.
- * alter the number of wait states for BIOS ROM access.
- * alter the operating speed of the I/O slots.

To see what this program can do for you, just type

A>SATSW <ENTER>

5.2 SHADOW

This program is used to enable shadow RAM function.

5.3 EMS DRIVER

The system board supports LIM EMS 4.0. A driver program EMMSAT SYS is included for this purpose.

There is a file "READ.ME" on the diskette containing detail information about these utility programs. Please read the file by typeing the following at the DOS prompt :

A>TYPE READ.ME <ENTER>