

A Team-320A

Mother Board

User's Manual

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ABOUT THE A Team-320A MOTHERBOARD

Specification

- * 6 or 12.5 MHz 80286 selectable by keyboard or by hardware switch
- * 4 Mega byte high-speed memory standard
- * 16 Mega byte expandable in the protected virtual address mode
- * 2 sockets for PHOENIX or AWARD or ERSO or AMI BIOS fully compatible with IBM BIOS.
- * 7 I/O expansion slots
- * Socket for 80287 numeric processor
- * CMOS clock and calendar circuit
- * Battery on-board and easily serviceable for replacement
- * 6 custom chips set used to reduce total ICs
- * EMS control circuit
- * 24-bit addressing and 16-bit data pathing capabilities
- * 16-level interrupt
- * 7-channel direct memory access (DMA)
- * 3-programmable timers
- * Speaker/keyboard connector
- * Standard AT power supply connector
- * Small A dimensions
- * High temperature burned-in
- * 0-wait-state or 1-wait-state selectable.

QUICK INSTALLATION GUIDE

Peripherals Required:

- 1) A Team-320A 4 Mega Byte system board.
- 2) IBM AT power supply or compatible equivalent
- 3) IBM monochrome/graphic display board or color card or EGA card or compatible equivalent.
- 4) IBM keyboard or compatible equivalent.
- 5) Monochrome or color monitor or EGA Monitor.

Procedures:

- 1) Connect power supply connectors to P8 as marked.
- 2) Plug in keyboard connector to the keyboard receptacle (J22) at the back.
- 3) Install monochrome or color graphic display board in expansion slot 1 or 7.
- 4) Select monochrome or color at DISP SW #2

- | |
|---|
| <ol style="list-style-type: none">1. ON-COLOR DISPLAY2. OFF-MONOCHROME DISPLAY |
|---|

- 5) Connect monitor cable to the display board.
- 6) Make sure "LOW BYTE" or "EVEN BYTE" BIOS is ON IC22.
- 7) Make sure "HIGH BYTE" or "ODD BYTE" BIOS is ON IC23.
- 8) Set the RAM size as follows by DIP Switch DSP1: #6-8

#6	#7	#8	MODE	SIZE
ON	ON	ON	0	512KB
ON	ON	OFF	1	640KB
ON	OFF	ON	2	640KB + 384KB
ON	OFF	OFF	3	640KB + EMS (384KB)
OFF	ON	ON	4	640KB + 1408KB
OFF	ON	OFF	5	640KB + EMS (1408KB)
OFF	OFF	ON	6	640KB + 3456KB
OFF	OFF	OFF	7	640KB + EMS (3456KB)

- 9) For those which have the IBM PC/AT chasis or compatible equivalent, plug in the speaker connector to JSP, and the Key Lock and Power LED connector to J20 at the front.
- 10) Turn on the monitor.
- 11) Turn on the power supply.
- 12) Diagram for DSP#1~#5

DSP1#-#5

ON

OFF

#1: Reserve

#2: Monitor TYPE

Color

Mono

#3: Parity Check

Parity Check

Don't need parity
Check bit

#4: EMS port address

0E8H

098H

#5: Blos ROM TYPE

27128

27256

HOW TO SET UP AN EVALUATION MOTHERBOARD

A. BIOS ROM

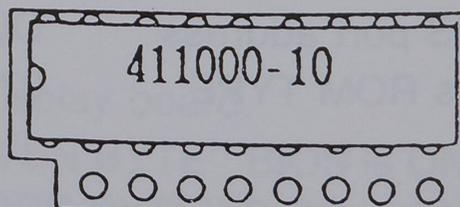
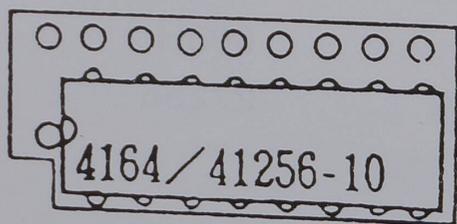
1. BIOS ROM (Lo) is inserted into IC22.
2. BIOS ROM (Hi) is inserted into IC23.

B. KEYBOARD BIOS

1. 8742 with keyboard BIOS programmed in it is inserted into 8742-marked location

C. DRAM

1. When 4164 or 41256 DRAM is used, either DRAM is inserted to the 16-pin side. When 411000 DRAM is used, it is inserted to the 18-pin side.



On the mainboard you can see the memory area can insert three kind of DRAM Chip, first area is for 1MB or 256KB or 64KB DRAM use, total is 18 pcs, this is area A. The second area is for 256KB x 4 (44256) and 256KB DRAM Chip use, this is area B. The third area is for 1MB or 256KB RAM Module use, this is area C.

You can setup your RAM by the following way:

(1) 512KB on board

a. You can insert 18 pcs 256KB DRAM in area A, and set the jumper

JP21	1,2 short
JP22	1,2 short
JP23	1,2 short

b. You can insert 4 pcs 256KB x 4 (44256) and 2 pcs 256KB DRAM in Bank0 of area B.

c. You can insert 2 pcs 256KB RAM Module in SIM0.SIM1 of area C.

(2) 640KB on board

a. You can insert 4 pcs 256KB x 4 (44256) and 2 pcs 256KB DRAM in Bank0 of area B and insert 18 pcs 64KB DRAM in Area A, and set the jumper

JP21	2,3 short
JP22	2,3 short
JP23	2,3 short

b. You can insert 2 pcs RAM Module in SIM0.SIM1 of area C and 18 pcs 64KB dram in area A, and set the jumper

JP21	2,3 short
JP22	2,3 short
JP23	2,3 short

(3) 1MB on board

a. You can insert 8pcs 256KB × 4 (44256) and 4pcs 256KB DRAM in area B

b. You can insert 4pcs 256KB RAM Module in area C

c. You can insert 4pcs 256KB × 4 (44256) and 2pcs 256KB DRAM in Bank0 of area B, and 18pcs 256KB DRAM in area A, and set the jumper

JP21	2,3 short
JP22	2,3 short
JP23	2,3 short

d. You can insert 4pcs 256KB × 4 (44256) and 2pcs 256KB DRAM in Bank1 of area B, and 18pcs 256KB DRAM in area A and set the Junper

JP21	2,3 short
JP22	2,3 short
JP23	2,3 short

e. You can insert 2 pcs 256KB dram Module in SIM0.SIM1 of area C and 18pcs 256KB dram in area A and set jumper

JP21	2,3 short
JP22	2,3 short
JP23	2,3 short

f. You can insert 2pcs 256KB RAM Module in SIM2.SIM3 of area C and 18pcs 256KB DRAM in area A and set jumper

JP21	1,2 short
JP22	1,2 short
JP23	1,2 short

(4) 2MB on board

a. You can insert 18pcs 1MB DRAM in area A and set jumper

JP21	1,2 short
JP22	1,2 short
JP23	1,2 short

b. You can insert 2 pcs 1MB RAM Module in SIM0.SIM1 of area C

(5) 4MB on board

a. You can insert 4 pcs 1MB RAM Module in area C

b. You can insert 2 pcs 1MB RAM Module in SIM0.SIM1 of area C and 18pcs 1MB DRAM in area A and set jumper

JP21	2,3 short
JP22	2,3 short
JP23	2,3 short

c. You can insert 2pcs 1MB RAM Module in SIM2.SIM3 of area C and 18pcs 1MB DRAM in area A, and set jumper

JP21	1,2 short
JP22	1,2 short
JP23	1,2 short

D. MONITOR TYPE

Using DSP#2 To Monitor TYPE:

1. When a color monitor is used, the DSP#2 is set to ON
2. When a monochrome monitor is used the DSP#2 is set to OFF

E. CLOCK SPEED SETTING

1. Hardware Switching to:

i) High Speed

Set JP7 to close and JP9 to 1 & 2

ii) Low Speed

Set JP7 to open and JP9 to 1 & 2

2. Software Switching

Use "CTRL" "ALT" and "-" to High Speed

Use "CTRL" "ALT" and "+" to Low Speed

F. RESET SWITCH

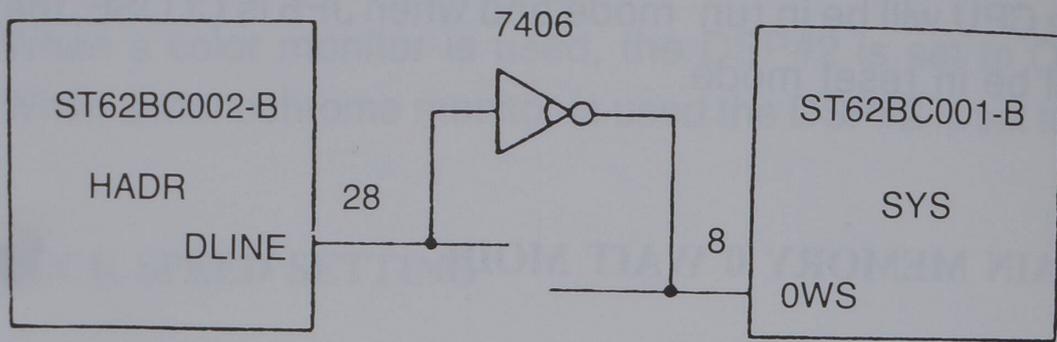
A mechanical switch is installed onto JP6. When JP6 is OPEN, the CPU will be in run mode and when JP6 is CLOSE, the CPU will be in reset mode.

G. MAIN MEMORY 0 WAIT MODE

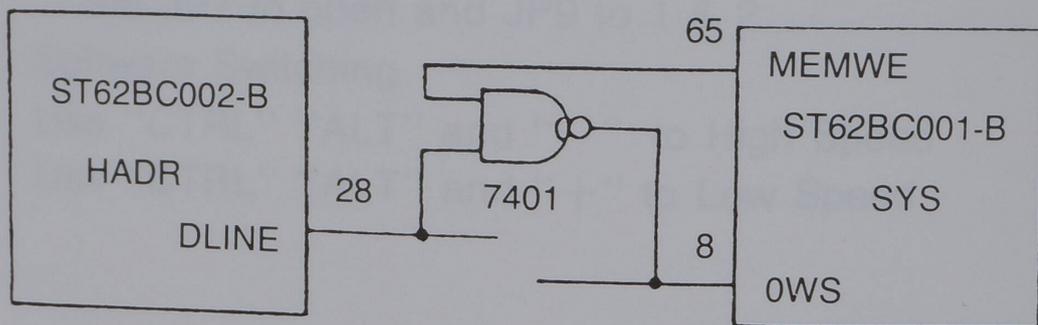
When JP5 is close, the main board memories will turn to 0 WAIT mode.

When JP5 is open, the main board memories will turn to 1 WAIT mode.

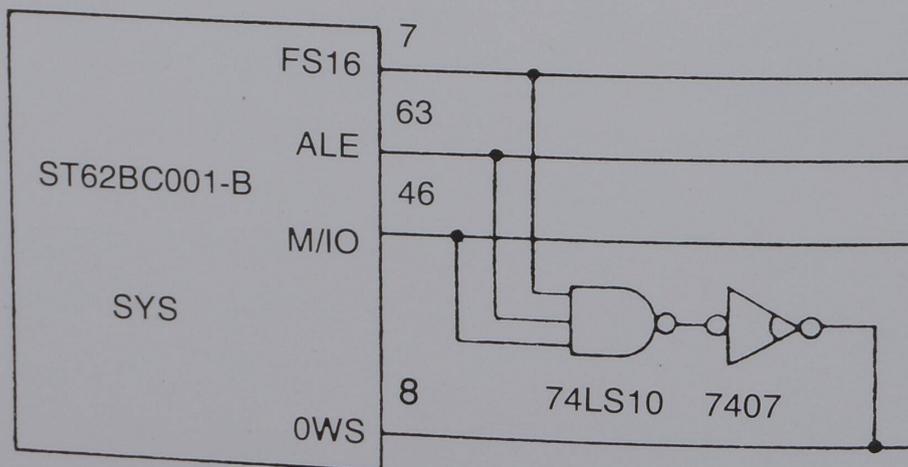
1. An additional circuit to be needed for 0 WAIT when DRAM is in state of READ or WRITE:



2. An additional circuit to be needed for 0 WAIT when DRAM is in state of READ:



3. An additional circuit to be needed for 0 WAIT when DRAM is in state of READ or WRITE and when PROM is in state of READ:



EMS DRIVER SET-UP

1. Boot PC system by using DOS and the system will prompt you with A >
2. Copy SEMS.SYS file on your DOS diskette.
3. Type:

```
COPY CON CONFIG.SYS <ENTER>  
DEVICE =SEMS5.SYS/M:xxx x P:xxxx/l:xxx <ENTER>  
^ Z <ENTER>
```

where M:xxx : System memory size, default is 640KB.
P:xxxx : EMS Physical page segment address, default automatic.
l:xxx : EMS Port address, default E8H or 98H.

The screen will display as follows:

```
1 File(s) copied
```

```
A >
```

4. Reboot your system. The screen will be display as follows:

```
SUNTAC 62 Chip Set EMS Driver Version 4.0 Release 1.1 ----- Ace Team -----
```

```
SUNTAC 62 Chip Set EMS Driver Version 4.0  
Ace Team Electronic Co., Ltd. Release 1.1
```

```
----- Ace Team -----  
SAMPLE PROGRAM
```

EMM Total Pages : 24
EMM Page Segment : C000H
EMM Port Address : 0098H

Current date is Wed 2-22-1989
Enter new date (mm-dd-yy):
Current time is 10:19:54.88
Enter new time:

Microsoft(R) MS-DOS(R) Version 3.21
(C) Copyright Microsoft Corp 1981-1987

A >

5. You can run the RAMBANK software like VD.SYS, PB.COM, RAMTEST. example:

When 384K has been set as virtual disk, then type in command line in:

```
COPY CON CONFIG.SYS <ENTER>
```

```
DRVICE = SEMS4.SYS <ENTER>
```

```
DEVICE = VD.SYS/384/ <ENTER>
```

```
^ Z <ENTER>
```

CONNECTOR PINOUT

1. POWER SUPPLY CONNECTOR (P8)

PIN	DESCRIPTION
1	POWER GOOD
2	+ 5V DC
3	+ 12V DC
4	- 12V DC
5	GROUND
6	GROUND
7	GROUND
8	GROUND
9	- 5V DC
10	+ 5V DC
11	+ 5V DC
12	+ 5V DC

2. SPEAKER CONNECTOR (SP)

1PIN	DESCRIPTION
1	SPEAKER DATA OUT
2	KEY
3	GROUND
4	+ 5V DC

3. KEYBOARD SWITCH & LED CONNECTOR (J20)

PIN	DESCRIPTION
1	LED POWER
2	KEY
3	GROUND
4	KEYBOARD INHIBITOR
5	GROUND

4. KEYBOARD CONNECTOR (J22)

PIN	DESCRIPTION
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	SPARE
4	KEYBOARD GROUND
5	+5V DC

5. RESET CONNECTOR (JP6)

PIN	DESCRIPTION
1	RESET IN
2	GROUND

6. HIGH SPEED LED CONNECTOR (TUB) JP7

PIN	DESCRIPTION
1	+ ANODE
2	- CATHODE

- NOTES: 1. XTAL SET 25MHz = LED ON
 2. XTAL SET 12MHz = LED OFF

INSTRUCTION FOR EMS DRIVER PREPARATION

1. After power is turned on, and before DRAM begins refreshing, an initial value needs to be written in EMS Register R0 (This writing to be done within BIOS ROM).

Initial values

- (1) Write 9DH when I/O port address is E8H.
 - (2) Write 93H when I/O port address is 98H.
2. When data has been written in EMS Registers R0-R7, Bit 7 in R0 has to be read as a way to confirm if the Register contents have been transferred from DADR to HADA.
 - (1) When Bit 7 in R0 is 1, it means that the transfer has yet to be achieved.
 - (2) When Bit 7 in R0 is 0, it means that the transfer has been achieved.
 3. The system memory size in EMS Register shall not be set at any value larger than 640KB (A0H).
 4. The segment start address in EMS Register R3 shall not be set at any value smaller than the system memory size (R2).
 5. When setting the page Nos. of banks 0-3 in EMS Registers R4-R7, these Nos. shall correspond to these page Nos. counted, by 16KB unit, from the DRAM address 0000 : 0000H.

Example

When EMS has a system memory size of 640KB, the usable page head is set to: $640 \div 16 = 40$ (28H)

Therefore, 28H is set as the page head.

Incidentally, a physical page can be released by setting its corresponding bank at 0.

6. The banks 0-3 in EMS Registers R4-R7 are always in correspondence to physical pages 0-3.
7. When the system memory size is 1MB (as shown in the Memory Address Setting 3 in an attached Table), the setting of EMS page No. at 40H will result in production of an image from the memory's 0000 : 0000H.
8. EMS maximum page Nos. are 216 pages at 4MB. The memory size that can be used with DOS is 640KB.

MEMORY ADDRESS

DRAM

NO.	DIP Switch setting			Memory type		Memory size	Memory Location
	S6	S7	S8	BANK1	BANK0		
0	ON	ON	ON	NONE	256KB	512KB	0 ~ 7FFFF
1	ON	ON	OFF	64KB	256KB	640KB	0 ~ 9FFFF
2	ON	OFF	ON	256KB	256KB	640KB + 384KB	0 ~ 9FFFF 10000 ~ 15FFFF
3	ON	OFF	OFF	256KB	256KB	640KB + EMS (16KB x 24pages)	0 ~ 9FFFF
4	OFF	ON	ON	NONE	1MB	640KB + 1408KB	0 ~ 9FFFF 10000 ~ 25FFFF
5	OFF	ON	OFF	NONE	1MB	640KB + EMS (16KB x 88pages)	0 ~ 9FFFF
6	OFF	OFF	ON	1MB	1MB	640KB + 3456KB	0 ~ 9FFFF 10000 ~ 45FFFF
7	OFF	OFF	OFF	1MB	1MB	640KB + EMS (16KB x 216pages)	0 ~ 9FFFF

PROM

Memory type	IC22, IC23 Location address
128KB	0E8000 ~ 0EFFFF 0F8000 ~ 0FFFFF FE8000 ~ FEFFFF FF8000 ~ FFFFFF
256KB	0F0000 ~ 0FFFFFFF FF0000 ~ FFFFFFFF

EMS INTERFACE

EMS Port Address

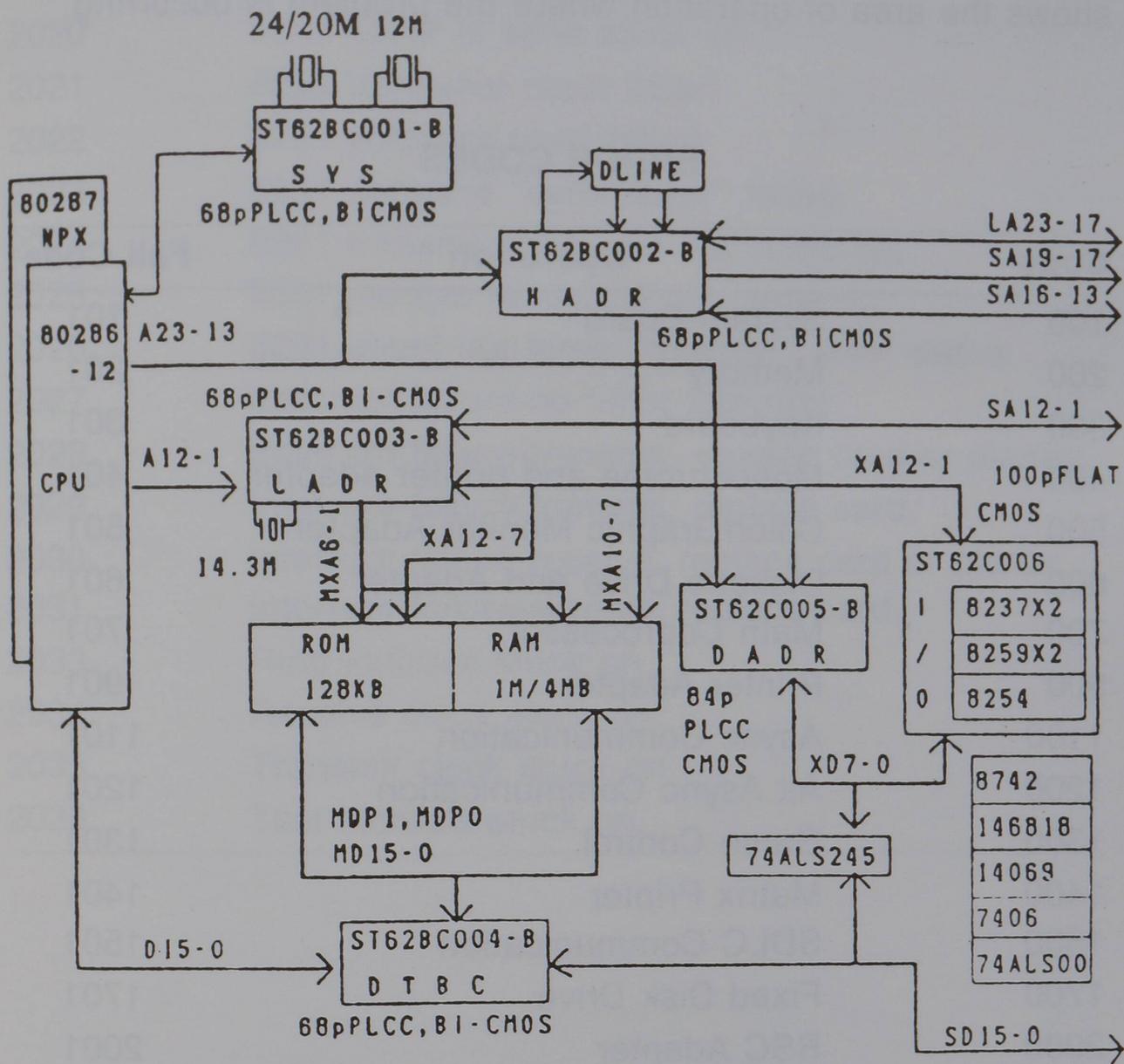
EMS98/E8	Location	Description
"L"	E8H	Access to 80287 is impossible at E8 – EFH.
"H"	98H	Access to 74LS612 is impossible at 98 – 9FH.

When Dip Switch bit 4 is ON
the EMS Address port will turn to 0E8H
when Dip Switch bit 4 is OFF
the EMS address port will turn to 098H

EMS Registers

		D7	D6	D5	D4	D3	D2	D1	D0	Description
R0	Variable port address.	T/R flag	Variable port address.							T/R flag Read 1: Transfer yet to be done 0: Transfer done Write 1: Read possible 0: Read impossible
	Transfer flag. (Read) R0 Read enable (Write)									
R1	Reserved.									
R2	System memory size.	A19	A18	A17	A16	A15	A14	fixed 0		Read impossible (A0H: 00000 ~ 9FFFFH)
R3	Segment start address.	A19	A18	A17	A16	A15	A14	fixed 0		Read impossible (C0H: segment-C000H)
R4	Bank 0	P7	P6	P5	P4	P3	P2	P1	P0	Read impossible
R5	Bank 1	P17	P16	P15	P14	P13	P12	P11	P10	Read impossible
R6	Bank 2	P27	P26	P25	P24	P23	P22	P21	P20	Read impossible
R7	Bank 3	P37	P36	P35	P34	P33	P32	P31	P30	Read impossible

SYSTEM BLOCK DIAGRAM



TROUBLE SHOOTING AND ERROR CODE

* If any "fail code" numbers appear on your screen, the chart below shows the area of operation where the problem is occurring.

ERROR CODES

Code	Operation	Fall Code
100	System Board	101
200	Memory	201
300	Keyboard	301
400	Monochrome and printer adapter	401
500	Color/Graphic Monitor Adapter	501
600	Diskette Drive and Adapter	601
700	Math Coprocessor	701
900	Printer Adapter	901
1100	Async Communication	1101
1200	Alt Async Communication	1201
1300	Game Control	1301
1400	Matrix Printer	1401
1500	SDLC Communication	1501
1700	Fixed Disk Drive	1701
2000	BSC Adapter	2001
2100	Alt BSC Adapter	2101

* If, for example, the error code 201 appeared on the screen when the system was powered up, there would be something related to the memory wrong with the chip. Either the RAM chip is bad or the switch setting is wrong.

* ADVANCED DIAGNOSTIC ERROR MESSAGES CONT.

Code	Description
2019	8251 Data set ready stuck on.
2020	8251 Clear to send stuck on.
2021	8251 hardware reset failed.
2022	8251 software reset failed.
2023	8251 software "error reset" failed.
2024	8251 transmit ready did not come on.
2025	8251 receive ready did not come on.
2026	8251 could not force "overrun" error status.
2027	Interrupt failure-no timer interrupt.
2028	Interrupt failure-transmit, replace card or planar.
2029	Interrupt failure-transmit, replace card.
2030	Interrupt failure-receive, replace card or planar.
2031	Interrupt failure-receive, replace card.
2033	Ring indicate stuck on.
2034	Receive clock stuck on.
2035	Transmit clock stuck on.
2036	Test indicate stuck on.

Code	Description
2037	Ring indicate stuck on.
2038	Receive clock not on.
2039	Transmit clock not on.
2040	Test indicate not on.
2041	Data set ready not on.
2042	Carrier detect not on.
2043	Clear to send not on.
2044	Data set ready stuck on.
2045	carrier detect stuck on.
2046	Clear to send stuck on.
2047	Unexpected transmit interrupt.
2048	Unexpected receive interrupt.
2049	Transmit data did not equal receive data.
2050	8251 detected overrun error.
2051	Lost data set ready during data wrap.
22xx	Cluster adapter errors.
22xx	Enhanced graphics adapter errors.
29xx	Color matrix printer errors.
2901	
2902	
2904	
33xx	Compact printer errors.

Code	Description
4xx	Monochrome monitor erros.
401	Monochrome memory test. horizontal sync frequency test, or video test failed
408	User-indicated display attributes failure.
416	User-indicated character set failure.
424	User-indicated 80 × 25 mode failure.
432	Parallel port test failed (monochrome adapter)
5xx	Color monitor errors.
501	Color memory test failed, horizontal sync frequency test, or video test failed.
508	Used-indicated display attribute failure.
516	User-indicated character set.
524	User-indicated 80 × 25 mode failure.
532	User-indicated 40 × 25 mode failure.
540	User-indicated 320 × 200 graphics mode failure.
6xx	Diskette drive errors.
601	Diskette power-on diagnostics test failed.
602	Diskette test failed; boot record is not valid.
606	Diskette verify function failed.
607	Write protected diskette.
608	Bad command diskette status returned.
610	Diskette initialization failed.
611	Timeout-diskette status returned.
612	Bad NEC-diskette status returned.
613	Bad DMA-diskette status returned.
621	Bad seek-diskette status returned.

622	Bad CRC-diskette status returned.
623	Record not found-diskette status returned.
624	Bad address mark-diskette status returned.
625	Bad NEC seek-diskette status returned.
626	Diskette data compare error.

7xx	8087 or 80287 math coprocessor errors.
9xx	Parallel printer adapter errors.
901	Parallel printer adapter test failed.
10xx	Reserved for parallel printer adapter.
11xx	Reserved for parallel printer adapter.
1101	Asynchronous communications adapter test failed.
12xx	Alternate asynchronous communications adapter errors.
1201	Alternate asynchronous communications adapter test failed.
13xx	Game control adapter errors.
1301	Game control adapter test failed.
1302	Joystick test failed.
14xx	Printer errors.
1401	Printer test failed.
1404	Matrix printer failed.

15xx

Synchronous data link control (SDLC)
communications

- 1510 8255 port B failure.
- 1511 8255 port A failure.
- 1512 8255 port C failure.
- 1513 8253 timer 1 did not reach terminal count.
- 1514 8253 timer 1 stuck on.
- 1515 8253 timer 0 did not reach terminal count.
- 1516 8253 timer 0 stuck on.
- 1517 8253 timer 2 did not reach terminal count.
- 1518 8253 timer 2 stuck on.
- 1519 8273 port B error.
- 1520 8273 port A error.
- 1521 8273 command/read timeout.
- 1522 Interrupt level 4 failure.
- 1523 Ring Indicate stuck on.
- 1524 Receive clock stuck on.
- 1525 Transmit clock stuck on.
- 1526 Test indicate stuck on.
- 1527 Ring indicate not on.
- 1528 Receive clock not on.
- 1529 Transmit clock not on.
- 1530 Test Indicate not on.
- 1531 Data set ready not on.
- 1532 Carrier detect not on.
- 1533 Clear to send not on.
- 1534 Data set ready stuck on.
- 1536 Clear to send stuck on.
- 1537 Level 3 interrupt failure.
- 1538 Receive interrupt results error.
- 1539 Wrap data miscompare.
- 1540 DMA channel 1 error.

- 1541 DMA channel 1 error.
- 1542 Error in 8273 error checking or status reporting.
- 1547 Stray interrupt level 4.
- 1548 Stray interrupt level 3.
- 1549 Interrupt presentation sequence timeout.

- 16xx Display emulation errors (327x, 5520, 525x).

- 17xx Fixed disk errors.
 - 1701 Fixed disk POST error.
 - 1702 Fixed disk adapter error.
 - 1703 Fixed disk drive error.
 - 1704 Fixed disk adapter or drive error.
 - 1780 Fixed disk 0 failure.
 - 1781 Fixed disk 1 failure.
 - 1782 Fixed disk controller failure.
 - 1790 Fixed disk 0 error.
 - 1791 Fixed disk 1 error.

- 18xx I/O expansion unit errors.
 - 1801 I/O expansion unit POST error.

 - 1810 Enable/Disable failure.
 - 1811 Extended card wrap test failed (disabled).
 - 1812 High order address lines failure (disabled).
 - 1813 Wait state failure (disable).
 - 1814 Enable/Disable could not be set on.
 - 1815 Wait state failure (disabled).
 - 1816 Extender card wrap test failed (enabled).
 - 1817 High order address lines failed (enabled).

1818	Disable not functioning.
1819	Wait request switch not set correctly.
1820	Receiver card wrap test failure.
1821	Receiver high order address lines failure.
19xx	3270 PC at attachment card errors.
20xx	Binary synchronous communications (BSC) adapter errors.
2010	8255 port A failure.
2011	8255 port B failure.
2012	8255 port C failure.
2013	8253 timer 1 did not reach terminal count.
2014	8253 timer 1 stuck on.
2016	8253 timer 2 did not reach terminal count, or timer 2 stuck on.
2017	8251 Data set ready failed to come on.
2018	8251 Clear to send not sensed.
01xx	Undetermined problem errors.
02xx	Power supply errors.
1xx	System board errors.
101	System board error interrupt failure.
102	System board error Timer failure.
103	System board error Timer interrupt failure.
104	System board error Protected mode failure.
105	System board error Last 8042 command not accepted.
106	System board error Converting logic test.
107	System board error Hot NMI test.

- 108 System board error Timer bus test.
- 109 Direct memory access test.
- 121 Unexpected hardware interrupts occurred.
- 131 Cassette wrap test failed.
- 152
- 161 System Options Error-(Run SETUP) (Battery failure).
- 162 System options not set correctly-(Run SETUP).
- 163 Time and date not set-(Run SETUP).
- 164 Memory size error-(run setup).
- 199 User-indicated configuration not correct.
- 2xx Memory (RAM) errors.
- 201 Memory test failed.
- 202 Memory address error.
- 203 Memory address error.
- 3xx Keyboard errors.
- 301 Keyboard did not respond to software reset correctly, or a stuck key failure was detected. If a stuck key was detected, the scan code for the key is displayed in hexadecimal. For example, the error code 49 301 indicates that key 73 the PgUp key has failed (49 hex = 73 decimal).
- 302 User-indicated error from the keyboard test or AT key lock is locked.
- 303 Keyboard or system unit error.
- 304 Keyboard or system unit error. CMOS does not match system.
-

THEORY/TECHNICAL REFERENCE

If the number of floppies changes, the BIOS will send a warning message to the screen and ask the user for the new configuration. The BIOS can determine if a floppy has been added or deleted, but it can not determine if a high capacity drive has been substituted for a normal floppy or vice versa. In such a case, a separate setup program must be used.

If the number of hard disk changes, the BIOS will send a warning message to the screen and ask the user for the new configuration. The BIOS can determine if a hard disk has been added or deleted, but it can not determine if one size hard disk has been substituted for another. In such a case, a separate setup must be used. The hard disk configuration in the CMOS RAM is only valid for an AT type hard disk adapter. If an XT hard disk adapter is used, no setup need to be done. When setup is done on a hard disk, it is necessary to enter the type of hard disk.

- AREA A -

- AREA C -

