SQUARE ONE
INDUSTRIES INC.

NC-544
Low-power 6X86
5.25" Little Board SBC

Reference Manual

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Introduction 1

1.1 Specifications

- CPU + Chipset:
  NS Geode GXLV/GX1 & CX5530 Chipset with 6X86- 166/233/300 MMX CPU built-in chip, GXLV supports low-power 0~85°C CPU (1.5W-5.4W)
  GX1 supports very-low-power 0~85°C CPU (0.8W-3W)
- Cache Memory: 16KB L1 Cache Memory
- I/O Chipset: NS PC97317 + SMC666/669
- BIOS: Award, 128KB Flash BIOS for Plug & Play function
- Memory: 144-pin SO DIMM socket supports up to 128 MB SD RAM memory and low-profile application
- LCD/VGA w/MPEG II: On-chip shared-memory 64-bit LCD/VGA, supports CRT and TFT LCD flat panel up to 1280X1024X8 BPP and 1024X768X16 BPP, supports MPEG1 and MPEG2 assist.
- 10/100 Ethernet with BOOT ROM: Intel 82559 10/100Mbps Ethernet with optional BOOT ROM
- 10/100 Ethernet X 2: Optional 2nd Intel 82559 10/100Mbps Ethernet.
- CMOS Backup: CMOS backup by Li battery
- High Quality NTSC/PAL TV-out: Optional on-board
- LVD/DSTN Daughter Board: Optional
- GPS Socket: Optional socket for GPS Module
- Keyboard & Mouse Connector: Supports 8-pin header PC/AT Keyboard & PS/2 Mouse Connector
- Bus Type: PC/104 Connector and PCI slot
- Touch Panel Interface: Optional
- Audio: 16-bit stereo FM synthesis, OPL3 emulation
- FlashDisk SSD: 32-pin socket for DiskOnChip SSD 2MB~288MB
- CompactFlash II socket: Supports C F I/II type IDE Flash Disk or IBM 340MB/1GB MicroDrive HDD
- IDE port X 2: Supports 2 IDE ports up to 4 IDE devices
- FDD: Supports up to 2 Floppy Disk Drives, 3.5" or 5.25" FDD (360K/720K/1.2M/1.44M/2.88M), Drives A & B are swappable

- Serial port X 4: Four 6-byte FIFO 16C550 serial ports, jumper selectable RS-232 X 3 + RS-232/422/485 X 1
- Parallel port: One bi-directional parallel port configured as LPT1, 2, 3 supports IEEE 1284 compliant high speed EPP and ECP modes
- Speaker: Buzzer on board
- IrDA and USB: IrDA X 1 and USB X 2
- DMA Controller: 82C37 X 2
- DMA Channels: 7
- Interrupt Controllers: 82C59 X 2
- Interrupt Levels: 15
- Operating Temperature: 0~60°C for board, 0~85°C low-power CPU (1.5W-5.4W), or optional 0~85°C very-low-power CPU (0.8W-3W) needs only a metal cooler, not a fan.
- Power Consumption:

	Peak Power	Average Power
GXLV-233 (2.5V)	5.4W	2.0W
GXLV-166 (2.2V)	3.7W	1.0W
GX1-300 (2.0V)	3.0W	1.5W
GX1-266 (1.8V)	2.3W	1.2W
GX1-233 (1.8V)	2.0W	1.0W
GX1-200 (1.6V)	1.6W	0.8W

- System Power Requirements: +/-5V, +/-12V power by using ATX power connector, or single +5V by using 2-pin connector.
- Board Dimensions: 203mm X 146mm
- Board Weight: 235g

1.2 Safety Precautions

Follow the warnings below to protect your system from damage and yourself from injury:

1. Avoid exposing your system to static electricity at any time.

2. Protect yourself from electric shock. Do not touch any components of this card when the power is ON. Always disconnect power when the system is not in use.

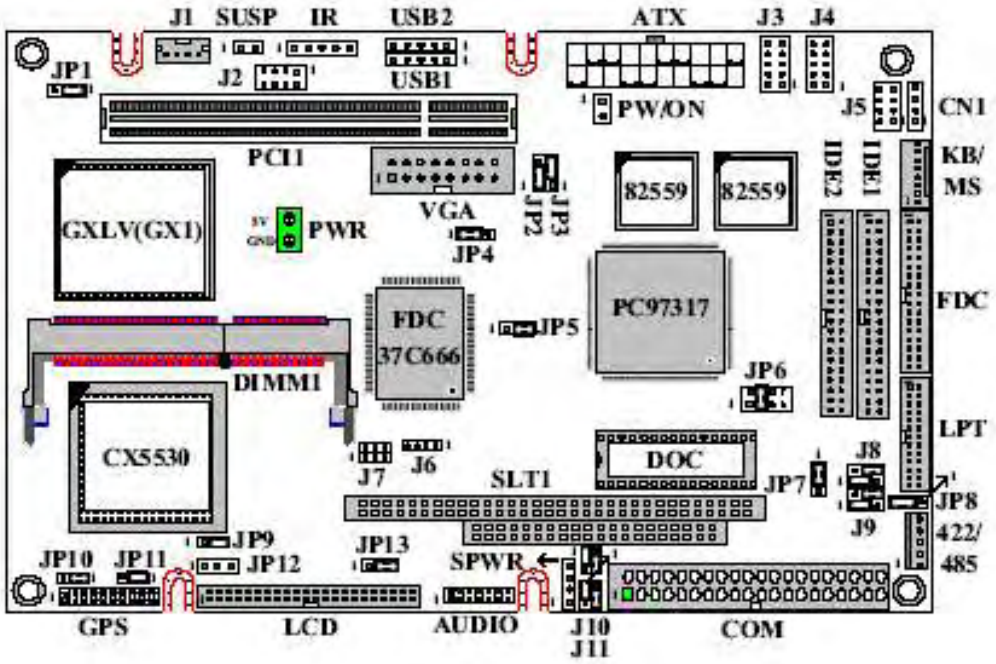
3. Disconnect power when you change any hardware devices.

Hardware Configuration 2

2.1 Jumpers/Connectors Quick Reference Table

Floppy Disk Drive Connector	FDC
Printer Connector	LPT
IDE1 Connector	IDE1
IDE2 Connector	IDE2
VGA Connector	VGA
RS-232 X 4 Connector	COM
ATX Power Connector	ATX
2-pin Single +5V Power Connector	PWR
LCD Connector	LCD
IrDA Connector	IR
USB1 Connector	USB1
USB2 Connector	USB2
8-pin PC/AT K/B & PS/2 Mouse Connector	KB/MS
Audio Output Connector	AUDIO
GPS Connector	GPS
ATX Power-on Push Button Connector	PW/ON
Negative Voltage Input	SPWR
RS-422/485 Connector	422/485
Hardware Suspend Connector	SUSP
Touch Panel Connector	CN1
Ethernet1 Enabled/Disabled Select	JP2
Ethernet2 Enabled/Disabled Select	JP3
CMOS Battery Clear Jumper	JP4
WDT Output Select	JP5
M-System Address Select	JP6
COM2 RS-232/422/485 Select	JP7
RS-422/485 D-SUB pin 9 voltage output select	JP8
GPS antenna power (+5V or +12V) select	JP9
GPS (SiRF or Rockwell) select	JP10/JP11
LCD Backlight Inverter Power Connector	JP12
LCD Panel Voltage Select	JP13
CD-ROM Audio-In Connector	J1
Front Panel Connector	J2
Ethernet1 Connector	J3
Ethernet2 Connector	J4
Ethernet 1,2 LED Connector	J5
TV-out Connector	J6, J7
COM3 D-SUB pin 1,9 Voltage or Signal Select	J8
COM4 D-SUB pin 1,9 Voltage or Signal Select	J9
COM1 D-SUB pin 1,9 Voltage or Signal Select	J10
COM2 D-SUB pin 1,9 Voltage or Signal Select	J11
Buzzer	BZ1
Memory Installation	DIMM1
PCI slot	PCI1
CompactFlash I/II socket	IBM1
ATX or Single +5V Jumper Select	JP1
Manufacturer Default Jumper List	JP4

2.2 Component Locations



2.3 Floppy Disk Drive Connector (FDC)

Pin	Assignment	Pin	Assignment
1	GND	2	DENSEL
3	GND	4	NC
5	GND	6	DRATE0
7	GND	8	INDEX
9	GND	10	MTR0
11	GND	12	DRV1
13	GND	14	DRV0
15	GND	16	MTR1
17	GND	18	DIR
19	GND	20	STEP
21	GND	22	WDATA
23	GND	24	WGATE
25	GND	26	TRK0
27	GND	28	WRTPRT
29	GND	30	RDATA
31	GND	32	SEL
33	GND	34	DSKCHG

2.4 Printer Connector (LPT)

Pin	Assignment	Pin	Assignment
1	STROB	2	AUTOFD
3	PD0	4	ERROR
5	PD1	6	INIT
7	PD2	8	SLCTIN
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC

2.5 VGA Connector (VGA)

Pin	Assignment	Pin	Assignment
1	RED	2	+5V
3	GREEN	4	GND
5	BLUE	6	NC
7	NC	8	SERIAL DATE
9	GND	10	HSYNC
11	GND	12	VSYNC
13	GND	14	SERIAL CLOCK
15	GND	16	NC

2.6 IDE1 & IDE Connectors (IDE1 & IDE2)

Pin	Assignment	Pin	Assignment
1	RESET	2	GND
3	HD7	4	HD8
5	HD6	6	HD9
7	HD5	8	HD10
9	HD4	10	HD11
11	HD3	12	HD12
13	HD2	14	HD13
15	HD1	16	HD14
17	HD0	18	HD15
19	GND	20	NC
21	DREQ	22	GND
23	IOW	24	GND
25	IOR	26	GND
27	IORDY	28	GND
29	DACK	30	GND
31	IRQ	32	SINGLE GND
33	SA1	34	NC
35	SA0	36	SA2
37	HDCS0	38	HDCS1
39	DASP	40	GND

2.7 RS-232 X 4 Connector (COM)

Pin	Assignment	Pin	Assignment
1	DCD1-	2	DSR1-
3	RXD1	4	RTS1-
5	TXD1	6	CTS1-
7	DTR1	8	RI1-
9	GND	10	NC
11	DCD2-	12	DSR2-
13	RXD2	14	RTS2-
15	TXD2	16	CTS2-
17	DTR2-	18	RI2-
19	GND	20	NC
21	DCD3-	22	DSR3-
23	RXD3	24	RTS3-
25	TXD3	26	CTS3-
27	DTR3-	28	RI3-
29	GND	30	NC
31	DCD4-	32	DSR4-
33	RXD4-	34	RTS4-
35	TXD4-	36	CTS4-
37	DTR4-	38	RI4-
39	GND	40	NC

2.8 ATX Power Connector (ATX)

Pin	Assignment	Pin	Assignment
1	NC	2	NC
3	GND	4	+5V
5	GND	6	+5V
7	GND	8	NC
9	5VS-B	10	+12V
11	NC	12	-12V
13	GND	14	POWER ON
15	GND	16	GND
17	GND	18	-5V
19	+5V	20	+5V

2.9 2-Pin Single +5V Power Connector (PWR)

Pin	Assignment	Pin	Assignment
1	GND	2	+5V

2.10 IrDA Connector (IR)

Pin	Assignment	Pin	Assignment
1	VCC	2	CIR RXD
3	IR-RXD	4	GND
5	IR-TXD		

2.11 LCD Connector (LCD)

Pin	Assignment	Pin	Assignment
1	+12V	2	+12V
3	GND	4	GND
5	LCD VCC	6	LCDVCC
7	NC	8	GND
9	DSTN SIGNAL	10	DSTN SIGNAL
11	B0	12	B1
13	B2	14	B3
15	B4	16	B5
17	DSTN SIGNAL	18	DSTN SIGNAL
19	G0	20	G1
21	G2	22	G3
23	G4	24	G5
25	DSTN SIGNAL	26	DSTN SIGNAL
27	R0	28	R1
29	R2	30	R3
31	R4	32	R5
33	GND	34	GND
35	SHFCLK	36	VSYNC(FLM)
37	M(D,0)	38	HSYNC(LP)
39	GND	40	ENABKL
41	+5V	42	+5V
43	LCDVCC	44	LCDVCC

2.12 USB1 & USB2 Connector (USB1 & USB2)

Pin	Assignment	Pin	Assignment
1	VCC +5V	2	BD-
3	BD+	4	GND
5	GND		

2.13 8-Pin PC/AT K/B & PS/2 Mouse Connector

Pin	Assignment	Pin	Assignment
1	MOUSE GND	2	VCC +5V
3	MOUSE DATA	4	MOUSE CLK
5	KEYBOARD GND	6	VCC +5V
7	KEYBOARD DATA	8	KEYBOARD CLK

2.14 Audio Output Connector (AUDIO)

Pin	Assignment	Pin	Assignment
1	LINE IN LEFT	2	GND
3	GND	4	LINE IN RIGHT
5	GND	6	MIC IN
7	MIC IN	8	GND
9	LINE OUT LEFT	10	LINE OUT RIGHT
11	GND	12	AMP OUT LEFT
13	AMP OUT RIGHT	14	GND

2.15 GPS Connector

Pin	Assignment	Pin	Assignment
1	ANTPWR	2	VCC +5V
3	BATT	4	VCC +3.3V
5	PG	6	NC
7	NC	8	NC
9	NC	10	GND
11	GPSRXD1	12	GPSTXD1
13	GND	14	GPSRXD2
15	GPSTXD2	16	GND
17	NC	18	GND
19	NC	20	NC

2.16 ATX Power On Push Button Connector (PW/ON)

Pin	Assignment	Pin	Assignment
1	POWER SIGNAL	2	GND

2.17 Negative Voltage Input (SPWR)

Pin	Assignment	Pin	Assignment
1	GND	2	-5V
3	GND	4	-12V

2.18 RS-422/485 Connector (422/485)

Pin	Assignment	Pin	Assignment
1	RXD/TX+	2	DTR/RX-
3	DCD/TX-	4	TXD/RX+
5	CABLE/RI		

2.19 Hardware Suspend Connector (SUSP)

Pin	Assignment	Pin	Assignment
1	SUSP SIGNAL	2	GND

2.20 Touch Panel Connector (CN1)

Pin	Assignment	Pin	Assignment
1	X+	2	X-
3	Y+	4	Y-

2.21 Ethernet1 Enabled/Disabled Select (JP2)

1-2 On: Enable 2-3 On: Disable

2.22 Ethernet2 Enabled/Disabled Select (JP3)

1-2 On: Enable 2-3 On: Disable

2.23 CMOS Battery Clear Jumper (JP4)

1-2 On: Default 2-3 On: CMOS Clear

2.24 WDT Output Select (JP5)

JP5: Watchdog Timer Output for System Reset or IRQ11 Selection.
When JP5 is set to position 1-2 ON, then the output signal of the timer will generate an interrupt signal to IRQ11.
Once the system accepts the interrupt request, it will release an ISR address (CS:E000 IP:0000) for the user.
The user can write an interrupt service routine here, for developing application software.
1-2 On: IRQ11 2-3 On: SYSTEM RESET

2.25 M-System Address Select (JP6)

Address Selection	Jumper Setting			
	Pin 1&2	Pin 3&4	Pin 5&6	Pin 7&8
C000	ON	OFF	OFF	OFF
C800	OFF	ON	OFF	OFF
D000	OFF	OFF	ON	OFF
D800	OFF	OFF	OFF	ON

2.26 COM2 RS-232/422/485 Select (JP7)

1-2 On: RS-232 2-3 On: RS-422/485

2.27 RS-422/485 D-SUB Pin9 Voltage Output Select (JP8)

1-2 On: +12V for RS-422/485 Connector Pin5 (D-SUB Pin9)
2-3 On: +5V for RS-422/485 Connector Pin5 (D-SUB Pin9)

2.28 GPS Antenna Power (+5V/+12V) Select (JP9)

1-2 On: +12V 2-3 On: +5V

2.29 GPS for SiRF or Rockwell Select (JP10/11)

JP10/11 1-2 On: SiRF JP10/11 2-3 On: Rockwell

2.30 LCD Backlight Inverter Power Connector (JP12)

Pin1: +12V Pin2: GND Pin3: VCC +5V

2.31 LCD Panel Voltage Select (JP13)

1-2 On: 5V 2-3 On: 3.3V

2.32 CD-ROM Audio In Connector (J1)

Pin	Assignment	Pin	Assignment
1	CDL	2	GND
3	GND	4	CDR

2.33 Front Panel Connector (J2)

Pin	Assignment	Pin	Assignment
1	HDLED-	2	HDLED+
3	SPK+	4	SPK- (GND)
5	WDTOUT- (GND)	6	WDTOUT+
7	RESET- (GND)	8	RESET+

2.34 Ethernet1 Connector(J3)

Pin	Assignment	Pin	Assignment
1	TX+	2	TX-
3	RX+	4	NC
5	NC	6	RX-
7	N/C	8	N/C
9	GND	10	GND

2.35 Ethernet2 Connector(J4)

Pin	Assignment	Pin	Assignment
1	TX+	2	TX-
3	RX+	4	NC
5	NC	6	RX-
7	N/C	8	N/C
9	GND	10	GND

2.36 Ethernet 1,2 LED Connector (J5)

Pin	Assignment	Pin	Assignment
1	ETHERNET1	2	ETHERNET1 ON LED
3	ETHERNET1	4	ETHERNET1 ACTIVE
5	ETHERNET2	6	ETHERNET2 ON LED
7	ETHERNET2	8	ETHERNET2 ACTIVE

2.37 TV-Out Connector (J6, J7)

Composite Video Output (J6)

Pin	Assignment	Pin	Assignment
1	SIGNAL	2	GND
3	GND	4	GND

S-Video Output (J7)

Pin	Assignment	Pin	Assignment
1	GND	2	LUMP
3	GND	4	GND
5	CHROMF	6	GND

2.38 COM3 D-SUB Pin 1,9 Voltage or Signal Select (J8)

1-3 On: Select +12V
2-4 On: Select VCC 5V
3-5 On: Select RI3
4-6 On: Select DCD3

2.39 COM4 D-SUB Pin 1,9 Voltage or Signal Select (J9)

1-3 On: Select +12V
2-4 On: Select VCC 5V
3-5 On: Select RI4
4-6 On: Select DCD4

2.40 COM1 D-SUB Pin 1,9 Voltage or Signal Select (J10)

1-3 On: Select +12V
2-4 On: Select VCC 5V
3-5 On: Select RI1
4-6 On: Select DCD1

2.41 COM2 D-SUB Pin 1,9 Voltage or Signal Select (J11)

1-3 On: Select +12V
2-4 On: Select VCC 5V
3-5 On: Select RI2
4-6 On: Select DCD2

2.42 Buzzer (BZ1)

Pin	Assignment	Pin	Assignment
1	VCC	2	SIGNAL

2.43 Memory Installation (DIMM1)

The NC-544 CPU Card uses one 144-pin SO-DIMM module.

2.44 PCI Slot (PCI1)

The NC-544 CPU Card supports one PCI Slot.

2.45 CompactFlash II Socket (IBM1)

The NC-544 CPU Card supports CompactFlash II (+5V only)

2.46 ATX or Single +5V Jumper Select

1-2 On: ATX Power 2-3 On: Single +5V

3.1 Preface

The NC-544 has two graphic output ports: one for interfacing with Thin-Film Transistor (TFT) flat panel displays and one for CRT display interfacing.

CRT Display Modes:

Resolution	Colors	Refresh Rate (Hz)	DOTCLK Rate (HZ)	PCLK	Graphic Port Width (Bits)
640X480	8 BPP 256 Colors	60	25.175	25.175	8
		72	31.5	31.5	8
		75	31.5	31.5	8
	16 BPP 64K Colors RGB	60	25.175	50.35	8
				25.175	16
		72	31.5	63.0	8
				31.5	16
		75	31.5	63.0	8
				31.5	16
800X600	8 BPP 256 Colors	60	40.0	40.0	8
		72	50.0	50.0	8
		75	49.5	49.5	8
	16 BPP 64K Colors RGB	60	40.0	80	8
				40	16
		72	50.0	100	8
				50.0	16
		75	49.5	99	8
				49.5	16
1024X768	8 BPP 256 Colors	60	65.0	65.0	8
		70	75.0	75.0	8
		75	78.5	78.5	8
	16 BPP 64K Colors RGB	60	65.0	65.0	16
		70	75.0	75.0	16
		75	78.5	78.5	16
1280X1024	8 BPP 256 Colors	60	108.0	108.0	8
				54.0	16
		75	135.0	67.5	16

3.2 TFT Panel Display Modes

Resolution	Simultaneous Colors	Refresh Rate (MHz)	DOTCLK Rate (MHz)	PCLK (MHz)	Panel Type (bits)
640X480	8 BPP 256 Colors	60	25.175	25.175	9
					12
					18
	16 BPP 64K Colors RGB	60	25.175	25.175	9
					12
					18
800X600	8 BPP 256 Colors	60	40.0	40.0	9
					12
					18
	16 BPP 64K Colors RGB	60	40.0	40.0	9
					12
					18
1024X768	8 BPP 256 Colors	60	65	32.5	9/18 I/F
	16 BPP 64K Colors	60	65	32.5	9/18 I/F

3.3 Utility Reference

The NC-544 supports on-chip VGA interface which uses shared memory technology to share system memory as VGA display buffer.

Touch Panel Interface 4

4.1 Serial Port Baud Rate

The BAUD rate of the serial port is 19200 BAUD using a 1.8432MHz crystal across XTAL I/O pins with capacitors to ground leads.

4.2 Touch Panel Interface Pin Out

Both versions provide 4-pin header direct connect signals X+, X-, Y+, Y- to the 4 wire Touch screen. The driver circuits are built-in internally. It is advisable to provide the shortest possible trace lengths to the touch screen.

4.3 Serial Port Pin Out (to Touch Screen)

The serial data output of both chips is connected to the serial port TX pin through two general-purpose transistors. The transistors are properly biased to provide the necessary signal level swing for the TX pin. The negative signal level is derived with the RX pin of the serial port (RX is not used since data is unidirectional). Power is derived from the DTR signal through a 5.0V linear regulator. Refer to the schematic diagram for details, the following table for serial port pin assignments, and the device data sheets for serial output data format.

DSUB-S Connector			
Pin Number	Signal	Pin Number	Signal
1	NC	6	NC
2	TX	7	NC
3	RX(-12V)	8	NC
4	DTR(+12V)	9	NC
5	NC		

DiskOnChip Flash Disk 5

5.1 Preface

The NC-544 features an optional M-System DiskOnChip Flash Disk function. The DiskOnChip can be built on-board by order. The NC-544 is designed to allow the DiskOnChip Flash Disk to plug into an on-board standard 32-pin EEPROM socket. The DiskOnChip Flash Disk should be mapped into an 8K Byte window in the BIOS expansion address space of the NC-544 CPU Card (typically between 0C0000H and 0EFFFFH). The NC-544 can store the operating system in the DiskOnChip to permit systems to boot without a hard disk.

The DiskOnChip can store and boot standard MS-DOS, and is fully compatible with standard DOS commands. Users can read and write DOS commands and data to DiskOnChip in the same manner as using a hard disk drive.

Users can designate the DiskOnChip as a physical HDD and select its drive letter priority via software.

The DiskOnChip has the following capacity settings available (units are in MB): 2, 4, 8, 12, 24, 40, 72, 144, 288.

The NC-544 supports the M-System DiskOnChip socket which is located at DOC.

5.2 Quick Installation Guide

1. Make sure the NC-544 CPU Card's Power is off.

2. Plug the DiskOnChip into socket DOC. Verify the positioning is correct (Pin 1 of the DiskOnChip is aligned with Pin 1 of the DOC socket).

3. Turn ON the system power.

4. During power up, a message may be displayed by the DiskOnChip when its driver is automatically loaded into the system's memory.

5. At this point, the DiskOnChip can be accessed as any disk in the system.

6. If the DiskOnChip is the only disk in the system, it will appear as Drive C. Otherwise, it will appear by default as the last drive.

Ethernet 6

6.1 Introduction

The NC-544 is equipped with two high-performance Intel 82559 PCI 10/100 Ethernet chipsets which are fully IEEE 802.3 compliant. The medium type can be configured via the 82559.exe program included on the utility disk.

The NC-544 has two 10-pin headers as Ethernet connectors on-board. It also supports a BOOT ROM socket which can be utilized by incorporating the appropriate BOOT ROM image files for the network operating system.

7.1 Watchdog Timer Function

The Watchdog Timer is a device to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have been caused by external EMI or a software bug. When the CPU halts normal operation, hardware on the board will perform a hardware reset (cold boot) or a non-maskable interrupt (NMI) to bring the system back to a known state.

Three I/O port operations control the Watchdog Timer.

443(hex)	Write	Set Time period and start Watchdog operation
443(hex)	Read	Refresh the Watchdog Timer
043(hex)	Read	Stop the Watchdog Timer

Prior to enabling the Watchdog Timer, the Timer interval must be selected. When selecting the timer interval, consideration must be given to the design to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time consuming.

The timer interval value is from 01(hex) to FF (hex) and time interval 4 sec to 1020 sec. in 4 sec increments. (see chart).

Start: To start the watchdog timer, the program must write the timer value to I/O port address 443H. This will activate the countdown timer with the selected timer value which will eventually time out and reset the CPU or cause an NMI depending on the setting of JP5.

Operation: To ensure that this reset condition does not occur, the Watch-Dog Timer must be periodically refreshed by reading the same I/O port 443H. This must be done within the time out period selected. A 30% latitude is recommended, so for a 10 second interval, the WDT should be refreshed every 7 seconds.

Stop: To stop the watchdog timer, the program should issue a read command to I/O port 043 (hex).

Note: Before exiting a program it is necessary to disable the Watchdog Timer, otherwise the system will reset.

VA	time	VA	time	VA	time	VA	time	VA	time	VA	time	VA	time	VA	time
00	1024	10	64	20	128	30	192	40	256	50	320	60	384	70	448
01	4	11	68	21	132	31	196	41	260	51	324	61	388	71	452
02	8	12	72	22	136	32	200	42	264	52	328	62	392	72	456
03	12	13	76	23	140	33	204	43	268	53	332	63	396	73	460
04	16	14	80	24	144	34	208	44	272	54	336	64	400	74	464
05	20	15	84	25	148	35	212	45	276	55	340	65	404	75	468
06	24	16	88	26	152	36	216	46	280	56	344	66	408	76	472
07	28	17	92	27	156	37	220	47	284	57	348	67	412	77	476
08	32	18	96	28	160	38	224	48	288	58	352	68	416	78	480
09	36	19	100	29	164	39	228	49	292	59	356	69	420	79	484
0A	40	1A	104	2A	168	3A	232	4A	296	5A	360	6A	424	7A	488
0B	44	1B	108	2B	172	3B	236	4B	300	5B	364	6B	428	7B	492
0C	48	1C	112	2C	176	3C	240	4C	304	5C	368	6C	432	7C	496
0D	52	1D	116	2D	180	3D	244	4D	308	5D	372	6D	436	7D	500
0E	56	1E	120	2E	184	3E	248	4E	312	5E	376	6E	440	7E	504
0F	60	1F	124	2F	188	3F	252	4F	316	5F	380	6F	444	7F	508
VA	time	VA	time	VA	time	VA	time	VA	time	VA	time	VA	time	VA	time
80	512	90	576	A0	640	B0	704	C0	768	D0	832	E0	896	F0	960
81	516	91	580	A1	644	B1	708	C1	772	D1	836	E1	900	F1	964
82	520	92	584	A2	648	B2	712	C2	776	D2	840	E2	904	F2	968
83	524	93	588	A3	652	B3	716	C3	780	D3	844	E3	908	F3	972
84	528	94	592	A4	656	B4	720	C4	784	D4	848	E4	912	F4	976
85	532	95	596	A5	660	B5	724	C5	788	D5	852	E5	916	F5	980
86	536	96	600	A6	664	B6	728	C6	792	D6	856	E6	920	F6	984
87	540	97	604	A7	668	B7	732	C7	796	D7	860	E7	924	F7	988
88	544	98	608	A8	672	B8	736	C8	800	D8	864	E8	928	F8	992
89	548	99	612	A9	676	B9	740	C9	804	D9	868	E9	932	F9	996
8A	552	9A	616	AA	680	BA	744	CA	808	DA	872	EA	936	FA	1000
8B	556	9B	620	AB	684	BB	748	CB	812	DB	876	EB	940	FB	1004
8C	560	9C	624	AC	688	BC	752	CC	816	DC	880	EC	944	FC	1008
8D	564	9D	628	AD	692	BD	756	CD	820	DD	884	ED	948	FD	1012
8E	568	9E	632	AE	696	BE	760	CE	824	DE	888	EE	952	FE	1016
8F	572	9F	636	AF	700	BF	764	CF	828	DF	892	EF	956	FF	1020

7.2 Watchdog Software Guide

The following example shows how to program the watchdog timer.

Watchdog Enable:

```
MOV AL, 00xxH          ;(Choose the needed values, from 0 to FF)
MOV DX, 0443H
OUT DX, AL
```

Watchdog Refresh

```
MOV DX, 0443H
IN DX, AL
```

Watchdog Disable:

```
MOV DX, 043H
IN DX, AL
```

The desired Timer Interval and the corresponding Hex value can be found on the preceding Watchdog Timer Control Table. VA Mean is the value for counter in hexadecimal units. Time mean is the WDT response time in seconds.

Audio 8

8.1 Introduction

The NC-544 on-board audio interface provides high quality stereo sound and FM music synthesis (ESFM) by using the CX5530 audio controller and Codec chip. The audio interface can record, compress, and play back voice, sound, and music with a built-in mixer control. The NC-544's AC97 audio interface also supports the Plug and Play (PnP) standard. The ESFM synthesizer is register compatible with the OPL3 and has extended capabilities.

Award Bios Setup 9

9.1 Introduction

This section discusses the Award Setup program built into the ROM BIOS. The Setup program allows users to modify the basic system configuration. This special configuration is then stored in battery-backed RAM so that the Setup information is retained when the power is turned off.

The Award BIOS installed in the computer system's ROM is a custom version of an industry standard BIOS. This means that it supports Intel/Cyrix/AMD processors in a standard IBM AT compatible Input/Output system. The BIOS provides critical low-level support for standard devices such as disk drives, serial, and parallel ports. The BIOS has additionally been customized through the addition of virus and password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system. The remainder of this section is a guide to using Setup for configuring the system.

9.2 Starting Setup

The Award BIOS is immediately activated when the computer powers on. The BIOS reads the system information contained in the CMOS and starts the process of system checks and configuration. When this is finished, the BIOS will seek an operating system on one of the disks and then launches and turns control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:

1. Press the <Del> key immediately after switching the system on.
2. Press the <Del> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self Test).

Press DEL to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, then restart the system and try again.

9.3 Main Menu

Once the Award BIOS Setup Utility is entered, the Main Menu will appear on the screen. Use the arrow keys to navigate among the items and press Enter to select an item. Note that a brief description of each highlighted selection appears at the bottom of the screen.

Setup Items

The main menu includes the following main setup categories. Note that some systems may not include all entries.

- **Standard CMOS Setup:** This includes all the items in a standard AT compatible BIOS.
- **BIOS Features Setup:** This includes all of the Award special enhanced features.
- **Chipset Features Setup:** This includes all of the chipset special features.
- **Power Management Setup:** This only appears if your system supports power management (Green PC) standards.
- **PnP/PCI Configuration:** This appears if your system supports PnP/PCI.

- **Load BIOS Defaults:** The BIOS defaults have been set by the manufacturer and represent settings which provide the minimum requirements for your system to operate.
- **Load Setup Defaults:** The chipset defaults are settings provided for maximum performance. While Award has designed the custom BIOS to maximize performance, the manufacturer may change these defaults to meet their needs.
- **Integrated Peripherals:** This includes IDE drives and Programmed I/O features.
- **Supervisor/User Password Settings:** Change, set, or disable password. This allows limitation of access to the system and to Setup, or just to Setup.
- **IDE HDD Auto Detection:** Automatically detects and configures hard disk parameters. Award BIOS includes this utility in case a user is uncertain of hard disk parameters.
- **Save and Exit Setup:** Saves value changes to CMOS and exits Setup.
- **Exit without saving:** Abandons changes to CMOS values and exits Setup.

9.4 Standard CMOS Setup

The items in the Standard CMOS Setup Menu are divided into ten categories. Use the arrow keys to highlight the item and then use the PageUp/PageDown keys to select the desired value.

- **Date:** The date format is mm:dd:yy. System BIOS will calculate theday of the week automatically.

- **Time:** The time format is hh:mm:ss. Time is calculated based on a 24 hour clock, thus 1PM is represented as 13:00:00.

- **Hard Disk Settings:** The BIOS supports Dual-Channel PIO and PCI Bus Master IDE ports. Each port supports one master and one slave drive. Use the PageUp/PageDown keys to select hard drive type. Incorrect settings may result in boot errors or system hang. If your hard disk type is not listed, selecting drive type User will allow manual drive definition. If the hard disk drive is a SCSI device, select none as the hard drive setting. In general, the selection of Auto as drive type is recommended.

- **Drive A Type/ Drive B Type:** This identifies the types of floppy disk drives that have been installed in the computer.

- **Video:** This selects the type of video adapter used for the primary system monitor. Although secondary monitors are supported, they do ot have to be specified in setup.

EGA/VGA	For EGA, VGA, SEGA, SVGA, or PGA monitor adapters.
CGA 40	For 40 column Color Graphics Adapters.
CGA 80	For 80 column Color Graphics Adapters.
MONO	Includes high resolution monochrome adapters.

- **Halt On:** This function allows the system to halt when an error is detected during the Power On Self Test.

No Errors	System boot does not stop for any detected error.
All Errors	When BIOS detects any non-fatal error, the system stops and the user is prompted.
All But Keyboard	System boot does not stop for a keyboard error, but stops for all other errors.
All But Diskette	System boot does not stop for a disk error, but stops for all other errors.
All But Disk/Key	System boot does not stop for a disk/key error, but stops for all other errors.

9.5 BIOS Features Setup

This allows system configuration for basic operation. Default speed, boot-up sequence, shadowing, keyboard operation, and security are selectable.

- **Virus Warning:** When enabled, the BIOS will monitor the boot sector and the partition table on the hard drive for any modification attempts. If an attempt is detected, the BIOS will halt the system and prompt the warning message. Select “disabled” when installing a new operating system.
- **CPU Internal Cache:** This may speed up memory access, depending on CPU/chipset design.
- **Quick Power On Self Test:** When this is enabled, BIOS will shorten or skip some items during the POST.
- **Boot Sequence:** This allows the user to select the boot sequence of the system.
- **Swap Floppy Drive:** Enabling this assigns physical drive A to Logical drive B, and vice versa.
- **Boot Up Floppy Seek:** Detects and verifies operation of the floppy drive type.
- **Boot Up NumLock Status:** This allows the NumLock key to be activated after system boot up.
- **Boot Up System Speed:** Selects the default system speed.
- **Gate A20 Option:** This is used to address memory above 1MB. Though many keyboards provide this support via a pin on the keyboard, it is faster for the system chipset to handle it.
- **Memory Parity Check:** This allow the memory parity check function to be selected. The recommended (and factory default) setting is Disabled.
- **Typematic Rate Setting:** When disabled, holding down a key on the keyboard will generate one instance. When enabled, after a momentary delay, if a key is still held down, the BIOS will report that the key is being depressed repeatedly.
- **Typematic Rate (Chars/sec):** Allows setting the rate at which a character keeps repeating when a key is held down.
- **Typematic Delay (msec):** Allows setting the delay between key depression and

the repetition signal.

- **Security Option:** This allows selection of whether the password is required every time the system boots or only when Setup is entered.
- **PCI / VGA Palette Snoop:** This allows for correction of screen color shifts when a combination of VGA cards, accelerator cards, or MPEG cards are present.
- **OS Select for DRAM > 64:** This needs to be enabled if the OS/2 operating system and installed memory is greater than 64MB.
- **Video BIOS Shadow:** Video shadow copies BIOS code from ROM to RAM, allowing for faster subsequent execution from RAM.
- **C8000 - CBFFF Shadow / DC000 - DFFFF Shadow:** Allows optional firmware to be copied from ROM to RAM.

9.6 Chipset Features Setup

- **SDRAM CAS Latency Time:** This is the clock calculated latency delay timing.
- **SDRAM Clock Ratio Div By:** Selects SDRAM Clock Ratio; the default is 4.
- **16-Bit I/O Recovery (CLK):** Specifies the length of a delay inserted between consecutive 16-bit I/O operations.
- **8-Bit I/O Recovery (CLK):** Specifies the length of a delay inserted between consecutive 16-bit I/O operations.

9.7 Power Management Setup

- **Power Management:** This allows user selection of the type or degree of power saving, using the following settings.

Disabled	The system operates under normal (non-Green) conditions.
Max. Saving	Maximizes power saving capabilities.
Min. Saving	Minimizes power saving capabilities.
User Defined	Allows the user to set Power Management time-out parameters, as described below.

- **Power Management Timers:**

The following four modes are user configurable Green PC power saving functions.

1. Doze Mode: When the system is inactive for a predefined time, system performance will drop. This is the first level of Power Management.

2. Standby Mode: The system turns off the video signal and the fixed drives. This is the second level of Power Management.

3. HDD Power Down: This instructs hard drives to be shut off while in Power Management modes.

4. Modem Use IRQ: This tells the Power Management BIOS which IRQ is assigned to

the installed modem. Options are N/A, 3, 4, 5, 7, 9, 10, 11.

- **Ring Power On Controller:** This allows an incoming call on the external modem to power up the system.

- **RTC Alarm Resume:** This allows the RTC Alarm to Wake Up the system which is set at soft Off.

- **Power Down and Resume Events:** These are I/O events whose occurrence can prevent the system from entering a power saving mode or can awaken the system from such a mode. The system remains alert for any occurrence to a device which is configured as On, even when the system is in Power Down mode. The following is a list of IRQs which can be exempted from this activity. The setting choices for this feature are On and Off(Default). When set to On, activity will neither prevent the system from going into a power management mode nor awaken the system from such a mode.

IRQ3 (COM2)	IRQ4 (COM1)	IRQ5 (LPT2)
IRQ6 (FDD)	IRQ7 (LPT1)	IRQ8 (RTC Alarm)
IRQ9 (IRQ2 Redir)	IRQ10(Reserved)	IRQ11 (Reserved)
IRQ12 (PS/2 Mouse)	IRQ13 (Coprocessor)	IRQ14 (Hard Disk)
IRQ15 (Reserved)		

9.8 PnP/PCI Configuration Setup

This section describes the configuration of the PCI bus system. PCI is a bus standard which allows I/O devices to operate at a speed approaching the speed the CPU itself uses when communicating with its own components. It is strongly recommended that only experienced users make changes to the default settings.

- **PnP OS Installed:** This field allows the use of a Plug and Play operating system. Unless a PnP OS is being used, set this as “No” to avoid IRQ problems.

- **Resources Controlled By:** Default setting is Auto, which allows the BIOS to self-detect settings and Plug and Play devices during start up. The user can select and configure IRQs under Manual mode.

- **Reset Configuration Data:** In case of an IRQ conflict, this allows the system to automatically reset the configuration and reassign the IRQs, DMAs, and I/O addresses.

- **IRQ-XX assigned to:** If user’s ISA card is not PnP compatible and requires a special IRQ to support its function, set the selected IRQ-x assigned to “Legacy ISA”. This informs the PnP BIOS to reserve the selected IRQ for the installed legacy ISA card.

- **DMA-X assigned to:** If user’s ISA card is not PnP compatible and requires a special DMA to support its function, set the selected DMA channel to “Legacy ISA”. This informs the PnP BIOS to reserve the selected DMA Channel for the installed legacy ISA card.

9.9 Integrated Peripherals

NOTE: If you are not using the on-board IDE connector, then use the on-card (ISA card) IDE connector. Set the Onboard Primary IDE and the Onboard Secondary IDE to Disabled as described in the Chipset Features Setup Utility.

- **IDE HDD Block Mode:** This enhances disk performance by allowing multi-sector data transfers and eliminating the interrupt handling time for each sector.
- **IDE Primary Master and Secondary Master/Slave PIO:** These four PIO fields allow the user to set a PIO mode (0-4) for each of four IDE devices. When set to Auto mode, the system automatically sets the best mode for each device.
- **IDE Primary Master and Secondary Master/Slave UDMA:** When set to Auto mode, the system will detect for hard drive support of Ultra DMA mode.
- **Onboard FDC Controller:** Select Enabled for activating the onboard FDC, Disabled for an add-on FDC.
- **Onboard Serial Port 1 and 2:** Selects an address and corresponding interrupt for the first/second serial ports. The default for the first port is 3F8/IRQ4 and the default for the second is 2F8/IRQ3.
- **UR2 Mode:** Activates the infrared transfer function.
- **Onboard Parallel Port:** Allows selection of an address and interrupt for the Parallel port.
- **Parallel Port Mode:** Select an operating mode for the Parallel port. Options are SPP, EPP1.7, EPP1.9, ECP and ECP/EPP1.7, ECP/EPP1.9.
- **Built-in CPU Audio:**
- **Video Memory Size:** This sets Video Memory Size.

9.10 Supervisor/User Password Setting

Either (or both) the supervisor or the user passwords can be set. The difference between the supervisor and the user password is that the supervisor has permission to change the setup menu options as well as editing the values presented; the user may only edit values.

Enter Password: Type the password, up to eight characters in length, and press Enter. The password typed now will clear any previously entered password from CMOS memory. You will then be asked to confirm the password by retyping it and pressing Enter. You may also press Esc to abort the selection and not enter a password.

To disable a password, just press Enter when prompted to enter a password. A message will confirm that the password will be disabled. Once the password is disabled, the system will boot and Setup can be entered freely.

When a password has been enabled, the user will be prompted for it every time an attempt is made to enter Setup.

Additionally, when a password is enabled, the BIOS can also be required to request a password every time the system is rebooted, preventing unauthorized use of the computer. This is done through the BIOS Features Setup Menu and its Security option.

9.11 BIOS Default Drive Table

Type	Size (MB)	Cylinders	Heads	Sectors	Write Precomp	Land Zone	Example Model
1	10	306	4	17	128	305	TEAC SD510, MMI 112, 5412
2	21	615	4	17	300	615	Seagate ST225, ST4026
3	32	615	6	17	300	615	
4	65	940	8	17	512	940	
5	49	940	6	17	512	940	
6	21	615	4	17	65535	615	Seagate ST125, Tandon TM262
7	32	462	8	17	256	511	
8	31	733	5	17	65535	733	Tandon TM703
9	117	900	15	17	65535	901	
10	21	820	3	17	65535	820	
11	37	855	5	17	65535	855	
12	52	855	7	17	65535	855	
13	21	306	8	17	128	319	Disctron 526, MMI M125
14	44	733	7	17	65535	733	
15		Reserved					
16	21	612	4	17	0	663	Microscience HH725, Syquest 3250, 3425
17	42	977	5	17	300	977	
18	59	977	7	17	65535	977	
19	62	1024	7	17	512	1023	
20	32	733	5	17	300	732	
21	44	733	7	17	300	732	
22	31	733	5	17	300	733	Seagate ST4038
23	10	306	4	17	0	336	
24	42	977	5	17	65535	976	Seagate ST4051
25	80	1024	9	17	65535	1023	Seagate ST4096
26	74	1224	7	17	65535	1223	Maxtor 2085
27	117	1224	11	17	65535	1223	Maxtor 2140, Priam S14
28	159	1224	15	17	65535	1223	Maxtor 2190, Priam S19
29	71	1024	8	17	65535	1023	Maxtor 1085, Micropolis 1325
30	98	1024	11	17	65535	1023	Maxtor 1105, 1120, 4780
31	87	918	11	17	65535	1023	Maxtor 1170
32	72	925	9	17	65535	926	CDC 9415
33	89	1024	10	17	65535	1023	
34	106	1024	12	17	65535	1023	
35	115	1024	13	17	65535	1023	
36	124	1024	14	17	65535	1023	
37	17	1024	2	17	65535	1023	
38	142	1024	16	17	65535	1023	
39	119	918	15	17	65535	1023	Maxtor 1140, 4380
40	42	820	6	17	65535	820	Seagate ST251
41	44	1024	5	17	65535	1023	Seagate 4053, Miniscribe3053/6053
42	68	1024	5	26	65535	1023	Miniscribe3053/6053 RLL
43	42	809	6	17	65535	852	Miniscribe3650
44	64	809	6	26	65535	852	Miniscribe3675 RLL
45	104	776	8	33	65535	775	Conner CP3104

Appendix A: Technical Summary

A.1 Interrupt Map

IRQ	Assignment
0	System Timer Interrupt From Timer-0
1	Keyboard Output Buffer Full
2	Cascade for IRQ 8-15
3	Serial Port 2
4	Serial Port 1
5	Parallel Port 2
6	Floppy Disk Adapter
7	Parallel Port 1
8	RTC Clock
9	Available
10	Available
11	Available
12	Available
13	Math Coprocessor
14	Hard Disk Adapter
15	Available

A.2 Timer and DMA Channel Maps

Timer Channel	Assignment
0	System Timer Interrupt
1	DRAM Refresh Request
2	Speaker Tone Generator

DMA Channel	Assignment
0	Available
1	IBM SDLC
2	Floppy Disk Adapter
3	Available
4	Cascade for DMA Controller 1
5	Available
6	Available
7	Available

A.3 RTC and CMOS Ram Map

Code	Assignment
00	Seconds
01	Second Alarm
02	Minutes
03	Minute Alarm
04	Hours
05	Hour Alarm
06	Day of Week
07	Day of Month
08	Month
09	Year
0A	Status Register A
0B	Status Register B
0C	Status Register C
0D	Status Register D
0E	Diagnostic Status Byte
0F	Shutdown Byte
10	Floppy Disk Drive Type Byte
11	Reserved
12	Hard Disk Type Byte
13	Reserved
14	Equipment Byte
15	Base Memory Low Byte
16	Base Memory High Byte
17	Extension Memory Low Byte
18	Extension Memory High Byte
30	Reserved for Extension Memory Low Byte
31	Reserved for Extension Memory High Byte
32	Date Century Byte
33	Information Flag
34-3F	Reserved
40-7F	Reserved for Chipset Setting Data

A.4 Memory and I/O Maps

Memory Map	Assignment
0000000-009FFFF	System Memory used by DOS and applications
00A0000-00BFFFF	Display buffer memory for VGA/CGA/EGA/MONO adapter
00C0000-00DFFFF	Reserved for I/O device BIOS ROM or RAM buffer
00E0000-00EFFFF	Reserved for PCI device ROM
00F0000-00FFFFF	System BIOS ROM
0100000-BFFFFF	System extension memory

I/O Map	Assignment
000-01F	DMA Controller (Master)
020-021	Interrupt Controller (Master)
022-023	Chipset Controller Registers I/O Ports
040-05F	Timer Control Registers
060-06F	Keyboard Interface Controller (8042)
070-07F	RTC Ports and CMOS I/O Ports
080-09F	DMA Register
0A0-0BF	Interrupt Controller (Slave)
0C0-0DF	DMA Controller (Slave)
0F0-0FF	Math Coprocessor
1F0-1F8	Hard Disk Controller
278-27F	Parallel Port 2
2B0-2BF	Graphics Adapter Controller
2F8-2FF	Serial Port 2
360-36F	Network Ports
378-37F	Parallel Port 1
3B0-3BF	Monochrome and Printer Adapter
3C0-3CF	EGA Adapter
3D0-3DF	CGA Adapter
3F0-3F7	Floppy Disk Controller
3F8-3FF	Serial Port 1

Appendix B: Troubleshooting

B.1 Troubleshooting POST Messages

During the Power On Self Test, if the BIOS detects an error requiring user attention, it will either sound a beep code or display a message.

B.2 Troubleshooting POST Beep

Currently there are two kinds of BIOS beep codes. One indicates that a video error has occurred and that the BIOS cannot initialize the video screen to display any additional information. This code consists of a long beep followed by three short beeps.

The other code is a single long repeated beep, which indicates a DRAM error.

- **Error Messages:** One or more error messages may be displayed if the BIOS detects an error during the POST. This list includes messages for both the ISA and the EISA BIOS.
- **CMOS Battery Has Failed:** CMOS Battery is not functioning and should be replaced.
- **CMOS Checksum Error:** This can indicate that the CMOS has become corrupted, the cause of this error may be a weak battery.
- **Disk Boot Error, Insert System Disk and Press Enter:** No boot device was found. This could mean that either a boot drive was not detected or the drive does not contain the proper system boot files. Insert a System Disk into Drive A and press Enter. If the system was expected to boot from the hard drive, verify that the controller is inserted correctly and that all cables are properly attached. Also verify that the disk is formatted as a boot device. Then reboot the system.
- **Diskette Drives Or Types Mismatch Error- Run Setup:** The Diskette drive type is different from the CMOS definition. Run Setup to reconfigure the drive type properly.
- **Display Switch is Set Incorrectly:** The display switch on the motherboard can be set to either monochrome or color. This message indicates that the switch is set differently than is indicated in Setup.
- **Display Type Has Changed Since Last Boot:** Since the last system shutdown, the display adapter has been changed. Reconfigure for the new display type.
- **Error Encountered Initializing Hard Drive:** Verify that the adapter is installed correctly and that all cables are correctly and firmly attached. Also ensure that the correct drive is selected in Setup.
- **Error Initializing Hard Disk Controller:** Make sure the card is correctly and firmly installed in the bus. Verify that the correct hard drive type is selected in setup, and also check for proper jumper settings on the hard drive, if applicable.

- **Floppy Disk Controller Error or No Controller Present:** Verify that the controller is installed correctly and firmly. If no floppy drives are installed, ensure that the Diskette Drive selection in Setup is set to None.

- **Invalid EISA Configuration:** Run the EISA Configuration Utility. The non-volatile memory containing the EISA configuration has become corrupted or was incorrectly programmed.

- **Keyboard Error or No Keyboard Present:** Make sure the keyboard is connected correctly and no keys are being pressed during the boot. If the system is intentionally configured without a keyboard, set the error halt condition in Setup to HALT ON ALL BUT KEYBOARD.

- **Memory Address Error At... :** Use the indicated location and the system memory map to locate and replace the bad memory chips.

- **Memory Parity Error At... :** Use the indicated location and the system memory map to locate and replace the bad memory chips.

- **Memory Size Has Changed Since Last Boot:** In EISA mode, use the Configuration Utility to adjust the memory configuration. In ISA mode, enter Setup and adjust the memory size in the memory fields.

- **Memory Verify Error At... :** Use the indicated location and the system memory map to locate and replace the bad memory chips.

- **Offending Address Not Found:** Used in conjunction with the I/O Channel Check and RAM Parity Error messages when the segment that has caused the problem cannot be isolated.

- **Offending Segment:** Used in conjunction with the I/O Channel Check and RAM Parity Error messages when the segment that has caused the problem has been isolated.

- **Press A Key To Reboot:** This message is displayed when there is a system error requiring a reboot.

- **Press F1 To Disable NMI, F2 To Reboot:** When the BIOS detects a Non-maskable Interrupt condition during boot, this allows the user to disable the NMI and continue to boot, or to reboot the system with the NMI enabled.

- **RAM Parity Error - Checking For Segment:** Indicates a parity error in RAM.

- **System Halted, CTRL-ALT-DEL To Reboot:** Indicates the present boot attempt has been aborted and the system must be rebooted by pressing and holding down the CTRL, ALT, and DEL keys simultaneously.

B.3 Troubleshooting For POST Codes

POST (hex)	Name	Description
C0	Turn Off Chipset Cache	OEM Specific - Cache Control
1	Processor Test 1	Process or Status (1 Flag) Verification. Tests the following processor status flags: Carry, Zero, Sign, Overflow. BIOS will set each of these flags, verify they are set, then turn them off and verify that they are off.
2	Processor Test 2	Read/Write/Verify all CPU registers except SS, SP, and BP with data patterns FF and 00.
3	Initialize Chips	Disable NMI, PIE, AIE, UEI, SQWV, Disable video, parity checking, DMA. Reset Math Coprocessor. Clear all page registers, CMOS shutdown byte. Initialize Timers 0, 1, and 2, including setting EISA timer to a known state. Initialize DMA Controllers 0 and 1. Initialize interrupt controllers 0 and 1. Initialize EISA extended registers.
4	Test Memory Refresh Toggle	RAM must be periodically refreshed in order to keep memory from decaying. This function assures that memory refresh is working properly.
5	Blank Video, Initialize Keyboard	Keyboard controller initialization.
6	Reserved	
7	Test CMOS Interface and Battery Status	Verifies CMOS is working properly, detects bad battery.
BE	Chipset Default Initialization	Program chipset registers with power on BIOS defaults.
C1	Memory Presence Test	OEM Specific - Test to size onboard memory.
C5	Early Shadow	OEM Specific - Early Shadow enable for fast boot.
C6	Cache Presence Test	External Cache Size Detection.
8	Setup Low Memory	Early Chipset Initialization, Memory Presence Test, OEM Chipset Routines, Clear Low 64K of memory, Test first 64K of memory.
9	Early Cache Initialization	Cyrix CPU Initialization, Cache Initialization.
A	Setup Interrupt Vector Table	Initialize first 120 interrupt vectors with SPURIOUS_INT_HDLR and initialize INT 00h-1Fh according to INT_TBL.
B	Test CMOS RAM Checksum	Test CMOS RAM Checksum, if bad or insert key is pressed, load defaults.
C	Initialize Keyboard	Detect type of keyboard controller (optional). Set NUM_LOCK status.

D	Initialize Video Interface	Detect CPU Clock. Read CMOS Location 14h to determine type of video in use. Detect and initialize video adapter.
E	Test Video Memory	Test video memory, write sign-on message to screen. Setup Shadow RAM, enable according to Setup.
F	Test DMA Controller 0	BIOS Checksum test. Keyboard detect and initialization.
10	Test DMA Controller 1	
11	Test DMA Page Registers	Test DMA Page Registers.
12-13	Reserved	
14	Test Timer Counter 2	Test 8254 Timer 0 Counter 2
15	Test 8259-1 Mask Bits	Verify 8259 Channel 1 masked interrupts by alternately turning off and on the interrupt lines.
16	Test 8259-2 Mask Bits	Verify 8259 Channel 2 masked interrupts by alternately turning off and on the interrupt lines.
17	Test Stuck 8259's Interrupt Bits	Turn off interrupts then verify no interrupt mask register is on.
18	Test 8259 Interrupt Functionality	Force an interrupt and verify the interrupt occurred.
19	Test Stuck NMI Bits (Parity I/O Check)	Verify NMI can be cleared.
1A		Display CPU clock.
1B-1E	Reserved	
1F	Set EISA Mode	If EISA non-volatile checksum is correct, execute EISA initialization. If not, execute ISA tests and clear EISA mode flag. Test EISA Configuration Memory Integrity (checksum & communication interface).
20	Enable Slot 0	Initialize Slot 0 (system board)
21-2F	Enable Slots 1-15	Initialize Slots 1 through 15
30	Size Base and Extended Memory	Size base memory from 256K to 640K and extended memory above 1MB
31	Test Base and Extended Memory	Test base memory from 256K to 640K and extended memory above 1MB by using various patterns. Note: this will be skipped in EISA mode and can be skipped by pressing the Esc key in ISA mode.
32	Test EISA Extended Memory	If EISA mode flag is set then test EISA Memory found in slots initialization. Note: this will be skipped in ISA mode and can be skipped by pressing the Esc key in EISA mode.
33-3B	Reserved	
3C	Setup Enabled	

3D	Initialize and Install Mouse	Detect if mouse is present, initialize mouse, install interrupt vectors.
3E	Setup Cache Controller	Initialize cache controller.
3F	Reserved	
BF	Chipset Initialization	Program chipset registers with Setup values.
40		Display virus protect disable or enable.
41	Initialize Floppy Drive and Controller	Initialize Floppy Disk Drive Controller and any drives.
42	Initialize Hard Drive and Controller	Initialize Hard Drive Controller and any drives.
43	Detect and Initialize Serial/Parallel Ports	Initialize any serial and parallel ports, also game port.
44	Reserved	
45	Detect and Initialize Math Coprocessor	Initialize Math Coprocessor.
46	Reserved	
47	Reserved	
48-4D	Reserved	
4E	Manufacturing POST Loop or Display Messages	Reboot if Manufacturing POST Loop pin is set. Otherwise display any messages and enter Setup.
4F	Security Check	Ask Password Security (optional).
50	Write CMOS	Write all CMOS values back to RAM and clear screen.
51	Pre-boot Enable	Enable parity checker. Enable NMI, enable cache before boot.
52	Initialize Option ROMs	Initialize any option ROMs present from C8000h to EFFFFh. Note: When FSCAN option is enabled, will scan from C8000h to F7FFFh.
53	Initialize Time Value	Initialize time value in 40h: BIOS area.
60	Setup Virus Protect	Setup virus protect according to setup.
61	Set Boot Speed	Set system speed for boot.
62	Setup NumLock	Setup NumLock status according to Setup.
63	Boot Attempt	Set low stack. Boot via INT 19h
B0	Spurious	If interrupt occurs in protected mode.
B1	Unclaimed NMI	If unmasked NMI occurs, display. Press F1 to disable NMI, F2 to reboot.
E1-EF	Setup Pages	E1=Page 1, E2=Page 2, etc.
FF	Boot	