INDUSTRIAL COMPUTER SOURCE®

Product Manual

MANUAL NO. 8705347

Revision F

SB586TCP/166

SB586TCP/150

SB586TCP/133

SB586TCP/120

SB586TCP/100

SB586TCP/90

INDUSTRIAL COMPUTER SOURCE® CE

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INDUSTRIAL COMPUTER SOURCE
GUARANTEE, LIMITED WARRANTY AND RETURN POLICY

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FOREWORD

This instruction manual provides the necessary user information for the referenced product(s) manufactured or distributed by Industrial Computer Source for the user to install, operate and/or program the product properly. Please refer to the preceding pages for information regarding the warranty and repair policies.

Technical assistance is available at (800) 480-0044.

<u>Manual Errors, Omissions and Bugs</u>: A Bug Sheet is included as the last page of this manual. Please use it if you find a problem with the manual you believe should be corrected.

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INTRODUCTION

The SB586TCP full-featured ISA/PCI processors are single board computers which feature Pentium® CPU, DRAM, PCI Local Bus, cache, floppy controller, EIDE interface, PCI SCSI controller, two serial ports, parallel port, speaker port and keyboard port on a single ISA card. These single-slot, high performance processors plug into ISA Bus passive backplanes and PICMG ISA/PCI passive back-planes and provide 100% PC compatibility for the system expansion slots.

MODEL NUMBERS

SB586TCP/166	Pentium CPU at 166MHz
SB586TCP/150	Pentium CPU at 150MHz
SB586TCP/133	Pentium CPU at 133MHz
SB586TCP/120	Pentium CPU at 120MHz
SB586TCP/100	Pentium CPU at 100MHz
SB586TCP/90	Pentium CPU at 90MHz

FEATURES

- Pentium microprocessor at 166MHz, 150MHz, 133MHz, 120MHz, 100MHz or 90MHz

- 256KB write-back cache memory, 64 bits wide with burst read and write

- PCI Local Bus supports off-board PCI option cards and on-board PCI SCSI controller - Symbios Logic 53C810

- Compatible with PCI Industrial Computer Manufacturers Group (PICMG) 2.0 Specification

- Supports up to 256MB of DRAM on-board

- Two serial ports and one parallel port

- Floppy drive and EIDE drive interface

FEATURES (continued)

- Automatic or manual peripheral configuration

- Watchdog timer

- On-board 3.3V regulator

- Supports 256K x 36, 512K x 36, 1M x 36, 2M x 36, 4M x 36, 8M x 36 and 16M x 36 SIMM's

- Shadow RAM for System BIOS and peripherals increases system speed and performance

- Full PC compatibility

- Intel Neptune chip set

ISA BUS

Parallel

Serial (2)

Floppy

IDE

SIO

SCSI

735

PCI BUS

ADDR/DATA

CNTL

PCMC

CNTL

ADDR

DRAM

DATA

LBX

LBX CNTL

CLK GENER.

TAG RAM

CNTL

SRAM

LATCH

CNTL

ADDR

DATA
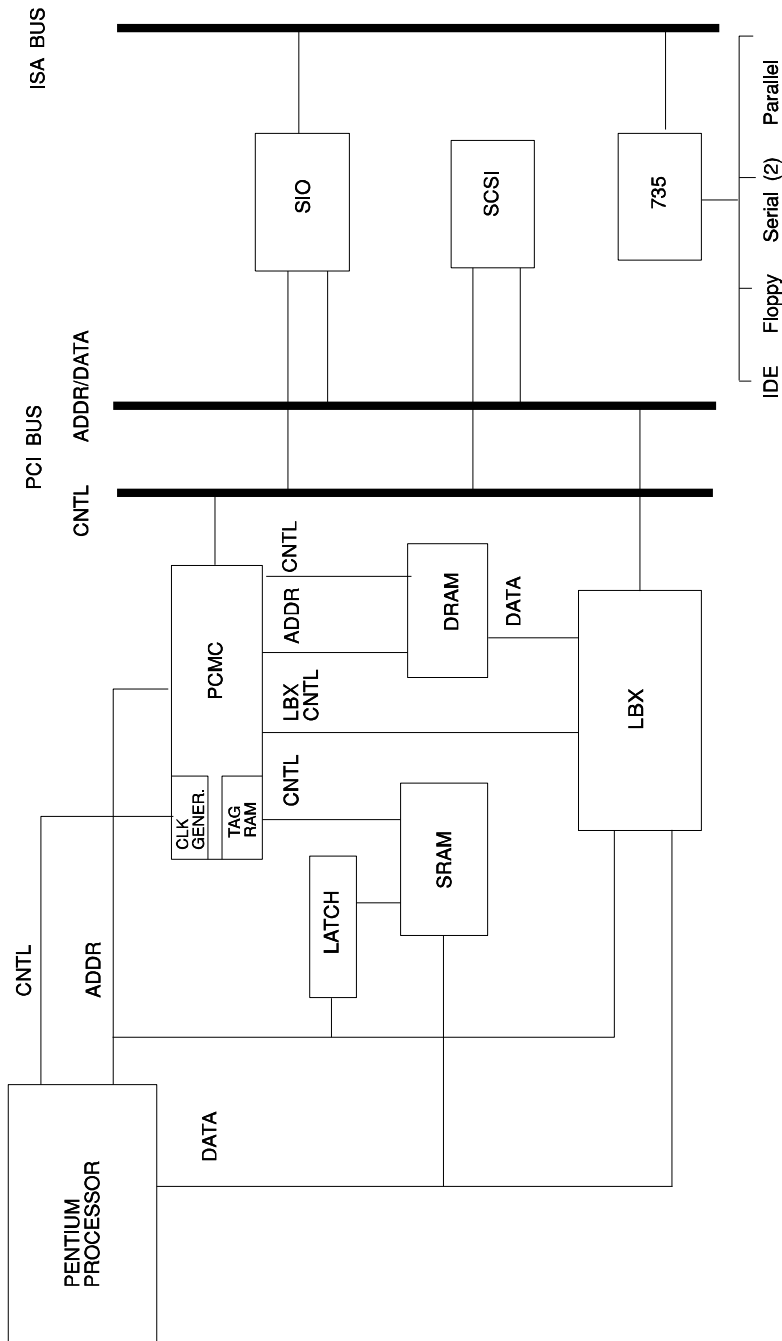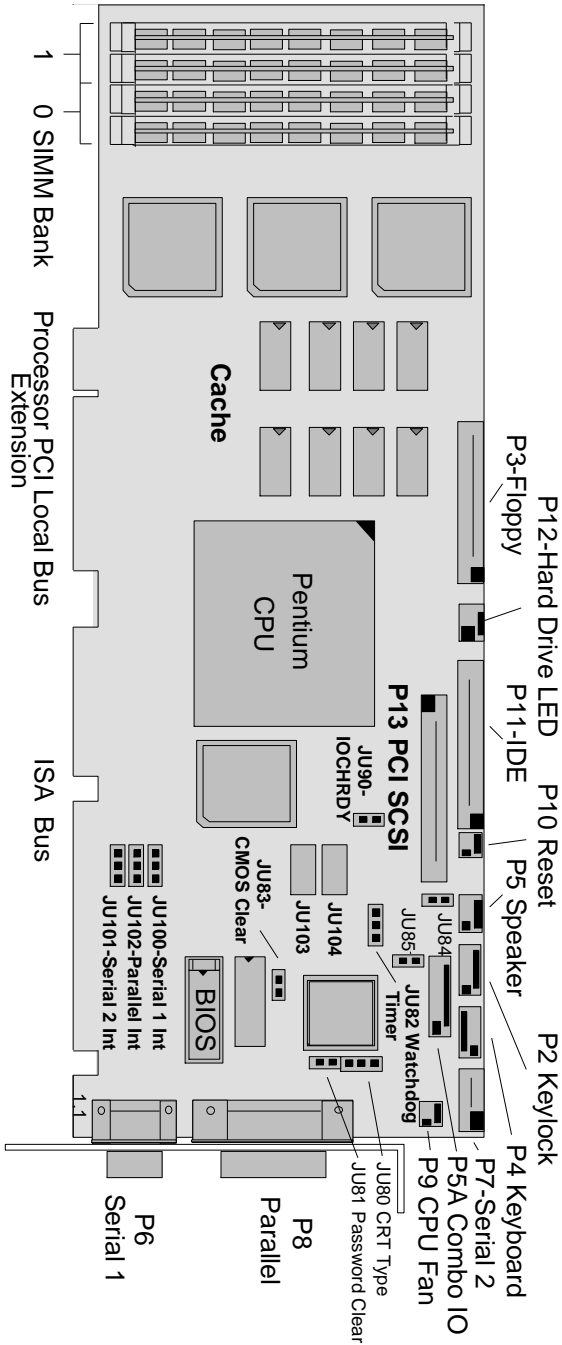
PENTIUM PROCESSOR

PROCESSOR

- Pentium at 166MHz, 150MHz, 133MHz, 120MHz, 100MHz or 90MHz operation

CPU CLOCK

- 166MHz, 150MHz, 133MHz, 120MHz, 100MHz or 90MHz

BUS SPEED

- 8.33MHz for 166MHz, 133MHz or 100MHz

- 7.5MHz for 150MHz, 120MHz or 90MHz

ON-BOARD FEATURES

- Speaker port

- Keyboard port

- Keylock port

- Floppy disk controller supports two floppy drives. Drives can be 3-1/2" or 5-1/4" or one of each.

- Two serial ports

- Parallel printer port - bidirectional

- EIDE interface supports two integrated drive electronics hard drives. Supports drives larger than 528MB.

- On-board 3.3V regulator

- PCI SCSI controller, which is a Symbios Logic 53C810 on the PCI Local Bus, is a fast SCSI-2 implementation supporting asynchronous and synchronous transfers with single-ended drivers and passive termination. Software drivers for most major PC operating systems are provided.

RAM MEMORY - 2 MB to 256 MB

Processor Board RAM Memory:

- The RAM memory array consists of two banks of 72-pin SIMM sockets. Bank 0 consists of sockets 1 and 2 (U52 & U53); bank 1 consists of sockets 3 and 4 (U62 & U63).

- Supported SIMM's are:

    - 256K x 36

    - 512K x 36

    - 1M x 36

    - 2M x 36

    - 4M x 36

    - 8M x 36

    - 16M x 36

NOTE: Two SIMM's of the same memory capacity must be used to fill a memory bank. All SIMM's must have gold contacts.

- RAM Speed

    - $\leq$ 70 nanoseconds fast page mode

ROM MEMORY

- BIOS ROM memory on the processor board is 1 27C010 (128K x 8)

PERFORMANCE

- Norton SI Version 8.0

    - 166MHz - 523

    - 150MHz - 476

    - 133MHz - 419

    - 120MHz - 380

    - 100MHz - 316

    - 90MHz - 288

POWER REQUIREMENTS

Voltage:
+5V @ 3.7 Amps typical
+12V @ < 100 mAmps typical
-12V @ < 100 mAmps typical

ENVIRONMENT

Operating Temperature: 0° C to 60° C.

Storage Temperature: - 40° C to 70° C.

Humidity Maximum: 90% non-condensing

CONFIGURATION JUMPERS

The setup of the configuration jumpers on the processor is described below. * indicates the default value of each jumper.

NOTE: For two-position jumpers (3-post), "RIGHT" is toward the bracket end of the board; "LEFT" is toward the memory sockets.

Jumper   Description

JU80   CRT Type Select

Install on the TOP for a color CRT. *
Install on the BOTTOM for a monochrome CRT.

JU81   Password Clear

Install for one power-up cycle to reset the password to the default (null password).
Remove for normal operation. *

JU82   Watchdog Timer

Install on the LEFT for normal reset operation. *
Install on the RIGHT to enable watchdog timer operation.

JU83   CMOS Clear

Install to clear.
Remove to operate. *

JU84   P5A Speaker Connect

Install to connect speaker data signal to pin 8 of the Combo IO connector (P5A). *
Remove to disconnect.

CONFIGURATION JUMPERS (continued)

Jumper	Description

JU85   P5A Reset Connect

Install to connect reset data signal to pin 1 of the
Combo IO connector (P5A). *
Remove to disconnect.

JU90   IDE IOCHRDY

Install to connect the IOCHRDY signal to the IDE
drive connector. *
Remove to disconnect the IOCHRDY signal from
the IDE drive connector.

JU100   On-Board Serial Port 1 Interrupt Select

Install on the LEFT for IRQ3.
Install on the RIGHT for IRQ4. *

JU101   On-Board Serial Port 2 Interrupt Select

Install on the LEFT for IRQ3. *
Install on the RIGHT for IRQ4.

JU102   On-Board Parallel Port 1 Interrupt Select

Install on the LEFT for IRQ7. *
Install on the RIGHT for IRQ5.

JU103   Parallel Port DACK

	Pins
DACK #7	1-2
DACK #6	3-4
DACK #5	5-6
DACK #3	7-8

CONFIGURATION JUMPERS (continued)

Jumper   Description

  JU104   Parallel Port DREQ

		Pins
	DREQ #7	1-2
	DREQ #6	3-4
	DREQ #5	5-6
	DREQ #3	7-8

SYSTEM BIOS

The System BIOS is an AMI WinBIOS with ROM-resident setup utilities. The main WinBIOS Setup screen displays four windows which contain selectable Setup options. These windows are:

- Setup

- Utility

- Security

- Default

WATCHDOG TIMER

The watchdog timer is a hardware timer which resets the processor board if the timer is not refreshed by software periodically. The timer is typically used to restart an application which becomes hung on an external event. When the application is hung, it can no longer refresh the timer. The watchdog timer then times out and resets the processor board.

The watchdog timer has two levels of enable. First, the watchdog timer jumper must be moved to the "enabled" position, which puts the watchdog timer under software control. Second, user-supplied software must start the watchdog timer via Keyboard Controller

(8042) Port 2, bit 3 (P23). P23 is set high from reset. Setting P23
low starts the watchdog timer timeout of 1.2 seconds (nominal).
Before the end of the timeout , P23 must be toggled high then low to
restart the timeout. If P23 is left low until the end of the timeout, the
watchdog timer issues a hardware reset to the processor board. The
timer should be refreshed by the software every 1.0 seconds to
prevent a timeout.

A set of watchdog timer software is available from Technical Sup-
port. The software includes sample C code which can be embedded
in a user program and demo software to demonstrate and test the
watchdog timer.

CONNECTORS

NOTE: Pin 1 on the connectors is indicated by the square pad on the PCB.

P2 - Keylock Connector
5 pin single row header, Amp #640456-5

PIN	SIGNAL
1	LED Power
2	Key
3	Gnd
4	Keylock Data
5	Gnd

P3 - Floppy Drive Connector
34 pin dual row header, Molex #10-89-1341

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	2	N-RPM
3	Gnd	4	NC
5	Gnd	6	NC
7	Gnd	8	P-Index
9	Gnd	10	N-Motoron 1
11	Gnd	12	N-Drive Sel2
13	Gnd	14	N-Drive Sel1
15	Gnd	16	N-Motoron 2
17	Gnd	18	N-Dir
19	Gnd	20	N-Stop Step
21	Gnd	22	N-Write Data
23	Gnd	24	N-Write Gate
25	Gnd	26	P-Track 0
27	Gnd	28	P-Write Protect
29	Gnd	30	N-Read Data
31	Gnd	32	N-Side Select
33	Gnd	34	Disk Chng

P4 - Keyboard Connector
5 pin single row header, Amp #640456-5

PIN	SIGNAL
1	Kbd Clock
2	Kbd Data
3	Key
4	Kbd Gnd
5	Kbd Power (+5V fused)

P5 - Speaker Port Connector
4 pin single row header, Amp #640456-4

PIN	SIGNAL
1	Speaker Data
2	Key
3	Gnd
4	+5V

P5A - Combo IO Connector
8 pin single row header, Amp #640456-8

PIN	SIGNAL
1	Reset
2	Gnd
3	NC
4	Kbd Clock
5	Kbd Data
6	Kbd Lock Data
7	Kbd Power (+5V fused)
8	Speaker Data

P6 - Serial Port 1 Connector
9 pin D, Amp #747840-3

PIN	SIGNAL	PIN	SIGNAL
1	Carrier Detect	6	Data Set Ready-I
2	Receive Data-I	7	Request to Send-O
3	Transmit Data-O	8	Clear to Send-I
4	Data Terminal Ready-O	9	Ring Indicator-I
5	Signal Gnd		

P7 - Serial Port 2 Connector
10 pin dual row header, Molex #10-89-1101

PIN	SIGNAL	PIN	SIGNAL
1	Carrier Detect	2	Data Set Ready-I
3	Receive Data-I	4	Request to Send-O
5	Transmit Data-O	6	Clear to Send-I
7	Data Terminal Ready-O	8	Ring Indicator-I
9	Signal Gnd	10	NC

P8 - Parallel Port Connector
25 pin D, Amp #747846-3

PIN	SIGNAL	PIN	SIGNAL
1	Strobe	14	Auto Feed XT
2	Data Bit 0	15	Error
3	Data Bit 1	16	Init
4	Data Bit 2	17	Slct In
5	Data Bit 3	18	Gnd
6	Data Bit 4	19	Gnd
7	Data Bit 5	20	Gnd
8	Data Bit 6	21	Gnd
9	Data Bit 7	22	Gnd
10	ACK	23	Gnd
11	Busy	24	Gnd
12	Paper End	25	Gnd
13	Slct		

P9 - **CPU Fan**
2 pin header, Amp #640456-2

PIN	SIGNAL
1	+12V
2	Gnd

P10 - **External Reset Connector**
2 pin header, Amp #640456-2

PIN	SIGNAL
1	Negative External Reset
2	Gnd

P11 - **IDE Hard Drive Connector**
40 pin dual row header, Molex #10-89-1401

PIN	SIGNAL	PIN	SIGNAL
1	Reset	2	Gnd
3	Data 7	4	Data 8
5	Data 6	6	Data 9
7	Data 5	8	Data 10
9	Data 4	10	Data 11
11	Data 3	12	Data 12
13	Data 2	14	Data 13
15	Data 1	16	Data 14
17	Data 0	18	Data 15
19	Gnd	20	NC
21	NC	22	Gnd
23	IOW	24	Gnd
25	IOR	26	Gnd
27	IOCHRDY (see JU90)	28	ALE
29	NC	30	Gnd
31	IRQ 14	32	IOCS16
33	Add 1	34	NC
35	Add 0	36	Add 2
37	CS 0	38	CS 1
39	Light	40	Gnd

P12 - **Hard Drive LED Connector**
4 pin single row header, Amp #640456-4

PIN	SIGNAL
1	+5V Pullup
2	Light
3	Light
4	+5V Pullup

P13 - **PCI SCSI Controller Connector**
50 pin dual row header, Molex #10-89-1501

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	2	SCZDB0
3	Gnd	4	SCZDB1
5	Gnd	6	SCZDB2
7	Gnd	8	SCZDB3
9	Gnd	10	SCZDB4
11	Gnd	12	SCZDB5
13	Gnd	14	SCZDB6
15	Gnd	16	SCZDB7
17	Gnd	18	SCZDBP
19	Gnd	20	Gnd
21	Gnd	22	Gnd
23	Gnd	24	Gnd
25	NC	26	TERMPWR
27	Gnd	28	Gnd
29	Gnd	30	Gnd
31	Gnd	32	SCZATN
33	Gnd	34	Gnd
35	Gnd	36	SCZBSY
37	Gnd	38	SCZACK
39	Gnd	40	SCZRST
41	Gnd	42	SCZMSG
43	Gnd	44	SCZSEL
45	Gnd	46	SCZCD
47	Gnd	48	SCZREQ
49	Gnd	50	SCZIO

ISA BUS PIN NUMBERING

62-pin ISA Bus Connector

B1 ○   A1 □

31 ○   31 ○

Component Side of Board

36-pin ISA Bus Connector

D1 ○   C1 ○

18 ○   18 ○
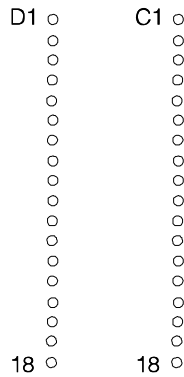
ISA BUS PIN ASSIGNMENTS

The following figures summarize pin assignments for the Industry
Standard Architecture (ISA) Bus connectors.

I/O Pin	Signal Name	I/O
A1	IOCHK#	I
A2	D7	I/O
A3	D6	I/O
A4	D5	I/O
A5	D4	I/O
A6	D3	I/O
A7	D2	I/O
A8	D1	I/O
A9	D0	I/O
A10	CHRDY	I
A11	AEN	O
A12	SA19	I/O
A13	SA18	I/O
A14	SA17	I/O
A15	SA16	I/O
A16	SA15	I/O
A17	SA14	I/O
A18	SA13	I/O
A19	SA12	I/O
A20	SA11	I/O
A21	SA10	I/O
A22	SA9	I/O
A23	SA8	I/O
A24	SA7	I/O
A25	SA6	I/O
A26	SA5	I/O
A27	SA4	I/O
A28	SA3	I/O
A29	SA2	I/O
A30	SA1	I/O
A31	SA0	I/O

I/O Pin	Signal Name	I/O
B1	Gnd	Ground
B2	RESDRV	O
B3	+5V	Power
B4	IRQ9	I
B5	-5V	Power
B6	DRQ2	I
B7	-12V	Power
B8	NOWS#	I
B9	+12V	Power
B10	Gnd	Ground
B11	SMWTC#	O
B12	SMRDC#	O
B13	IOWC#	I/O
B14	IORC#	I/O
B15	DAK3#	O
B16	DRQ3	I
B17	DAK1#	O
B18	DRQ1	I
B19	REFRESH#	I/O
B20	BCLK	O
B21	IRQ7	I
B22	IRQ6	I
B23	IRQ5	I
B24	IRQ4	I
B25	IRQ3	I
B26	DAK2#	O
B27	T-C	O
B28	BALE	O
B29	+5V	Power
B30	OSC	O
B31	Gnd	Ground

ISA BUS PIN ASSIGNMENTS (continued)

I/O Pin	Signal Name	I/O
C1	SBHE#	I/O
C2	LA23	I/O
C3	LA22	I/O
C4	LA21	I/O
C5	LA20	I/O
C6	LA19	I/O
C7	LA18	I/O
C8	LA17	I/O
C9	MRDC#	I/O
C10	MWTC#	I/O
C11	D8	I/O
C12	D9	I/O
C13	D10	I/O
C14	D11	I/O
C15	D12	I/O
C16	D13	I/O
C17	D14	I/O
C18	D15	I/O

I/O Pin	Signal Name	I/O
D1	M16#	I
D2	IO16#	I
D3	IRQ10	I
D4	IRQ11	I
D5	IRQ12	I
D6	IRQ15	I
D7	IRQ14	I
D8	DAK0#	O
D9	DRQ0	I
D10	DAK5#	O
D11	DRQ5	I
D12	DAK6#	O
D13	DRQ6	I
D14	DAK7#	O
D15	DRQ7	I
D16	+5V	Power
D17	Master16#	I
D18	Gnd	Ground

ISA BUS SIGNAL DESCRIPTIONS

The following is a description of the ISA Bus signals. All signal lines are TTL-compatible.

AEN (O)

Address Enable (AEN) is used to degate the microprocessor and other devices from the I/O channel to allow DMA transfers to take place. When this line is active, the DMA controller has control of the address bus, the data-bus Read command lines (memory and I/O), and the Write command lines (memory and I/O).

BALE (O) (Buffered)

Address Latch Enable (BALE) is provided by the bus controller and is used on the system board to latch valid addresses and memory decodes from the microprocessor. It is available to the I/O channel as an indicator of a valid microprocessor or DMA address (when used with AEN). Microprocessor addresses SA[19::0] are latched with the falling edge of BALE. BALE is forced high during DMA cycles.

BCLK (O)

BCLK is the system clock. The clock has a 50% duty cycle. This signal should only be used for synchronization. It is not intended for uses requiring a fixed frequency.

CHRDY (I)

I/O Channel Ready (CHRDY) is pulled low (not ready) by a memory or I/O device to lengthen I/O or memory cycles. Any slow device using this line should drive it low immediately upon detecting its valid address and a Read or Write command. Machine cycles are extended by an integral number of clock cycles. This signal should be held low for no more than 2.5 microseconds.

D[15::0] (I/O)

Data signals D[15::0] provide bus bits 15 through 0 for the microprocessor, memory, and I/O devices. D15 is the most-significant bit and D0 is the least-significant bit. All 8-bit devices on the I/O channel should use D[7::0] for communications to the microprocessor. The 16-bit devices will use D[15::0]. To support 8-bit devices, the data on D[15::8] will be gated to D[7::0] during 8-bit transfers to these devices. 16-bit microprocessor transfers to 8-bit devices will be converted to two 8-bit transfers.

DAK[7::5]#, DAK[3::0]# (O)

DMA Acknowledge DAK[7::5]# and DAK[3::0]# are used to acknowledge DMA requests DRQ[7::5] and DRQ[3::0]. They are active low.

DRQ[7::5], DRQ[3::0] (I)

DMA Requests DRQ[7::5] and DRQ[3::0] are asynchronous channel requests used by peripheral devices and the I/O channel microprocessors to gain DMA service (or control of the system). They are prioritized, with DRQ0 having the highest priority and DRQ7 having the lowest. A request is generated by bringing a DRQ line to an active level. A DRQ line must be held high until the corresponding DMA Request Acknowledge (DAK) line goes active. DRQ[3::0] will perform 8-bit DMA transfers; DRQ[7::5] will perform 16-bit transfers.

IO16# (I)

I/O 16-bit Chip Select (IO16#) signals the system board that the present data transfer is a 16-bit, 1 wait-state, I/O cycle. It is derived from an address decode. IO16# is active low and should be driven with an open collector or tri-state driver capable of sinking 20 mAmps.

IOCHK# (I)

I/O Channel Check (IOCHK#) provides the system board with parity (error) information about memory or devices on the I/O channel. When this signal is active, it indicates an uncorrectable system error.

IORC# (I/O)

I/O Read (IORC#) instructs an I/O device to drive its data onto the data bus. It may be driven by the system microprocessor or DMA controller, or by a microprocessor or DMA controller resident on the I/O channel. This signal is active low.

IOWC# (I/O)

I/O Write (IOWC#) instructs an I/O device to read the data on the data bus. It may be driven by any microprocessor or DMA controller in the system. This signal is active low.

IRQ[15::14], IRQ[12::9], IRQ[7::3] (I)

Interrupt Requests IRQ[15::14], IRQ[12::9] and IRQ[7::3] are used to signal the microprocessor that an I/O device needs attention. The interrupt requests are prioritized, with IRQ[15::14] and IRQ[12::9] having the highest priority (IRQ9 is the highest) and IRQ[7::3] having the lowest priority (IRQ7 is the lowest). An interrupt request is generated when an IRQ line is raised from low to high. The line must be held high until the microprocessor acknowledges the interrupt request (Interrupt Service routine).

LA[23::17] (I/O)

These signals (unlatched) are used to address memory and I/O devices within the system. They give the system up to 16MB of addressability. These signals are valid when BALE is high. LA[23::17] are not latched during microprocessor cycles and therefore do not stay valid for the whole cycle. Their purpose is to generate memory decodes for 1 wait-state memory cycles. These decodes should be latched by I/O adapters on the falling edge of BALE. These signals

also may be driven by other microprocessors or DMA controllers that reside on the I/O channel.

M16# (I)

M16# Chip Select signals the system board if the present data transfer is a 1 wait-state, 16-bit, memory cycle. It must be derived from the decode of LA[23::17]. M16# should be driven with an open collector or tri-state driver capable of sinking 20 mAmps.

Master16# (I)

Master16# is used with a DRQ line to gain control of the system. A processor or DMA controller on the I/O channel may issue a DRQ to a DMA channel in cascade mode and receive a DAK#. Upon receiving the DAK#, an I/O microprocessor may pull Master16# low, which will allow it to control the system address, data, and control lines (a condition known as tri-state). After Master16# is low, the I/O microprocessor must wait one system clock period before driving the address and data lines, and two clock periods before issuing a Read or Write command. If this signal is held low for more than 15 microseconds, system memory may be lost because of a lack of refresh.

NOWS# (I)

The No Wait State (NOWS#) signal tells the microprocessor that it can complete the present bus cycle without inserting any additional wait cycles. In order to run a memory cycle to a 16-bit device without wait cycles, NOWS# is derived from an address decode gated with a Read or Write command. In order to run a memory cycle to an 8-bit device with a minimum of two wait states, NOWS# should be driven active on system clock after the Read or Write command is active gated with the address decode for the device. Memory Read and Write commands to a 8-bit device are active on the falling edge of the system clock. NOWS# is active low and should be driven with an open collector or tri-state driver capable of sinking 20 mAmps.

OSC (O)

Oscillator (OSC) is a high-speed clock with a 70-nanosecond period (14.31818 MHz). This signal is not synchronous with the system clock. It has a 50% duty cycle.

REFRESH# (I/O)

The REFRESH# signal is used to indicate a refresh cycle and can be driven by a microprocessor on the I/O channel.

RESDRV (O)

Reset Drive (RESDRV) is used to reset or initialize system logic at power-up time or during a low line-voltage outage. This signal is active high.

SA[19::0] (I/O)

Address bits SA[19::0] are used to address memory and I/O devices within the system. These twenty address lines, in addition to LA[23::17], allow access

of up to 16MB of memory. SA[19::0] are gated on the system bus when BALE is high and are latched on the falling edge of BALE. These signals are generated by the microprocessor or DMA Controller. They also may be driven by other microprocessors or DMA controllers that reside on the I/O channel.

SBHE# (I/O)

System Bus High Enable (SBHE#) indicates a transfer of data on the upper byte of the data bus, D[15::8]. 16-bit devices use SBHE# to condition data bus buffers tied to D[15::8].

SMRDC# (O), MRDC# (I/O)

These signals instruct the memory devices to drive data onto the data bus. SMRDC# is active only when the memory decode is within the low 1MB of memory space. MRDC# is active on all memory read cycles. MRDC# may be driven by any microprocessor or DMA controller in the system. SMRDC is derived from MRDC# and the decode of the low 1MB of memory. When a microprocessor on the I/O channel wishes to drive MRDC#, it must have the address lines valid on the bus for one system clock period before driving MRDC# active. Both signals are active low.

SMWTC# (O), MWTC# (I/O)

These signals instruct the memory devices to store the data present on the data bus. SMWTC# is active only when the memory decode is within the low 1MB of the memory space. MWTC# is active on all memory write cycles. MWTC# may be driven by any microprocessor or DMA controller in the system. SMWTC# is derived from MWTC# and the decode of the low 1MB of memory. When a microprocessor on the I/O channel wishes to drive MWTC#, it must have the address lines valid on the bus for one system clock period before driving MWTC# active. Both signals are active low.

T-C (O)

Terminal Count (T-C) provides a pulse when the terminal count for any DMA channel is reached.

I/O ADDRESS MAP

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

INTERRUPT ASSIGNMENTS

Interrupt	Description
IRQ0	Timer Output 0
IRQ1	Keyboard (Output Buffer Full)
IRQ2	Interrupt 8 through 15
IRQ3	Serial Port 2
IRQ4	Serial Port 1
IRQ5	Parallel Port 2
IRQ6	Diskette Controller
IRQ7	Parallel Port 1
IRQ8	Realtime Clock Interrupt
IRQ9	Software Redirected to INT 0AH (IRQ2)
IRQ10	Unassigned
IRQ11	Unassigned
IRQ12	Unassigned
IRQ13	Coprocessor
IRQ14	Fixed Disk Controller
IRQ15	Unassigned

PCI LOCAL BUS

PCI OVERVIEW

The PCI (Peripheral Component Interconnect) Local Bus is a high performance, 32-bit or 64-bit bus with multiplexed address and data lines. It is intended for use as an interconnect mechanism between highly integrated peripheral controller components, peripheral add-in boards and processor/memory systems.

The "local bus" moves peripheral functions with high bandwidth requirements closer to the system's processor bus and can produce substantial performance gains with graphical user interfaces (GUI's) and other high bandwidth functions (i.e., full motion video, SCSI, LAN's, etc.).

The PCI Local Bus accommodates future system requirements and is applicable across multiple platforms and architectures.

The PCI component and add-in card interface is processor independent, enabling an efficient transition to future processor generations, by bridges or by direct integration, and use with multiple processor architectures. Processor independence allows the PCI Local Bus to be optimized for I/O functions, enables concurrent operation of the local bus with the processor/memory subsystem, and accommodates multiple high performance peripherals in addition to graphics. Movement to enhanced video and multimedia displays and other high bandwidth I/O will continue to increase local bus bandwidth requirements. A transparent 64-bit extension of the 32-bit data and address buses is defined, doubling the bus bandwidth and offering forward and backward compatibility of 32-bit (132MB/s peak) and 64-bit (264MB/s peak) PCI Local Bus peripherals.

PCI LOCAL BUS SIGNAL DEFINITION

The PCI interface requires a minimum of 47 pins for a target-only device and 49 pins for a master to handle data and addressing, interface control, arbitration and system functions. The diagram below shows the pins in functional groups, with required pins on the left side and optional pins on the right side.

Required Pins: *Optional Pins:*

Address & Data: *64-bit Extension:*
   AD[31::00]   AD[63::32]

   C/BE[3::0]#   C/BE[7::4]#

   PAR   PAR64
                                                             REQ64#
Interface Control: PCI   ACK64#
   FRAME#   COMPLIANT
   TRDY#   DEVICE   *Interface Control:*
   IRDY#   LOCK#
   STOP#   INTA#
   DEVSEL#   INTB#
   IDSEL   INTC#
                                                             INTD#
Error Reporting:
   PERR#   *Cache Support:*
   SERR#   SBO#
                                                             SDONE
Arbitration
(masters only):   *JTAG (IEEE 1149.1):*
   REQ#   TDI
   GNT#   TDO
System: TCK
   CLK   TMS
   RST#   TRST#
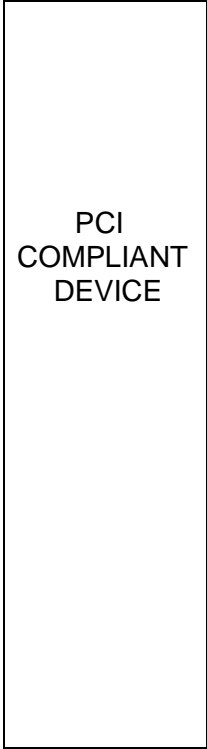
PCI Pin List

PCI LOCAL BUS PIN NUMBERING

Component Side
of Board

B2○ B1○   A2○ A1□

5-volt/32-bit PCI Connector

PCI LOCAL BUS PIN ASSIGNMENTS

The PCI Local Bus specifies both 5-volt and 3.3-volt signaling environments. The bus pin assignments shown below are for the 5-volt connector. The 3.3-volt connector bus pin assignments are the same with the following exceptions:

* The pins noted as +V (I/O) are +5 volts or +3.3 volts, depending on which connector is being used.

† Pins B12, B13, A12 and A13 are Gnd (ground) on the 5-volt connector, but are Connector Keys on the 3.3-volt connector.

†† Pins B50, B51, A50 and A51 are Connectors Keys on the 5-volt connector, but are Gnd (ground) on the 3.3-volt connector.

I/O Pin	Signal Name
B1	-12V
B2	TCK
B3	Gnd
B4	TDO
B5	+5V
B6	+5V
B7	INTB#
B8	INTD#
B9	PRSNT1#
B10	Reserved
B11	PRSNT2#
B12	Gnd †
B13	Gnd †
B14	Reserved
B15	Gnd
B16	CLK
B17	Gnd
B18	REQ#
B19	+V (I/O) *
B20	AD31
B21	AD29
B22	Gnd

I/O Pin	Signal Name	
A1	TRST#	32-bit connector start
A2	+12V	
A3	TMS	
A4	TDI	
A5	+5V	
A6	INTA#	
A7	INTC#	
A8	+5V	
A9	Reserved	
A10	+V (I/O) *	
A11	Reserved	
A12	Gnd †	
A13	Gnd †	
A14	Reserved	
A15	RST#	
A16	+V (I/O) *	
A17	GNT#	
A18	Gnd	
A19	Reserved	
A20	AD30	
A21	+3.3V	
A22	AD28	

PCI LOCAL BUS PIN ASSIGNMENTS (continued)

I/O Pin	Signal Name
B23	AD27
B24	AD25
B25	+3.3V
B26	C/BE3#
B27	AD23
B28	Gnd
B29	AD21
B30	AD19
B31	+3.3V
B32	AD17
B33	C/BE2#
B34	Gnd
B35	IRDY#
B36	+3.3V
B37	DEVSEL#
B38	Gnd
B39	LOCK#
B40	PERR#
B41	+3.3V
B42	SERR#
B43	+3.3V
B44	C/BE1#
B45	AD14
B46	Gnd
B47	AD12
B48	AD10
B49	Gnd
B50	Connector Key ††
B51	Connector Key ††
B52	AD8
B53	AD7
B54	+3.3V
B55	AD5
B56	AD3
B57	Gnd
B58	AD1
B59	+V (I/O) *
B60	ACK64#
B61	+5V
B62	+5V

I/O Pin	Signal Name	
A23	AD26	
A24	Gnd	
A25	AD24	
A26	IDSEL	
A27	+3.3V	
A28	AD22	
A29	AD20	
A30	Gnd	
A31	AD18	
A32	AD16	
A33	+3.3V	
A34	FRAME#	
A35	Gnd	
A36	TRDY#	
A37	Gnd	
A38	STOP#	
A39	+3.3V	
A40	SDONE	
A41	SBO#	
A42	Gnd	
A43	PAR	
A44	AD15	
A45	+3.3V	
A46	AD13	
A47	AD11	
A48	Gnd	
A49	AD9	
A50	Connector Key ††	5-volt key
A51	Connector Key ††	5-volt key
A52	C/BE0#	
A53	+3.3V	
A54	AD6	
A55	AD4	
A56	Gnd	
A57	AD2	
A58	AD0	
A59	+V (I/O) *	
A60	REQ64#	
A61	+5V	
A62	+5V	32-bit connector end

PCI LOCAL BUS PIN ASSIGNMENTS (continued)

I/O Pin	Signal Name		I/O Pin	Signal Name	
Connector Key			Connector Key		64-bit spacer
Connector Key			Connector Key		64-bit spacer
B63	Reserved		A63	Gnd	64-bit connector start
B64	Gnd		A64	C/BE7#	
B65	C/BE6#		A65	C/BE5#	
B66	C/BE4#		A66	+V (I/O) *	
B67	Gnd		A67	PAR64	
B68	AD63		A68	AD62	
B69	AD61		A69	Gnd	
B70	+V (I/O) *		A70	AD60	
B71	AD59		A71	AD58	
B72	AD57		A72	Gnd	
B73	Gnd		A73	AD56	
B74	AD55		A74	AD54	
B75	AD53		A75	+V (I/O) *	
B76	Gnd		A76	AD52	
B77	AD51		A77	AD50	
B78	AD49		A78	Gnd	
B79	+V (I/O) *		A79	AD48	
B80	AD47		A80	AD46	
B81	AD45		A81	Gnd	
B82	Gnd		A82	AD44	
B83	AD43		A83	AD42	
B84	AD41		A84	+V (I/O) *	
B85	Gnd		A85	AD40	
B86	AD39		A86	AD38	
B87	AD37		A87	Gnd	
B88	+V (I/O) *		A88	AD36	
B89	AD35		A89	AD34	
B90	AD33		A90	Gnd	
B91	Gnd		A91	AD32	
B92	Reserved		A92	Reserved	
B93	Reserved		A93	Gnd	
B94	Gnd		A94	Reserved	64-bit connector end

PCI LOCAL BUS SIGNAL DESCRIPTIONS

The PCI Local Bus signals are described below and may be categorized into the following functional groups:

- System Pins

- Address and Data Pins

- Interface Control Pins

- Arbitration Pins (Bus Masters Only)

- Error Reporting Pins

- Interrupt Pins (Optional)

- Cache Support Pins (Optional)

- 64-Bit Bus Extension Pins (Optional)

- JTAG/Boundary Scan Pins (Optional)

A # symbol at the end of a signal name indicates that the active state occurs when the signal is at a low voltage. When the # symbol is absent, the signal is active at a high voltage.

The following are descriptions of the PCI Local Bus signals.

ACK64# (optional)

Acknowledge 64-bit Transfer, when actively driven by the device that has positively decoded its address as the target of the current access, indicates the target is willing to transfer data using 64 bits. ACK64# has the same timing as DEVSEL#.

AD[31::00]

Address and Data are multiplexed on the same PCI pins. A bus transaction consists of an address phase followed by one or more data phases. During the address phase, AD[31::00] contain a physical address (32 bits). During data phases, AD[07::00] contain the least significant byte (lsb) and AD[31::24] contain the most signficant byte (msb).

AD[63::32] (optional)

Address and Data are multiplexed on the same pins and provide 32 additional bits. During an address phase (when using the DAC command and when REQ64# is asserted), the upper 32 bits of a 64-bit address are transferred;

otherwise, these bits are reserved but are stable and indeterminate. During a data phase, an additional 32 bits of data are transferred when REQ64# and ACK64# are both asserted.

C/BE[3::0]#

Bus Command and Byte Enables are multiplexed on the same PCI pins. During the address phase of a transaction, these pins define the bus command; during the data phase they are used as byte enables. The byte enables are valid for the entire data phase and determine which byte lanes carry meaningful data. C/BE0# applies to byte 0 (lsb) and C/BE3# applies to byte 3 (msb).

C/BE[7::4]# (optional)

Bus Command and Byte Enables are multiplexed on the same pins. During an address phase (when using the DAC command and when REQ64# is asserted), the actual bus command is transferred on C/BE[7::4]#; otherwise, these bits are reserved and indeterminate. During a data phase, C/BE[7::4]# are byte enables indicating which byte lanes carry meaningful data when REQ64# and ACK64# are both asserted. C/BE4# applies to byte 4 and C/BE7# applies to byte 7.

CLK

Clock provides timing for all transactions on PCI and is an input to every PCI device.

DEVSEL#

Device Select, when actively driven, indicates that the driving device has decoded its address as the target of the current access. As an input, DEVSEL# indicates whether any device on the bus has been selected.

FRAME#

Cycle Frame is an interface control pin which is driven by the current master to indicate the beginning and duration of an access. When FRAME# is asserted, data transfers continue; when it is deasserted, the transaction is in the final data phase.

GNT#

Grant indicates to the agent that access to the bus has been granted. This is a point to point signal. Every master has its own GNT#.

IDSEL

Initialization Device Select is used as a chip select during configuration read and write transactions.

INTA#, INTB#, INTC#, INTD# (optional)

Interrupts on PCI are optional and defined as "level sensitive," asserted low (negative true), using open drain output drivers. PCI defines one interrupt for

a single function and up to four interrupt lines for a multi-function device or connector.

Interrupt A is used to request an interrupt. For a single function device, only INTA# may be used, while the other three interrupt lines have no meaning.

Interrupt B, Interrupt C and Interrupt D are used to request additional interrupts and only have meaning on a multi-function device.

IRDY#

Initiator Ready indicates the initiating agent's (bus master's) ability to complete the current data phase of the transaction. IRDY# is used in conjunction with TRDY#. During a write, IRDY# indicates that valid data is present on AD[31::0]. During a read, it indicates that the master is prepared to accept data.

LOCK#

Lock indicates an operation that may require multiple transactions to complete. When LOCK# is asserted, non-exclusive transactions may proceed to an address that is not currently locked.

PAR

Parity is even parity across AD[31::00] and C/BE[3::0]#. Parity generation is required by all PCI agents. The master drives PAR for address and write data phases; the target drives PAR for read data phases.

PAR64 (optional)

Parity Upper DWORD is the even parity bit that protects AD[63::32] and C/BE[7::4]#. The master drives PAR64 for address and write data phases; the target drives PAR64 for read data phases.

PERR#

Parity Error is for the reporting of data parity errors during all PCI transactions except a Special Cycle. There are no special conditions when a data parity error may be lost or when reporting of an error may be delayed.

PRSNT1# and PRSNT2#

PRSNT1# and PRSNT2# are related to the connector only, not to other PCI components. They are used for two purposes: indicating that a board is physically present in the slot and providing information about the total power requirements of the board.

REQ#

Request indicates to the arbiter that this agent desires use of the bus. This is a point to point signal. Every master has its own REQ#.

REQ64# (optional)

Request 64-bit Transfer, when actively driven by the current bus master, indicates it desires to transfer data using 64 bits. REQ64# has the same timing as FRAME#. REQ64# has meaning at the end of reset.

RST#

Reset is used to bring PCI-specific registers, sequencers and signals to a consistent state.

SBO# (optional)

Snoop Backoff is an optional cache support pin which indicates a hit to a modified line when asserted. When SBO# is deasserted and SDONE is asserted, it indicates a "clean" snoop result.

SDONE (optional)

Snoop Done is an optional cache support pin which indicates the status of the snoop for the current access. When deasserted, it indicates the result of the snoop is still pending. When asserted, it indicates the snoop is complete.

SERR#

System Error is for reporting address parity errors, data parity errors on the Special Cycle command, or any other system error where the result will be catastrophic. If an agent does not want a non-maskable interrupt (NMI) to be generated, a different reporting mechanism is required.

STOP#

Stop indicates that the current target is requesting the master to stop the current transaction.

TCK (optional)

Test Clock is used to clock state information and test data into and out of the device during operation of the TAP (Test Access Port).

TDI (optional)

Test Data Input is used to serially shift test data and test instructions into the device during TAP (Test Access Port) operation.

TDO (optional)

Test Data Output is used to serially shift test data and test instructions out of the device during TAP (Test Access Port) operation.

TMS (optional)

Test Mode Select is used to control the state of the TAP (Test Access Port) controller in the device.

TRDY#

Target Ready indicates the target agent's (selected device's) ability to complete the current data phase of the transaction. TRDY# is used in conjunction with IRDY#. During a read, TRDY# indicates that valid data is present on AD[31::00]. During a write, it indicates that the target is prepared to accept data.

TRST# (optional)

Test Reset provides an asynchronous initialization of the TAP controller. This signal is optional in the IEEE Standard Test Access Port and Boundary Scan Architecture.

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BIOS OPERATION

Sections 3 through 7 of this manual describe the operation of the AMI WinBIOS and WinBIOS Setup. Refer to *Running WinBIOS Setup* later in this section for standard Setup screens, options and defaults.

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

1) **System Test and Initialization**. Test and initialize system boards for normal operations.

2) **System Configuration Verification**. Compare defined configuration with hardware actually installed.

If an error is encountered during the diagnostic tests, the error is reported in one of two different ways. If the error occurs before the display device is initialized, a series of beeps is transmitted. If the error occurs after the display device is initialized, the error message is displayed on the screen. See *BIOS Errors* later in this section for more information on error handling.

The following are the Power-On Self Tests (POST's) which are performed when the system is powered on:

- Processor Register Test

- ROM BIOS Checksum Check

- Keyboard Controller Test

- CMOS Shutdown Register Test

- Channel 2, 1, 0 Timer Test

- Memory Refresh Test

- Base 64KB RAM Test

- CMOS Battery, Options Set, Checksum Check

- Display Type Verification

- Entering Protected Mode

- Address Line Test and Memory Size Finding

- Conventional and Extended Memory Test

- DMA Controller Test

- Keyboard Test

- System Configuration Verification and Setup

NOTE: When you perform a warm boot by pressing
<Ctrl><Alt><Del>, all memory tests are bypassed.

WinBIOS checks all system and cache memory and reports them on
both the initial WinBIOS screen and the WinBIOS System Con-
figuration screen which appears after POST is completed. WinBIOS
attempts to initialize the peripheral devices by verifying the validity
of the system setup information stored in the system CMOS RAM.
(See the *Running WinBIOS Setup* section of this manual.) If
WinBIOS detects a fault, the screen displays the error condition(s)
which has/have been detected. If no errors are detected, WinBIOS at-
tempts to load the system from any bootable device, such as a floppy
disk or hard disk.

Normally, the only POST routine visible on the screen is the memory
test. The following screen displays when the system is powered on:

```
AMIBIOS (C)1994 American Megatrends Inc.
INDUSTRIAL COMPUTER SOURCE
XXXXXX



Hit DEL if you want to run SETUP
```

Initial Power-On Screen

You have two options:

- Press **<Del>** to access the WinBIOS Setup program.

  This option allows you to change various system parameters such as date and time, disk drives, etc. The *Running WinBIOS Setup* section of this manual describes the options available.

  You may be requested to enter a password before gaining access to the WinBIOS Setup program. (See *Password Entry* later in this section.)

  If you enter the correct password or no password is required, the WinBIOS Setup Main Menu displays. (See *Running WinBIOS Setup* later in this section.)

- Allow the bootup process to continue without invoking the WinBIOS Setup program.

  In this case, after WinBIOS loads the system, you may be requested to enter a password. (See *Password Entry* later in this section.)

Once the POST routines complete successfully, a screen displays showing the current configuration of your system, including processor type, base and extended memory amounts, floppy and hard drive types, display type and peripheral ports.

In systems with more than 1MB, WinBIOS reports 384KB less RAM than it finds, because it accounts for the address space between 640K and 1024K which is unavailable to DOS. This space is used for video RAM, video BIOS, system BIOS and adapter ROM's.

Password Entry

The system may be configured so that the user is required to enter a password each time the system boots or whenever an attempt is made to enter WinBIOS Setup. The password function may also be disabled so that the password prompt does not appear under any circumstances.

The Password Checking option in the Advanced Setup program al-
lows you to specify when the password prompt displays: **Always** or
only when **Setup** is attempted. The password may be changed using
the Password icon in the Security window of the WinBIOS Setup
Main Menu. If the password is null, the password prompt does not
display at any time. A more detailed description of the password
setup function may be found under SECURITY in the *Running
WinBIOS Setup* section of this manual.

When password checking is enabled, the following password prompt
displays:

```
          Enter CURRENT Password:
```
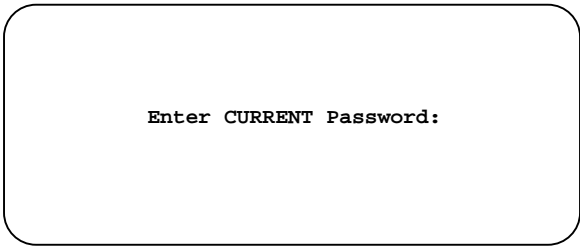
Type the password and press **<Enter>**.

NOTE: The null password is the system default and is in effect if a
password has not been assigned or if the CMOS is corrupted. In this
case, the password prompt does not display. To set up a password,
you may use the Password icon in the Security window of the
WinBIOS Setup Main Menu. (See the *Running WinBIOS Setup* sec-
tion of this manual.)

If an incorrect password is entered, the following screen displays:

```
          Enter CURRENT Password: X
          Enter CURRENT Password:
```
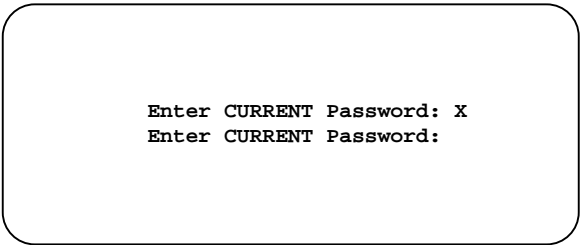
You may try again to enter the correct password. If you enter the password incorrectly *three* times, the system responds in one of two different ways, depending on the value specified in the Password Checking option on the Advanced Setup screen:

1) If the Password Checking option is set to **Setup**, the system does not let you enter Setup, but does continue the booting process. You must reboot the system manually to retry entering the password.

2) If the Password Checking option is set to **Always**, the system locks and you must reboot. After rebooting, you will be requested to enter the password.

Once the password has been entered correctly, you are allowed to continue.

BIOS Errors

If an error is encountered during the diagnostic checks performed when the system is powered on, the error is reported in one of two different ways:

1) If the error occurs before the display device is initialized, a series of beeps is transmitted.

2) If the error occurs after the display device is initialized, the screen displays the error message. In the case of a non-fatal error, a prompt to press the <F1> key may also appear on the screen.

Explanations of the beep codes and BIOS error messages may be found in *Appendix A - BIOS Messages*.

As the POST routines are performed, test codes are presented on Port 80H. These codes may be helpful as a diagnostic tool and are listed in *Appendix A - BIOS Messages*.

If certain non-fatal error conditions occur, you will be requested to run the WinBIOS Setup utility. The error messages are followed by this screen:

```
AMIBIOS (C)1994 American Megatrends Inc.
INDUSTRIAL COMPUTER SOURCE
XXXXXX


RUN SETUP UTILITY
Press F1 to RESUME
```

NOTE: Pausing the system after a non-fatal error may be bypassed by disabling the "Wait for "F1" If Any Error" option in the Advanced Setup program. See the *Advanced Setup* section of this manual.

Press **<F1>**. You may be requested to enter a password before gaining access to the WinBIOS Setup program. (See *Password Entry* earlier in this section.)

If you enter the correct password or no password is required, the WinBIOS Setup Main Menu displays.

RUNNING WINBIOS SETUP

WinBIOS Setup keeps a record of the system parameters, such as date and time, disk drives, and numeric coprocessors. The Setup parameters reside in the Read Only Memory Basic Input/Output System (ROM BIOS) so that they are available each time the system is turned on. WinBIOS Setup stores the information in the complementary metal oxide semiconductor (CMOS) memory. When the system is turned off, a backup battery retains system parameters in the CMOS memory.

Each time the system is powered on, it is configured with these values, unless the CMOS has been corrupted or is faulty. The WinBIOS Setup program is resident in the ROM BIOS (Read Only Memory Basic Input/Output System) so that it is available each time the computer is turned on. If, for some reason, the CMOS becomes corrupted, the system is configured with the default values stored in this ROM file.

As soon as the system is turned on, the power-on diagnostic routines check memory, attempt to prepare peripheral devices for action, and offer you the option of pressing <Del> to run WinBIOS Setup.

If certain non-fatal errors occur during the Power-On Self Test (POST) routines which are run when the system is turned on, you may be prompted to run WinBIOS Setup by pressing <F1>.

When selecting a certain setting for one WinBIOS Setup option determines the available selections for one or more other WinBIOS Setup options, WinBIOS does not permit you to use these settings unless the setting for the first option is changed. For example, the Serial Port1 and Serial Port2 options in Peripheral Setup can be set to 2F8H, 3F8H, 2E8H or 3E8H. If 2F8H is selected for Serial Port1, WinBIOS disables 2F8H as an option for Serial Port2. Invalid options are grayed on the WinBIOS Setup screen and cannot be selected.

WINBIOS SETUP MENU

When you press **<F1>** in response to an error message received
during the POST routines or when you press the **<Del>** key to enter
the WinBIOS Setup Program, the following screen displays:
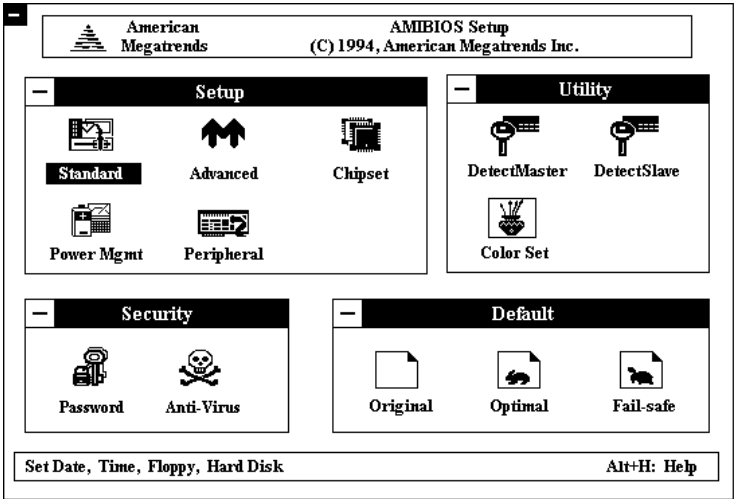
WinBIOS Setup Main Menu

The WinBIOS Setup Main Menu is organized into four windows,
each of which contains several icons.

You may select an option in one of two ways:

- Use the mouse to double-click on the appropriate icon.

- Use the **<Tab>** key to move to the next window. Use the
  <Right Arrow> and **<Left Arrow>** keys to move to the
  desired option within the window and then press **<Enter>**.

The four windows on the WinBIOS Setup Main Menu screen are:

1) **SETUP Window**

   The functions in the Setup window permit you to set system con-
   figuration options such as date and time, floppy drive type, hard
   disk type and many advanced features.
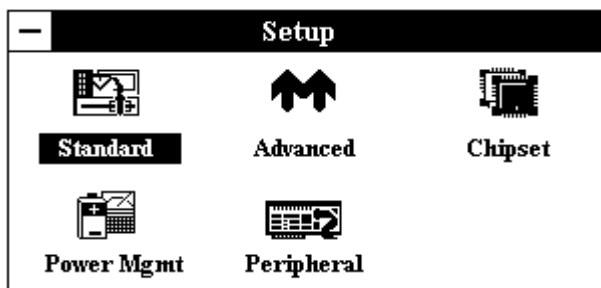
Four options are available:

- Select the **Standard** icon to make changes to Standard
  Setup. The Setup program is described in the *Standard
  Setup* section of this manual. The following options may be
  changed:

  - Date/Time

  - Floppy A Type

  - Floppy B Type

  - Master Disk Type

  - Slave Disk Type

- Select the **Advanced** icon to make changes to Advanced
  Setup. The Setup program is described in the *Advanced
  Setup* section of this manual. The following options may be
  changed:

  - System Keyboard

  - Primary Display

  - Above 1MB Memory Test

- Memory Test Tick Sound

- Hit "DEL" Message Display

- Wait for "F1" If Any Error

- System Boot Up Num Lock

- Floppy Drive Seek at Boot

- Floppy Drive Swapping

- System Boot Up Sequence

- Password Checking

- Cache Memory

- Adapter Shadow Cacheable

- System BIOS Shadow Cacheable

- ISA Video ROM Shadow

- ISA Adapter ROM Shadow

- IDE Block Mode

- Primary Master LBA Mode

- Primary Slave LBA Mode

- Secondary Ctrl Drives Present

- Secondary Master LBA Mode

- Secondary Slave LBA Mode

- Select the **Chipset** icon to make changes to the Chipset Setup. The Setup program is described in the *Advanced Setup* section of this manual. The following options may be changed:

    - ISA VGA Frame Buffer Size

    - ISA VGA Frame Buf. Base Addr

    - PCI VGA Palette Snooping

    - PCI VGA Buffering

- On Board PCI SCSI

- Boot to PnP Operating System

- OS2 Above 64MB Memory Support

- IRQ5, IRQ9, IRQ10, IRQ11 and IRQ15 Available to

- Select the **Power Mgmt** icon to make changes to Power Management Setup. The Setup program is described in the *Power Management Setup* section of this manual. The following options may be changed:

    - Advanced Power Management

    - IDE Drive Power Down

    - VESA Video Power Down

    - Timeout Value

    - IRQ Break Events

- Select the **Peripheral** icon to make changes to the Peripheral Setup. The Setup program is described in the *Peripheral Setup* section of this manual. The following options may be changed:

    - Programming Mode

    - OnBoard FDC

    - OnBoard IDE

    - Serial Port1

    - Serial Port2

    - Parallel Port

    - Parallel Port Mode

2) **UTILITY Window**

The functions in the Utility window permit you to perform system functions and are described later in this section.
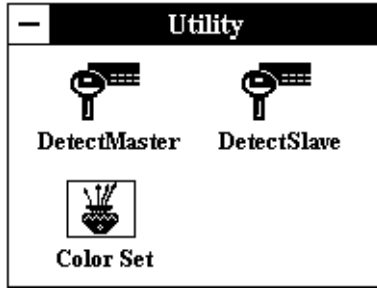
Three options are available:

- Select the **DetectMaster** icon if the Master Disk (Hard Disk C) is an IDE drive. The hard disk parameters will be detected automatically.
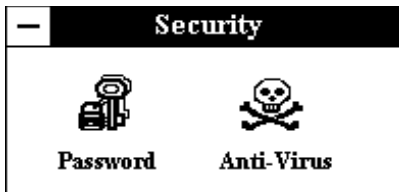
- Select the **DetectSlave** icon if the Slave Disk (Hard Disk D) is an IDE drive. The hard disk parameters will be detected automatically.

- Select the **Color Set** icon to set up WinBIOS Setup screen colors, if you have a color monitor.

3) **SECURITY Window**

The functions in the Security window control WinBIOS security functions and are described later in this section.

Two options are available:

- Select the **Password** icon to change the password required for access to the system or to the WinBIOS Setup programs.

- Select the **Anti-Virus** icon to request WinBIOS to issue a warning when any program or virus issues a Disk Format command or attempts to write to the boot sector of the hard disk drive.

4) **DEFAULT Window**

The options in the Default window permit you to select a group of default settings for all WinBIOS Setup options. These options are described later in this section.
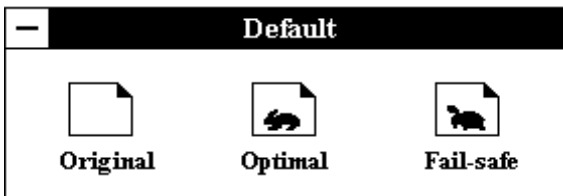
Three options are available:

- Select the **Original** icon to return to the system configuration values present in WinBIOS Setup when you first began the current Setup session.

- Select the **Optimal** icon to provide the best performance characteristics.

- Select the **Fail-safe** icon when you cannot boot your computer successfully. The fail-safe settings are more likely to configure a workable computer, but they do not provide optimal performance.

SAVING AND EXITING

When you have made all desired changes to the Setup, Utility, Security and Default options, press **<Esc>** to exit WinBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

The following screen displays:

```
┌───────────────────────────────────────┐
│ ─       Exit Setup                     │
├───────────────────────────────────────┤
│                                        │
│   ┌─────────────────────────────────┐  │
│   │ Save changes and Exit           │  │
│   └─────────────────────────────────┘  │
│   ┌─────────────────────────────────┐  │
│   │ Do not save changes and Exit    │  │
│   └─────────────────────────────────┘  │
│   ┌─────────────────────────────────┐  │
│   │ Continue                        │  │
│   └─────────────────────────────────┘  │
│                                        │
└───────────────────────────────────────┘
```
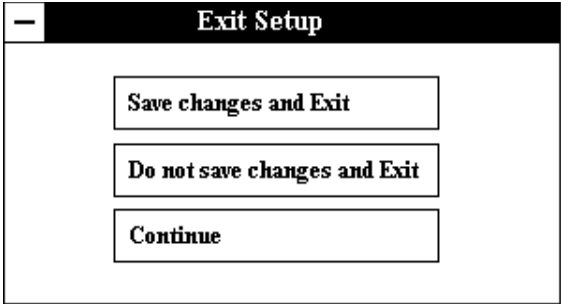
Three options are available:

•   Select **Save changes and Exit** to store your changes in the CMOS. The CMOS checksum is calculated and written to the CMOS. Control is then passed back to WinBIOS and the booting process continues, using the new CMOS values.

•   Select **Do not save changes and Exit** to pass control back to WinBIOS *without* writing any changes to the CMOS. WinBIOS continues with the booting process.

•   Select **Continue** to return to the WinBIOS Setup Main Menu if you want to continue making changes to other Setup options.

UTILITY FUNCTIONS

DetectMaster/DetectSlave

The **DetectMaster** and **DetectSlave** options allow you to have
WinBIOS automatically detect the type of hard disk drive(s) in your
system. The automatic detection functions only if you have IDE
drives. The parameters are reported to the appropriate screen in
WinBIOS Standard Setup (Master Disk or Slave Disk), so the hard
drive can easily be configured.

If you select the **DetectMaster** or the **DetectSlave** icon from the
Utility window of the WinBIOS Setup Main Menu, the following
window displays:

```
┌──────────────────────────────────────┐
│ Auto Detection in progress            │
├──────────────────────────────────────┤
│           ┌──────────┐                │
│           │ Cancel   │                │
│           └──────────┘                │
│                                       │
└──────────────────────────────────────┘
```
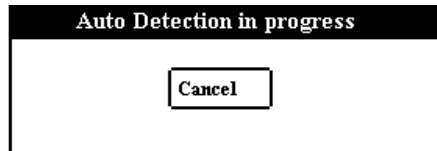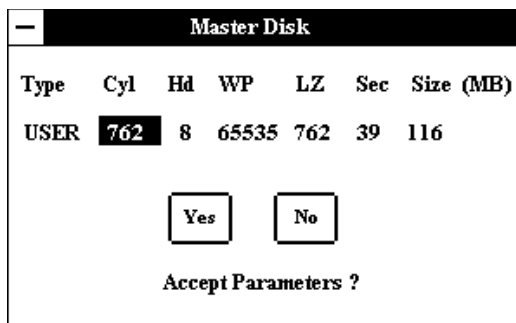
WinBIOS searches for the hard disk, and if it can access the drive it
reads the disk parameters. It then searches the WinBIOS drive table
for matching parameters to determine the disk type and displays both
the type and parameters on the screen. If no matching parameters
are found in the table, WinBIOS specifies the type as "USER" and
fills in the parameter values it found on the drive. If it cannot access
the drive or if it is not an IDE drive, WinBIOS times out and
specifies that the disk drive is "Not Detected."

The screen displays the parameters for the disk drive and asks if you
accept the values:

```
┌──────────────────────────────────────┐
│ ─            Master Disk              │
├──────────────────────────────────────┤
│ Type  Cyl  Hd  WP    LZ   Sec  Size (MB) │
│                                       │
│ USER  762  8   65535 762  39   116    │
│                                       │
│        ┌──────┐    ┌──────┐          │
│        │ Yes  │    │  No  │          │
│        └──────┘    └──────┘          │
│                                       │
│         Accept Parameters ?           │
└──────────────────────────────────────┘
```

NOTE: The auto detect feature displays disk parameter values as es-tablished by the drive manufacturer. If the drive has been formatted using any other values, accepting the auto detect values will cause erratic behavior. You must either reformat the drive to meet the manufacturer's specifications or use Standard Setup to enter para-meters which match the current format of the drive.

You have two options for each disk drive:

- Select **No** if you do not want to accept the hard disk type and its associated parameters or if it is "Not Detected." You may use Standard Setup to set up the correct parameters for the drive.

- Select **Yes** to accept the hard disk type and its associated parameters. The disk type values will be displayed when you select either the **Master Disk** or **Slave Disk** option in Standard Setup.

Color Set

This option allows you to set up the WinBIOS screen colors if you have a color monitor.

If you select the **Color Set** icon from the Utility window of the WinBIOS Setup Main Menu, the following window displays:

```
┌─────────────────────────┐
│ ─  Color Set            │
├─────────────────────────┤
│   ▣  LCD                 │
│   ☐  Army                │
│   ☐  Pastel              │
│   ☐  Sky                 │
└─────────────────────────┘
```

Use the mouse or keyboard arrow keys to make your selection.

SECURITY FUNCTIONS

Password

WinBIOS Setup has an optional password feature which can be con-
figured so that a password must be entered each time the system
boots or just when a user attempts to enter WinBIOS Setup. (See the
Advanced Setup section of this manual for information on how to
enable the Password Checking option.)

If password checking is enabled, the **Password** option in the Security
window of the WinBIOS Setup Main Menu allows you to change the
current password or to disable the password prompt by entering a
null password. If you select the **Password** icon, the following win-
dow displays:

The window above displays the message "Enter New Password."
This is the message you will see before you have established a new
password, or if the last password entered was the null password.

The message shown in the Password window changes depending on
where you are in the password procedure.

NOTE: The null password is the system default and will be in effect
if a password has not been assigned or if the CMOS has been cor-
rupted. In this case, the "Enter CURRENT Password" prompt is
bypassed when you boot the system, and you must establish a new
password.

The password cannot exceed six (6) characters in length. The screen does not display the characters as you enter them.

You may enter the password in one of two ways:

- Use the mouse to click on each letter in the password on the screen keypad and then click on **Enter**.

- Type the password and press the **<Enter>** key.

If a password has already been established, the Password window displays the following message when you select the Password icon:

Enter Current Password

Use the mouse or type in your current password.

If you enter the incorrect password, the following message displays:

When you select OK, you return to the WinBIOS Setup Main Menu. You must reselect the **Password** icon to try again.

After the current password has been correctly entered or if no password has been established previously, the Password window displays the message:

Enter New Password

After you have entered the new password, the following message displays in the Password window:

Confirm New Password

Re-key the new password as above.

If the password confirmation is miskeyed, WinBIOS Setup reissues the "Enter New Password" prompt and you must restart the procedure.

If the password confirmation is entered correctly, the following screen displays:

```
┌─────────────────────┐
│ ─                   │
├─────────────────────┤
│                     │
│ Password is Enabled │
│                     │
│      ┌────┐         │
│      │ OK │         │
│      └────┘         │
│                     │
└─────────────────────┘
```

To *disable* password checking so that the password prompt does not appear under any circumstances, you may create a null password by selecting **<Enter>** without typing in a new password. You will be asked to confirm the password. Select **<Enter>** again and the following message displays:

```
┌──────────────────────┐
│ ─                    │
├──────────────────────┤
│                      │
│ Password is Disabled │
│                      │
│      ┌────┐          │
│      │ OK │          │
│      └────┘          │
│                      │
└──────────────────────┘
```

Press **<Esc>** or **<Enter>** to return to the WinBIOS Setup Main Menu screen. If you save the changes when you exit WinBIOS Setup, the password is stored in CMOS RAM. The next time the system boots, you are prompted for the password if the password function is present and is enabled. (See *Advanced Setup* later in this manual for an explanation of how to enable password checking.)

NOTE: Be sure to keep a record of the new password each time it is changed. If you forget it, use the Password Clear jumper to reset it to the default (null password). See the *Specifications* section of this manual for details.

Anti-Virus

This option allows you to request WinBIOS to issue a warning when any program or virus issues a Disk Format command or attempts to write to the boot sector of the hard disk drive.

If you select the **Anti-Virus** icon from the Security window of the WinBIOS Setup Main Menu, the following window displays:

```
┌─────────────────────────────┐
│ ─  Virus Protection         │
├─────────────────────────────┤
│  ▣  Disabled                │
│  ☐  Enabled                 │
└─────────────────────────────┘
```

If the **Anti-Virus** option is set to **Enabled**, the following message displays when a write is attempted to the boot sector.

   Boot Sector Write!!! Possible VIRUS: Continue (Y/N)?

Select **Y** or **N** as appropriate. You may have to select **N** several times to prevent the boot sector write.

The following message displays if any attempt is made to format any cylinder, head or sector of any hard disk drive via the BIOS INT 13 Hard Disk Drive Service:

   Format!!! Possible VIRUS: Continue (Y/N)?

Select **Y** or **N** as appropriate. If you select **Y** to continue, formatting proceeds normally. If you do not want to continue formatting, you may have to select **N** several times, depending on how many retries are performed by the upper-level software. For example, DOS does at least five retries before the Format utility is actually terminated.


NOTE: You should *not* enable anti-virus protection when formatting a hard drive.

The DOS hard disk Format utility does not use INT 13H function AH=05H to format the hard disk. It only verifies the hard disk using the INT 13H Verify function (AH=04H). The virus warning message is not displayed during DOS hard disk drive formatting.

DEFAULT SETTINGS

Each WinBIOS Setup option has two default settings (Optimal and Fail-safe). These settings can be applied to all WinBIOS Setup options when you select the appropriate **Default** option.

The following shows the Default window of the WinBIOS Setup Main Menu:
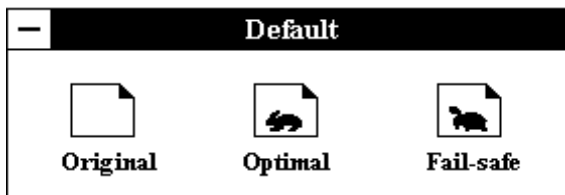
The icons available in this window allow you to select a group of settings for all WinBIOS Setup options. You can use these icons to quickly set system configuration parameters, or you can select a group of settings which have a better chance of working when the system is having configuration-related problems.

Three options are available:

• Select the **Original** icon to return to the system configuration values present in WinBIOS Setup when you first began the current Setup session.

The following screen displays:
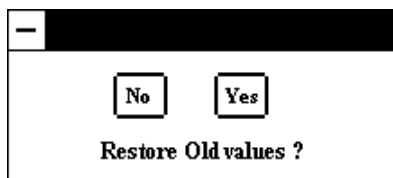
- Select **No** to leave the current values in effect.

- Select **Yes** to restore the values which were present when you first began Setup.

- Select the **Optimal** icon to load the Optimal default settings. These settings are best-case values which should provide the best performance characteristics. If CMOS RAM is corrupted, the Optimal settings are loaded automatically.
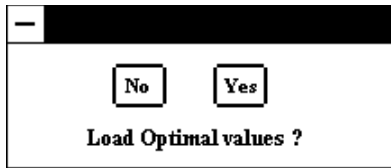
   The following screen displays:

   | No | Yes |

   Load Optimal values ?

   - Select **No** to leave the current values in effect.
   - Select **Yes** to load the Optimal default settings.

- Select the **Fail-safe** icon when you cannot boot your computer successfully. The Fail-safe settings are more likely to configure a workable computer. They do not provide optimal performance, but are the most stable settings. You may use this option as a diagnostic aid if your system is behaving erratically. Select the Fail-safe settings and then try to diagnose the problem after the computer boots.

   The following screen displays:

   | No | Yes |

   Load Fail-safe values ?
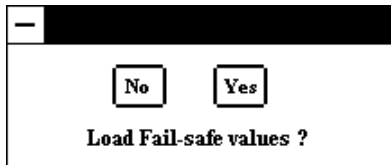
   - Select **No** to leave the current values in effect.
   - Select **Yes** to load the Fail-safe settings.

KEY CONVENTIONS

Navigation and selection in WinBIOS may be done using the keyboard, a mouse or a combination of both.

Listed below is an explanation of the keys you may use for navigation and selection in the WinBIOS Setup program:

Key	Task
<Esc>	Close the current operation and return to the previous level.
<Tab>	Move to the next window or field.
Arrow keys	Move to the next field in the desired direction.
Enter	Select the current item.
<Pg Up>	Return to the previous page.
<PgDn>	Advance to the next page.
<Home>	Return to the first option.
<End>	Advance to the last option.
<Alt> + <H>	Access the Help window.
<Alt> + < Spacebar>	Exit WinBIOS Setup.
<Alphabetic keys>	A to Z are used in the Virtual Keyboard, and are not case sensitive.
<Numeric keys>	0 to 9 are used in the Virtual Keyboard and Numeric Keypad.
Plus key (+)	Increment a value.
Minus key (-)	Decrement a value.

MOUSE CONVENTIONS

WinBIOS Setup can be accessed using a mouse. The following types of mouse devices are supported:

- PS/2-type mouse

- Bus mouse which uses IRQ3, IRQ4 or IRQ5 (IRQ2 is not supported)

- Microsoft-compatible mouse (the M, V, W Series using the M and M+ protocols)

- Logitech C-series-compatible mouse using the MM protocol

Listed below are the mouse click functions:

Action	Task
Single click	Change or select both global and current fields.
Double-click	Perform an operation in the selected field.

STANDARD SETUP

When you select the **Standard** icon from the WinBIOS Setup Main
Menu, the Standard Setup window displays:
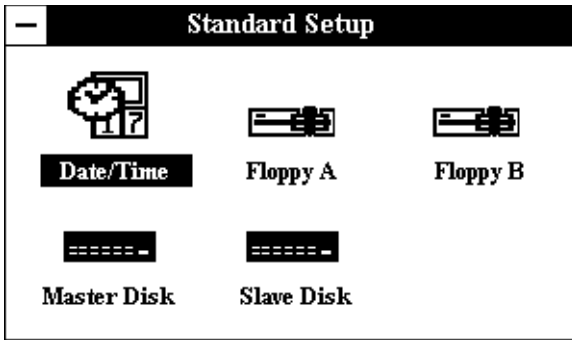
Standard Setup Window

The Standard Setup window allows you to select options to change
the date and time, the floppy drive type(s) and the hard disk type(s).
These options are described below.

You may select an option in one of two ways:

- Use the mouse to double-click on the appropriate icon.

- Use the **<Right Arrow>** and **<Left Arrow>** keys to move to
  the option and then press **<Enter>**.

STANDARD SETUP OPTIONS

Once values have been defined for the various Standard Setup options, they display each time Standard Setup is run.

Date/Time

When you select the **Date/Time** icon from the Standard Setup window, the current values for the date, day and time display:

```
┌──┬────────────────────────┐
│ ─│       Date/Time        │
├──┴──────────────────┬───┐ │
│ Date : Mon, Oct 10, 1994│ + │
│ Time: 10:40:32          │ ─ │
└─────────────────────┴───┘
```
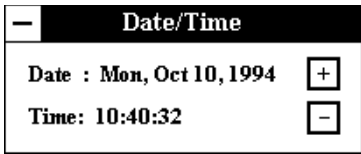
There are three fields for entering the date and three fields for entering the time. Use the mouse or the left and right arrow keys to move from one field to another. To change the values in each field, use the mouse to click on the plus and minus keys on the screen or use the plus and minus keys on the keyboard. When you change the month, date or year field, the day of the week changes automatically to reflect the new date.

Floppy A/Floppy B

When you select either the **Floppy A** or **Floppy B** icon from the Standard Setup window, the following window displays:

```
┌──┬──────────────────┐
│ ─│     Floppy A     │
├──┴──────────────────┤
│  ☐   Not Installed  │
│  ☐   360  MB  5 1/4"│
│  ☐   1.2  MB  5 1/4"│
│  ☐   720  MB  3 1/2"│
│  ◉   1.44 MB  3 1/2"│
│  ☐   2.88 MB  3 1/2"│
└─────────────────────┘
```
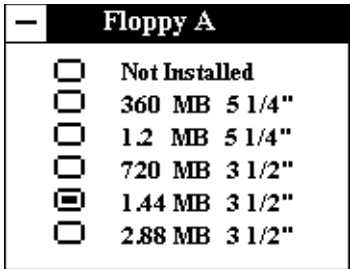
The **Not Installed** option can be used for diskless work stations.

Master Disk/Slave Disk

When you select either the **Master Disk** or **Slave Disk** icon from the Standard Setup window, a list of hard disk types displays.

Scroll through the list to locate the correct type of disk drive in your computer.

As you scroll through the disk types, the drive Type displays, along with values for cylinders, heads, write precompensation, landing zone, sectors and size. Available drive types are listed at the end of this section. If the parameters supplied by the manufacturer of your disk drive do not match any of these preprogrammed drive types, you may select the **USER** drive type to enter the parameters manually as described below.

Not Installed is available for use as an option. This option can be used for diskless work stations.

NOTE: If the hard disk is an IDE drive, you may use the **DetectMaster** or **DetectSlave** option in the Utility window of the WinBIOS Setup Main Menu to automatically configure the hard disk type. This allows WinBIOS to detect the IDE drive parameters and report them on the Master Disk and Slave Disk screens. The **DetectMaster** and **DetectSlave** options are described in the *Running WinBIOS Setup* section of this manual.

User-Defined Drive Types

If the parameters supplied by the manufacturer of your disk drive do not match any of the preprogrammed drive types in the drive type table, you may enter the parameters manually.

Scroll to the end of the drive type list, select the **USER** option and press the **<Enter>** key.

The following window displays:
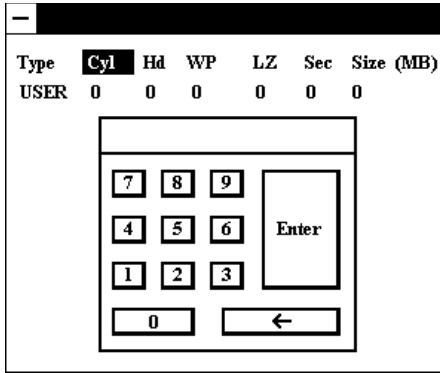
You can manually enter the Cyl, Hd, WP, LZ and Sec parameters. The Size parameter is automatically calculated and displayed by the system based on the other parameters entered.

Once you have placed the cursor in a field by using either the mouse or the right and left arrow keys, you may enter the value in one of two ways:

- Use the mouse to click on each number on the screen keypad and then click on **Enter**.

- Type the parameter value and press the **<Enter>** key.

The numbers entered display above the line on the screen keypad. If an invalid value is entered, an "**E**" appears to the left of the number entered. The backspace key on the screen keypad (or on the keyboard) removes the last character entered.

The parameters for **USER** under Master Disk and Slave Disk may be different, which effectively allows two different user-definable hard disk types.

The following explains the drive parameters which you must enter for a drive type which is not in the list:

Type is the numeric designation for a drive with certain identification parameters.

Cylinders (Cyl) is the number of disk cylinders found in the specified drive type.

Heads (Hd) is the number of disk heads found in the specified drive type.

Write Precompensation (WP) is the read delay circuitry which takes into account the timing differences between the inner and outer edges of the surface of the disk. The size of the sector gets progressively smaller as the track diameter diminishes. Yet each sector must still hold 512 bytes. Write precompensation circuitry on the hard disk compensates for the physical difference in sector size by boosting the write current for sectors on inner tracks. This parameter designates the track (cylinder) number where write precompensation begins.

Landing Zone (LZ) is the disk cylinder where the head lands. This number determines the cylinder location where the heads will normally park when the system is shut down.

Sectors (Sec) designates the number of disk sectors per track.

Size is the formatted capacity of the drive (in megabytes) based on the following formula:

# of heads x # of cylinders x # of sects/cyln x 512 bytes/sect

Saving and Exiting

When you have made all desired changes to Standard Setup, press **<Esc>** to return to the WinBIOS Setup Main Menu screen.

You may make changes to other Setup, Utility, Security or Default options or press **<Esc>** to exit WinBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

FIXED DRIVE TYPES

Default fixed drive types defined in WinBIOS are as follows:

Cyl = Cylinders per drive   LZ = Landing zone
Hd = Heads per drive   Sec = Nbr of sectors per cylinder
WP = Write precompensation   Size = Total storage size (Megabytes)
     (0 = all; 65535 = none)

Type	Cyl	Hd	WP	LZ	Sec	Size
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	31
4	940	8	512	940	17	62
5	940	6	512	940	17	47
6	615	4	65535	615	17	20
7	462	8	256	511	17	31
8	733	5	65535	733	17	30
9	900	15	65535	901	17	112
10	820	3	65535	820	17	20
11	855	5	65535	855	17	35
12	855	7	65535	855	17	50
13	306	8	128	319	17	20
14	733	7	65535	733	17	43
15			----- Invalid -----			
16	612	4	0	663	17	20
17	977	5	300	977	17	41
18	977	7	65535	977	17	57
19	1024	7	512	1023	17	60
20	733	5	300	732	17	30
21	733	7	300	732	17	43
22	733	5	300	733	17	30
23	306	4	0	336	17	10
24	925	7	0	925	17	54
25	925	9	65535	925	17	69
26	754	7	754	754	17	44
27	754	11	65535	754	17	69
28	699	7	256	699	17	41
29	823	10	65535	823	17	68
30	918	7	918	918	17	53
31	1024	11	65535	1024	17	94
32	1024	15	65535	1024	17	128
33	1024	5	1024	1024	17	43
34	612	2	128	612	17	10
35	1024	9	65535	1024	17	77

FIXED DRIVE TYPES (continued)

Type	Cyl	Hd	WP	LZ	Sec	Size
36	1024	8	512	1024	17	68
37	615	8	128	615	17	41
38	987	3	987	987	17	25
39	987	7	987	987	17	57
40	820	6	820	820	17	41
41	977	5	977	977	17	41
42	981	5	981	981	17	41
43	830	7	512	830	17	48
44	830	10	65535	830	17	69
45	917	15	65535	918	17	114
46	1224	15	65535	1223	17	152
USER						
ESDI						
SCSI						

USING A WORKSHEET FOR SETUP

Copy this worksheet to record the values needed for the initial
WinBIOS Standard Setup program. Keep a copy in case of backup
battery failure. Consult your drive manual if you are unsure about
any of these values.

Floppy A Type _____				
Floppy B Type _____				
Master Disk Type _____				
** Cyl	Hd	WP	LZ	Sec
_____	_____	_____	_____	_____
Slave Disk Type _____				
** Cyl	Hd	WP	LZ	Sec
_____	_____	_____	_____	_____

** Values required only if Type = USER

ADVANCED SETUP

When you select the **Advanced** icon from the WinBIOS Setup Main
Menu, the Advanced Setup window displays:

─ Advanced Setup	
System Keyboard	: Present
Primary Display	: VGA/EGA
Above 1MB Memory Test	: Enabled
Memory Test Tick Sound	: Enabled
Hit "DEL" Message Display	: Enabled
Wait for "F1" If Any Error	: Enabled
System Boot Up Num Lock	: On
Floppy Drive Seek At Boot	: Disabled
Floppy Drive Swapping	: Disabled
System Boot Up Sequence	: C:, A:
Password Checking	: Setup
Cache Memory	: Both
Adapter Shadow Cacheable	: Disabled
System BIOS Shadow Cacheable	: Enabled
ISA Video ROM C000,32K	: Enabled
ISA Adapter ROM C800,16K	: Disabled
ISA Adapter ROM CC00,16K	: Disabled
ISA Adapter ROM D000,16K	: Disabled
ISA Adapter ROM D400,16K	: Disabled
ISA Adapter ROM D800,16K	: Disabled
ISA Adapter ROM DC00,16K	: Disabled
IDE Block Mode	: Disabled
Primary Master LBA Mode	: Disabled
Primary Slave LBA Mode	: Disabled
Secondary Ctrl Drives Present	: None
Secondary Master LBA Mode	: Disabled
Secondary Slave LBA Mode	: Disabled

The Advanced Setup Window

When you display the Advanced Setup Window, the format is
similar to the sample shown above, except the window displays only
ten options at a time. If you need to change other options, use the
scroll bar on the right or the down arrow key to locate the

appropriate option. If values display for all parameters, the Setup
parameters have been defined previously.

NOTE: The values in this screen do not necessarily reflect the
values appropriate for your processor board. Refer to the explana-
tions below for specific instructions about entering correct informa-
tion.

ADVANCED SETUP OPTIONS

The descriptions for the system options listed below show the values
as they appear if you have not run the Advanced Setup program yet.
Once values have been defined, they display each time Advanced
Setup is run.

System Keyboard

This option enables the system keyboard.

The Setup screen displays the system option:

      System Keyboard   **: Present**

Available options are:

        Absent
        Present

Primary Display

This option specifies the type of display in the system.

The Setup screen displays the system option:

      Primary Display   **: VGA/EGA**

Available options are:

>Absent
>VGA/EGA
>CGA 40 x 25
>CGA 80 x 25
>Mono (monochrome)

Above 1MB Memory Test

This option, when enabled, executes the POST memory routines on *all* system memory. If the option is disabled, WinBIOS checks only the first 1MB of system memory.

The Setup screen displays the system option:

>**Above 1MB Memory Test   : Enabled**

Available options are:

>Disabled
>Enabled

Memory Test Tick Sound

This option allows you to turn on or turn off the ticking sound during the memory test which is performed when the system boots up.

The Setup screen displays the system option:

>**Memory Test Tick Sound   : Enabled**

Available options are:

>Disabled
>Enabled

Hit "DEL" Message Display

The "Hit DEL if you want to run SETUP" message displays when the system boots up. Disabling this option prevents the message from displaying.

The Setup screen displays the system option:

Hit "DEL" Message Display   **: Enabled**

Available options are:

> Disabled
> Enabled

Wait For "F1" If Any Error

Before the system boots up, WinBIOS executes the Power-On Self Test (POST) routines, a series of system diagnostic routines. If any of these tests fail but the system can still function, a non-fatal error has occurred. WinBIOS responds with an appropriate error message followed by:

Press F1 to RESUME

If this option is disabled, a non-fatal error does not generate the "Press F1 to RESUME" message. WinBIOS still displays the appropriate error message, but continues the booting process without waiting for the <F1> key to be pressed. This eliminates the need for any user response to a non-fatal error condition message. Non-fatal error messages are listed in *Appendix A - BIOS Messages*.

The Setup screen displays the system option:

Wait For "F1" If Any Error   **: Enabled**

Available options are:

> Disabled
> Enabled

System Boot Up Num Lock

This option enables you to turn off the Num Lock option on the en-
hanced keyboard when the system is powered on. If Num Lock is
turned off, the arrow keys on the numeric keypad can be used, as
well as the other set of arrow keys on the enhanced keyboard.

The Setup screen displays the system option:

> **System Boot Up Num Lock   : On**

Available options are:

> Off
> On

Floppy Drive Seek At Boot

This option causes the system to have the floppy drive(s) seek during
bootup. The default for this option is **Disabled** to allow a fast boot
and to decrease the possibility of damage to the heads.

The Setup screen displays the system option:

> **Floppy Drive Seek At Boot   : Disabled**

Available options are:

> Disabled
> Enabled

Floppy Drive Swapping

This option allows WinBIOS to boot from floppy drive B: instead of
floppy drive A: when it searches for a bootable device. The search
sequence is defined by the **System Boot Up Sequence** option
described below.

The default for this option is **Disabled**, which causes the system to
boot from floppy drive A:.

The Setup screen displays the system option:

Floppy Drive Swapping **: Disabled**

Available options are:

Disabled
Enabled

System Boot Up Sequence

This option specifies the disk drive sequence WinBIOS uses to search for a bootable device. WinBIOS normally attempts to boot from hard disk C:, if present. If it is unsuccessful, it then attempts to boot from the floppy drive (either floppy drive A: or floppy drive B:, depending on the setting of the **Floppy Drive Swapping** option described above).

This option allows you to reverse the bootup sequence to search for the floppy drive first.

The Setup screen displays the system option:

System Boot Up Sequence **: C:, A:**

Available options are:

C:, A:
A:, C:

Password Checking

This option determines when a password is required for access to the system.

The Setup screen displays the system option:

Password Checking **: Setup**

Two options are available:

- Select **Setup** to have the password prompt appear only when an attempt is made to enter the WinBIOS Setup program. The Optimal and Fail-safe default settings are **Setup**.

- Select **Always** to have the password prompt appear each time the system is powered on.

NOTE: To *disable* password checking, a null password should be entered in the Password function in the Security window of the WinBIOS Setup Main Menu. (See the *Running WinBIOS Setup* section of this manual.) The null password is the system default and will be in effect if a password has not been assigned or if the CMOS is corrupted.

Cache Memory

Cache memory may be enabled or disabled using this option.

The Setup screen displays the system option:

    Cache Memory   **: Both**

Three options are available:

- Select **Disabled** to disable *all* cache memory.

- Select **Internal** to enable only the internal cache memory in the Pentium processor.

- Select **Both** to enable internal *and* external cache memory.

Adapter Shadow Cacheable

This option allows the caching of shadowed adapter ROM's.

The Setup screen displays the system option:

Adapter Shadow Cacheable   : Disabled

Available options are:

> Disabled
> Enabled

System BIOS Shadow Cacheable

The System BIOS is automatically shadowed to RAM by the BIOS.
This option allows the caching of the shadowed System BIOS.

The Setup screen displays the system option:

System BIOS Shadow Cacheable   : Enabled

Available options are:

> Disabled
> Enabled

Video or Adapter ROM Shadow

ROM shadow is a technique in which BIOS code is copied from
slower ROM to faster RAM. The BIOS is then executed from the
RAM.

Each option allows for a segment of 16KB or 32KB to be shadowed
from ROM to RAM. If one of these options is enabled and there is
BIOS code present in that particular segment, the BIOS is shadowed.

ISA Video ROM Shadow

Video BIOS shadowing may be done in a 32K segment at C000H.
Enabling shadowing can speed up the operation of a machine be-
cause RAM can be accessed more rapidly than ROM and the data
bus is wider to RAM.

The Setup screen displays the system option:

ISA Video ROM C000,32K   : Enabled

Available options are:

> Disabled
> Enabled

ISA Adapter ROM Shadow

Other ROM's may be shadowed in the memory area from C800H to
E000H, depending upon preferences and system requirements. The
ROM area that is not used by ISA adapter cards is allocated to PCI
adapter cards.

The Setup screen displays the system option:

ISA Adapter ROM XXXX,16K   : Disabled

> where XXXX is the base address of the segment of memory
> to be shadowed.

Available options are:

> Disabled
> Enabled

IDE Block Mode

This option supports transfer of multiple sectors to and from an IDE
drive.

The Setup screen displays the system option:

IDE Block Mode   : Disabled

Available options are:

> Disabled
> 2 S/B
> 4 S/B
> 8 S/B
> 16 S/B
> 32 S/B
> 64 S/B
> Auto

Primary Master LBA Mode

This option allows you to enable IDE LBA (Logical Block Address) Mode for the first (master) IDE drive attached to the primary IDE controller. Data is accessed by block addresses rather than by the traditional Cylinder-Head-Sector scheme. This allows you to use drives larger than 528MB.

The Setup screen displays the system option:

Primary Master LBA Mode   : Disabled

Available options are:

> Disabled
> Enabled

Primary Slave LBA Mode

This option allows you to enable IDE LBA (Logical Block Address) Mode for the second (slave) IDE drive attached to the primary IDE controller. Data is accessed by block addresses rather than by the traditional Cylinder-Head-Sector scheme. This allows you to use drives larger than 528MB.

The Setup screen displays the system option:

Primary Slave LBA Mode   : Disabled

Available options are:

> Disabled
> Enabled

Secondary Ctrl Drives Present

This option specifies the number of IDE drives controlled by the
secondary IDE controller.

The Setup screen displays the system option:

> **Secondary Ctrl Drives Present   : None**

Available options are:

> None
> 1
> 2

Secondary Master LBA Mode

This option allows you to enable IDE LBA (Logical Block Address)
Mode for the first (master) IDE drive attached to the secondary IDE
controller. Data is accessed by block addresses rather than by the
traditional Cylinder-Head-Sector scheme. This allows you to use
drives larger than 528MB.

If the **Secondary Ctrl Drives Present** option described above is set
to **None**, this option is not available.

The Setup screen displays the system option:

> **Secondary Master LBA Mode   : Disabled**

Available options are:

> Disabled
> Enabled

Secondary Slave LBA Mode

This option allows you to enable IDE LBA (Logical Block Address)
Mode for the second (slave) IDE drive attached to the secondary IDE
controller. Data is accessed by block addresses rather than by the
traditional Cylinder-Head-Sector scheme. This allows you to use
drives larger than 528MB.

If the **Secondary Ctrl Drives Present** option described above is set
to **None** or **1**, this option is not available.

The Setup screen displays the system option:

Secondary Slave LBA Mode   : Disabled

Available options are:

Disabled
Enabled

Saving and Exiting

When you have made all desired changes to Advanced Setup, press
<Esc> to return to the WinBIOS Setup Main Menu screen.

You may make changes to other Setup, Utility, Security or Default
options or press **<Esc>** to exit WinBIOS Setup. You may save the
changes you have just made or you may exit from Setup without
saving your changes.

CHIPSET SETUP

When you select the **Chipset** icon from the WinBIOS Setup Main
Menu, the following Setup window displays:

```
┌───┬─────────────────────────────────────────────────┐
│ ─ │              Chipset Setup                        │
├───┴─────────────────────────────────────────────────┤
│ ISA VGA Frame Buffer Size          : Disabled    ▲  │
│ ISA VGA Frame Buf. Base Addr        : (N/A)         │
│ PCI VGA Palette Snooping            : Disabled      │
│ PCI VGA Buffering                   : Disabled      │
│ On Board PCI SCSI                   : Disabled      │
│ Boot to PnP operating system        : No           │
│ OS2 Above 64MB Memory Support       : Disabled     │
│ IRQ5   Available to                 : PCI/PnP      │
│ IRQ9   Available to                 : PCI/PnP      │
│ IRQ10 Available to                  : PCI/PnP      │
│ IRQ11 Available to                  : PCI/PnP      │
│ IRQ15 Available to                  : PCI/PnP   ▼  │
└─────────────────────────────────────────────────────┘
```

The Chipset Setup Window

When you display the Chipset Setup window, the format is similar to
the sample shown above. If values display for all parameters, the
Setup parameters have been defined previously.

NOTE: The values in this screen do not necessarily reflect the
values appropriate for your processor board. Refer to the explana-
tions below for specific instructions about entering correct informa-
tion.

CHIPSET SETUP OPTIONS

The descriptions for the system options listed below show the values as they appear if you have not run the Chipset Setup program yet. Once values have been defined, they display each time Chipset Setup is run.

NOTE: Do *not* change the values for the options on this screen unless you understand the impact on system operation. Depending on your system configuration, selection of other values may cause unreliable system operation.

ISA VGA Frame Buffer Size

This option sets the size of the VGA frame buffer. It must be set to one of the size values if the VGA card installed in the system requires a frame buffer.

The Setup screen displays the system option:

> **ISA VGA Frame Buffer Size   : Disabled**

Available options:

> Disabled
> 1MB
> 2MB
> 4MB

ISA VGA Frame Buf. Base Addr

This option displays the base address of the VGA frame buffer. If the VGA card installed in the system requires a frame buffer, the base address is displayed but may not be modified. The Base Address parameter is not applicable (**N/A**) if the **ISA VGA Frame Buffer Size** option is disabled.

The Setup screen displays the system option:

ISA VGA Frame Buf. Base Addr   : (N/A)

The settings displayed for the base address of the VGA frame buffer are are follows:

ISA VGA Frame Buffer Size	ISA VGA Frame Bfr. Base Addr
Disabled	(N/A)
1MB	15 MB
2MB	14 MB
4MB	12 MB

PCI VGA Palette Snooping

This option indicates whether or not any ISA adapter card installed in the system requires VGA palette snooping.

The Setup screen displays the system option:

PCI VGA Palette Snooping   : Disabled

Available options:

> Disabled
> Enabled

PCI VGA Buffering

The Setup screen displays the system option:

PCI VGA Buffering   : Disabled

Available options:

> Disabled
> Enabled

On Board PCI SCSI

This option indicates whether or not the PCI SCSI controller on the processor board will be used.

The Setup screen displays the system option:

On Board PCI SCSI : Disabled

Available options:

Disabled
Enabled

Boot to PnP Operating System

This option indicates whether or not a Plug and Play operating system is being used. Setting this option to **Yes** allows full inter-action between the BIOS and the operating system PnP features.

The Setup screen displays the system option:

Boot to PnP operating system : No

Available options:

No
Yes

OS2 Above 64MB Memory Support

To load OS/2 2.11 or OS/2 Warp in a system with more than 64MB of on-board memory, this option must be set to **Enabled**.

The Setup screen displays the system option:

OS2 Above 64MB Memory Support : Disabled

Available options:

> Disabled
> Enabled

IRQ5, IRQ9, IRQ10, IRQ11, IRQ15 Available to

These options indicate whether or not the specified interrupt request (IRQ) is available for use by the system for PCI Plug and Play features or is reserved for use by option cards on the ISA Bus.

The Setup screen displays the system option:

> **IRQ# Available to   : PCI/PnP**

> where # is the number of the interrupt request (IRQ) available to the option specified (PCI or ISA).

Available options:

> PCI/PnP
> ISA/EISA

Saving and Exiting
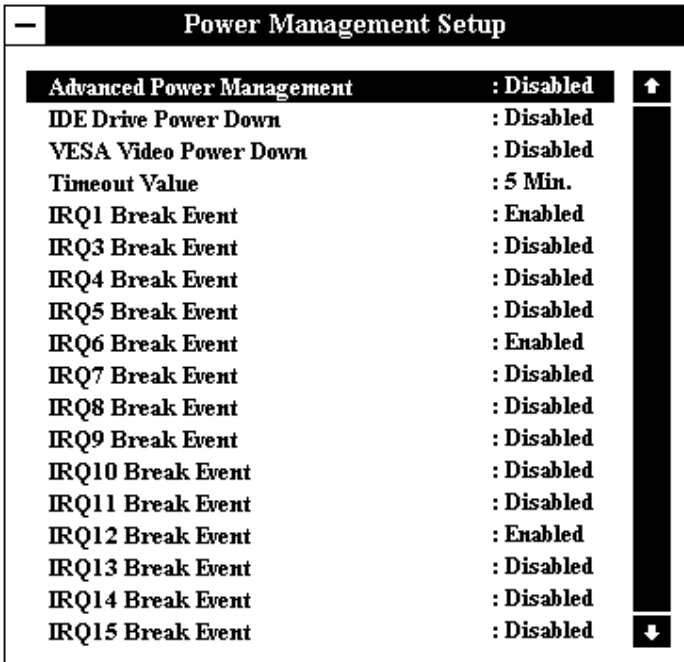
When you have made all desired changes to Chipset Setup, press **<Esc>** to return to the WinBIOS Setup Main Menu screen.

You may make changes to other Setup, Utility, Security or Default options or press **<Esc>** to exit WinBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

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POWER MANAGEMENT SETUP

When you select the **Power Mgmt** icon from the WinBIOS Setup
Main Menu, the following Setup window displays:

Power Management Setup	
Advanced Power Management	: Disabled
IDE Drive Power Down	: Disabled
VESA Video Power Down	: Disabled
Timeout Value	: 5 Min.
IRQ1 Break Event	: Enabled
IRQ3 Break Event	: Disabled
IRQ4 Break Event	: Disabled
IRQ5 Break Event	: Disabled
IRQ6 Break Event	: Enabled
IRQ7 Break Event	: Disabled
IRQ8 Break Event	: Disabled
IRQ9 Break Event	: Disabled
IRQ10 Break Event	: Disabled
IRQ11 Break Event	: Disabled
IRQ12 Break Event	: Enabled
IRQ13 Break Event	: Disabled
IRQ14 Break Event	: Disabled
IRQ15 Break Event	: Disabled

The Power Management Setup Window

When you display the Power Management Setup window, the format
is similar to the sample shown above. If values display for all
parameters, the Setup parameters have been defined previously.

NOTE: The values in this screen do not necessarily reflect the
values appropriate for your processor board. Refer to the explana-
tions below for specific instructions about entering correct informa-
tion.

POWER MANAGEMENT SETUP OPTIONS

The descriptions for the system options listed below show the values as they appear if you have not run the Power Management Setup program yet. Once values have been defined, they display each time Power Management Setup is run.

Advanced Power Management

This option allows you to enable Advanced Power Management (APM) on your system. If this option is set to **Disabled**, you cannot change the other options on the Power Management Setup screen.

The Setup screen displays the system option:

> **Advanced Power Management   : Disabled**

Available options are:

> Disabled
> Enabled

IDE Drive Power Down

This option indicates whether or not WinBIOS is allowed to power down the IDE drive.

The Setup screen displays the system option:

> **IDE Drive Power Down   : Disabled**

Available options are:

> Disabled
> Enabled

VESA Video Power Down

This option indicates whether or not WinBIOS is allowed to power down the video adapter and monitor.

The Setup screen displays the system option:

VESA Video Power Down   : Disabled

Available options are:

> Disabled
> Standby
> Suspend
> Off

Timeout Value

This option specifies the length of time WinBIOS waits before turning off power to the drive if the drive remains inactive.

The Setup screen displays the system option:

Timeout Value   : 5 Min.

Available options are:

5 Min.	45 Min.
10 Min.	50 Min.
15 Min.	55 Min.
20 Min.	60 Min.
25 Min.	65 Min.
30 Min.	70 Min.
35 Min.	75 Min.
40 Min.	

IRQ1 Break Event through IRQ15 Break Event

This option allows you to enable break ("wake-up") events for the specified interrupt request line (IRQ).

The Setup screen displays the system option:

IRQ# Break Event **: Enabled**

where # is the IRQ line number.

Available options are:

Disabled
Enabled

Saving and Exiting

When you have made all desired changes to Power Management Setup, press **\<Esc\>** to return to the WinBIOS Setup Main Menu screen.

You may make changes to other Setup, Utility, Security or Default options or press **\<Esc\>** to exit WinBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

PERIPHERAL SETUP

When you select the **Peripheral** icon from the WinBIOS Setup Main
Menu, the following Setup window displays:

Peripheral Setup	
Programming Mode	: Auto
OnBoard FDC	: Enabled
OnBoard IDE	: Enb-PRI
Serial Port1	: 3F8H
Serial Port2	: 2F8H
Parallel Port	: 378H
Parallel Port Mode	: Normal

The Peripheral Setup Window

When you display the Peripheral Setup window, the format is similar
to the sample shown above. If values display for all parameters, the
Setup parameters have been defined previously.

NOTE: The values in this screen do not necessarily reflect the
values appropriate for your processor board. Refer to the explana-
tions below for specific instructions about entering correct informa-
tion.

PERIPHERAL SETUP OPTIONS

The descriptions for the system options listed below show the values as they appear if you have not run the Peripheral Setup program yet. Once values have been defined, they display each time Peripheral Setup is run.

Programming Mode

This option allows automatic or manual setup of peripheral devices.

The Setup screen displays the system option:

Programming Mode : **Auto**

Two options are available:

- Select **Auto** to have WinBIOS configure the peripherals automatically as described below under *Automatic BIOS Configuration Features*.

- Select **Manual** to have WinBIOS configure the peripherals as they have been defined on the Peripheral Setup screen. See the *Manual BIOS Configuration Features* section below.

Automatic BIOS Configuration Features

When Programming Mode is set to **Auto**, WinBIOS automatically detects all adapter cards installed in the system and configures the on-board I/O (floppy controllers, IDE controller, serial ports and parallel port). Any floppy controller, IDE controller, serial port or parallel port on an adapter card in an expansion slot is configured before on-board I/O.

OnBoard FDC

WinBIOS attempts to enable any floppy drive controller on the ISA Bus. If no floppy controller is found on the ISA Bus, the on-board floppy controller is enabled.

OnBoard IDE

WinBIOS attempts to enable any hard disk drive controller on the ISA Bus. If no hard disk drive controller is found on the ISA Bus, the on-board IDE controller is enabled.

Serial Port 1 and Serial Port 2

WinBIOS also attempts to avoid address conflicts. If the off-board serial ports are configured to specific starting I/O ports via jumper settings, WinBIOS configures the on-board serial ports to avoid conflicts.

WinBIOS checks the ISA Bus for serial ports. Any off-board serial ports found on the ISA Bus are left at their assigned addresses. Serial Port 1, the first on-board serial port, is configured with the first available address and Serial Port 2, the second on-board serial port, is configured with the next available address. The default address assignment order is 3F8H, 2F8H, 3E8H, 2E8H. Note that this same assignment order is used by WinBIOS to place the active serial port addresses in lower memory (BIOS data area) for configuration as logical COM devices.

After all addresses have been assigned, any remaining on-board serial ports are disabled.

For example, if there is one off-board serial port on the ISA Bus and its address is set to 2F8H, Serial Port 1 is assigned address 3F8H and Serial Port 2 is assigned address 3E8H. Configuration is then as follows:

> COM1 - Serial Port 1 (at 3F8H)
> COM2 - off-board serial port (at 2F8H)
> COM3 - Serial Port 2 (at 3E8H)

The interrupts used by Serial Port 1 and Serial Port 2 may be assigned by jumpers on some processor boards. For those boards on which the selectable interrupt jumpers are not available, Serial Port 1 utilizes interrupt 4 (IRQ4) and Serial Port 2 utilizes interrupt 3 (IRQ3).

Parallel Port

WinBIOS checks the ISA Bus for off-board parallel ports. Any parallel ports found on the ISA Bus are left at their assigned addresses. The on-board Parallel Port is automatically configured with the first available address not used by an off-board parallel port. The default address assignment order is 3BCH, 378H, 278H. Note that this same assignment order is used by WinBIOS to place the active parallel port addresses in lower memory (BIOS data area) for configuration as logical LPT devices.

The interrupts used by the Parallel Port may be assigned by a jumper setting on some processor boards. For those boards on which the selectable interrupt jumper is not available, IRQ7 is used for the on-board Parallel Port (LPT1).

Manual BIOS Configuration Features

When Programming Mode is set to **Manual**, the options you set up manually are used by WinBIOS when booting the system. WinBIOS reports any I/O conflicts after displaying the BIOS Configuration Summary screen.

OnBoard FDC

The on-board floppy drive controller may be enabled or disabled using this option.

The Setup screen displays the system option:

  OnBoard FDC   : Enabled

Available options are:

   Disabled
   Enabled

OnBoard IDE

The on-board IDE (Integrated Drive Electronics) controller may be
enabled or disabled using this option.

The Setup screen displays the system option:

OnBoard IDE : **Enb-PRI**

Available options are:

> Disabled
> Enb-PRI (Enable Primary)
> Enb-SEC (Enable Secondary)

Serial Port 1

The address of Serial Port 1, the first on-board serial port, may be set
using this option. The interrupts used by Serial Port 1 and Serial
Port 2 may be assigned by jumper settings on some processor boards.
For those boards on which the selectable interrupt jumpers are not
available, IRQ4 is used for Serial Port 1 (COM1).

The Setup screen displays the system option:

Serial Port1 : **3F8H**

Available options are:

> Disabled
> 3F8H
> 2F8H
> 3E8H
> 2E8H

Serial Port 2

The address of Serial Port 2, the second on-board serial port, may be
set using this option. The interrupts used by Serial Port 1 and Serial
Port 2 may be assigned by jumper settings on some processor boards.

For those boards on which the selectable interrupt jumpers are not available, IRQ3 is used for Serial Port 2 (COM2).

The Setup screen displays the system option:

Serial Port2 **: 2F8H**

Available options are:

> Disabled
> 3F8H
> 2F8H
> 3E8H
> 2E8H

Parallel Port

The address of the on-board Parallel Port may be set using this option. The interrupts used by the Parallel Port may be assigned by a jumper setting on some processor boards. For those boards on which the selectable interrupt jumper is not available, IRQ7 is used for the Parallel Port (LPT1).

The Setup screen displays the system option:

Parallel Port **: 378H**

Available options are:

> Disabled
> 3BCH
> 378H
> 278H

Parallel Port Mode

This option allows configuration of the on-board parallel port.

The Setup screen displays the system option:

Parallel Port Mode **: Normal**

Available options are:

Normal
Bi-Dir (Bi-directional)
ECP (Enhanced Capabilities Port)
EPP (Enhanced Parallel Port)

Saving and Exiting

When you have made all desired changes to Peripheral Setup, press **<Esc>** to return to the WinBIOS Setup Main Menu screen.

You may make changes to other Setup, Utility, Security or Default options or press **<Esc>** to exit WinBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

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TECHNICAL REFERENCE

APPENDIX A - BIOS MESSAGES

BIOS BEEP CODES

Errors may occur during the POST (Power-On Self Test) routines which are performed each time the system is powered on.

Non-fatal errors are those which, in most cases, allow the system to continue the bootup process. The error message normally appears on the screen. See *BIOS Error Messages* later in this section for descriptions of these messages.

Fatal errors are those which will not allow the system to continue the bootup procedure.

These fatal errors are usually communicated through a series of audible beeps. Each error message has its own specific beep code, defined by the number of beeps following the error detection. The following table lists the errors which are communicated audibly.

All errors listed, *with the exception of #8*, are fatal errors.

Beep Count	Message	Description
1	Refresh Failure	The memory refresh circuitry of the processor board is faulty.
2	Parity Error	A parity error was detected in the base memory (the first block of 64KB) of the system.
3	Base 64KB Memory Failure	A memory failure occurred within the first 64KB of memory.
4	Timer Not Operational	A memory failure occurred within the first 64KB of memory, or Timer #1 on the processor board has failed to function properly.
5	Processor Error	The CPU (Central Processing Unit) on the processor board has generated an error.
6	8042 - Gate A20 Failure	The keyboard controller (8042) contains the Gate A20 switch which allows the CPU to operate in protected mode. This error message means that the BIOS is not able to switch the CPU into protected mode.
7	Processor Exception Interrupt Error	The CPU on the processor board has generated an exception interrupt.

BIOS BEEP CODES (continued)

Beep Count	Message	Description
8	Display Memory Read/Write Error	The system video adaptor is either missing or its memory is faulty.
		NOTE: This is *not* a fatal error.
9	ROM Checksum Error	The ROM checksum value does not match the value encoded in the BIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for the CMOS memory has failed.
11	Cache Memory Bad; Do Not Enable Cache	The cache memory test failed. Cache memory is disabled. *Do not press <Ctrl><Alt><Shift><+> to enable cache memory.*

BIOS ERROR MESSAGES

If a non-fatal error occurs during the POST routines performed each time the system is powered on, the error message will appear on the screen in the following format:

> ERROR Message Line 1
> ERROR Message Line 2
> Press <F1> to RESUME

Note the error message and press the **<F1>** key to continue with the bootup procedure.

NOTE: If the "Wait for <F1> If Any Error" option in the Advanced Setup portion of the BIOS Setup Program has been set to **Disabled**, the "Press <F1> to RESUME" prompt will not appear on the third line.

For most of the error messages, there is no ERROR Message Line 2. Generally, for those messages containing an ERROR Message Line 2, the text will be "RUN SETUP UTILITY." Pressing the **<F1>** key will invoke the BIOS Setup Program.

BIOS ERROR MESSAGES (continued)

A description of each error message appears below. The errors are listed in alphabetical order, not in the order in which they may occur.

Message	Description
8042 Gate-A20 Error	The gate-A20 portion of the keyboard controller (8042) has failed to operate correctly. Replace the 8042 chip.
Address Line Short!	An error has occurred in the address decoding circuitry of the processor board.
C: Drive Error	The BIOS is not receiving any response from hard disk drive C:. Check Standard Setup using the WinBIOS Setup Program to see if the correct hard disk drive has been selected.
C: Drive Failure	The BIOS cannot get *any* response from hard disk drive C:. It may be necessary to replace the hard disk.
Cache Memory Bad, Do Not Enable Cache!	Cache memory is defective.
CH-2 Timer Error	Most AT standard system boards include two timers. An error with Timer #1 is a fatal error, explained in *BIOS Beep Codes* earlier in this section. If an error occurs with Timer #2, this error message appears.
CMOS Battery State Low	There is a battery in the system which is used for storing the CMOS values. This battery appears to be low in power and needs to be replaced.
CMOS Checksum Failure	After the CMOS values are saved, a checksum value is generated to provide for error checking. If the previous value is different from the value currently read, this error message appears. To correct the error, run the WinBIOS Setup Program.
CMOS Display Type Mismatch	The type of video stored in CMOS does not match the type detected by the WinBIOS. Run the WinBIOS Setup Program to correct the error.
CMOS Memory Size Mismatch	If the BIOS finds the amount of memory on the system board to be different from the amount stored in CMOS, this error message is generated. Run the WinBIOS Setup Program to correct the error.
CMOS System Options Not Set	The values stored in the CMOS are either corrupt or nonexistent. Run the WinBIOS Setup Program to correct the error.

BIOS ERROR MESSAGES (continued)

Message	Description
CMOS Time & Date Not Set	Use Standard Setup in the WinBIOS Setup Program to set the date and time of the CMOS.
D: Drive Error	The BIOS is not receiving any response from hard disk drive D:. Check Standard Setup using the WinBIOS Setup Program to see if the correct hard disk drive has been selected.
D: Drive Failure	The BIOS cannot get *any* response from hard disk drive D:. It may be necessary to replace the hard disk.
Diskette Boot Failure	The disk used to boot up in floppy drive A: is corrupt, which means it cannot be used to boot up the system. Use another boot disk and follow the instructions on the screen.
Display Switch Not Proper	Some systems require that a video switch on the processor be set to either color or monochrome, depending upon the type of video being used. To correct this situation, set the switch properly after the system is powered off.
DMA Error	An error has occurred in the DMA controller on the processor board.
DMA #1 Error	An error has occurred in the first DMA channel on the processor board.
DMA #2 Error	An error has occurred in the second DMA channel on the processor board.
FDD Controller Failure	The BIOS is not able to communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered off.
HDD Controller Failure	The BIOS is not able to communicate with the hard disk drive controller. Check all appropriate connections after the system is powered off.
INTR #1 Error	The interrupt channel #1 has failed the POST routine.
INTR #2 Error	The interrupt channel #2 has failed the POST routine.
Invalid Boot Diskette	The BIOS can read the disk in floppy drive A:, but it *cannot* boot up the system with it. Use another boot disk and follow the instructions on the screen.
KB/Interface Error	The BIOS has found an error with the keyboard connector on the processor board.

BIOS ERROR MESSAGES (continued)

Message	Description
Keyboard Error	The BIOS has encountered a timing problem with the keyboard. The Keyboard option in the Standard Setup portion of the WinBIOS Setup Program may be set to **Not Installed**, which will cause the BIOS to skip the keyboard POST routines.
Keyboard Is Locked... Unlock It	The keyboard lock on the system is engaged. It must be unlocked to continue the bootup procedure.
No ROM BASIC	This error occurs when a proper bootable sector cannot be found on either floppy disk drive A: or hard disk drive C:. The BIOS will try at this point to run ROM Basic, and the error message is generated when the BIOS does not find it.

Off Board Parity Error	The BIOS has encountered a parity error in memory installed on an adapter card in an I/O (Bus) expansion slot. The message appears as follows:
	
	    OFF BOARD PARITY ERROR
	    ADDR (HEX) = (XXXX)
	
	where XXXX is the address (in hexadecimal) at which the error has occurred. "Off Board" means that it is part of the memory installed via an expansion card in an I/O (Bus) slot, as opposed to memory attached directly to the processor board.

On Board Parity Error	The BIOS has encountered a parity error in memory installed on the processor board. The message appears as follows:
	
	    ON BOARD PARITY ERROR
	    ADDR (HEX) = (XXXX)
	
	where XXXX is the address (in hexadecimal) at which the error has occurred. "On Board" means that it is part of the memory attached directly to the processor board, as opposed to memory installed via an expansion card in an I/O (Bus) slot.

Parity Error ????	The BIOS has encountered a parity error with some memory in the system, but it is not able to determine the address of the error.

ISA BIOS NMI HANDLER MESSAGES

The ISA NMI (non-maskable interrupt) messages are described below.

Message	Description
Memory Parity Error	Memory failed. The message appears as follows: MEMORY PARITY ERROR AT XXXXX where XXXXX is the address (in hexadecimal) at which the error has occurred. If the memory location cannot be determined, the message is "Memory Parity Error ????"
I/O Card Parity Error	An expansion card failed. The message appears as follows: I/O PARITY ERROR AT XXXXX where XXXXX is the address (in hexadecimal) at which the error has occurred. If the address cannot be determined, the message is "I/O Card Parity Error ????"
DMA Bus Time-Out	A device has driven the bus signal for more than 7.8 microseconds.

PORT 80 CODES

The following codes are presented on Port 80H as the BIOS performs its reset procedure.

Code	Description
Uncompressed INIT code checkpoints:	
C2	NMI is disabled. Power-on delay starting.
C5	Power-on delay complete. Going to disable cache if any.
C6	Calculating ROM BIOS checksum.
C7	ROM BIOS checksum passed. CMOS shutdown register test to be done next.
C8	CMOS shutdown register test done. CMOS checksum calculation to be done next.
CA	CMOS checksum calculation is done, CMOS diagnostic byte written. CMOS status register about to init for date and time.
CB	CMOS status register init done. Any initialization before keyboard BAT to be done next.
CD	BAT command to keyboard controller is to be issued.
CE	Keyboard controller BAT result verified. Any initialization after keyboard controller BAT to be done next.
CF	Initialization after keyboard controller BAT done. Keyboard command byte to be written next.
D1	Keyboard controller command byte is written. Going to check pressing of <Ins> key during power-on.
D2	Checking for pressing of <Ins> key during power-on done. Going to disable DMA and interrupt controllers.
D3	DMA controllers #1 and #2 and interrupt controllers #1 and #2 disabled. Chipset init/auto memory detection about to begin.
D4	Chipset initialization/auto memory detection over. To uncompress the RUNTIME code next.
D5	RUNTIME code is uncompressed.
DD	Transfer control to uncompressed code in shadow RAM at F000:FFF0.

PORT 80 CODES (continued)

Code	Description
	Runtime code is uncompressed in F000 shadow RAM.
03	NMI is disabled. To check soft reset/power-on next.
05	Soft reset and power-on determined. Going to disable cache if any.
06	POST code to be uncompressed.
07	POST code is uncompressed. CPU init and CPU data area init to be done next.
08	CPU and CPU data area init done. CMOS checksum calculation to be done next.
09	CMOS checksum calculation is done, CMOS diagnostic byte written. CMOS init to begin (if the "Init CMOS at every boot" option is set.
0A	CMOS initialization done (if any). CMOS status register about to init for date and time.
0B	CMOS status register init done. Any initialization before keyboard BAT to be done next.
0C	Keyboard controller I/B free. Going to issue the BAT command to keyboard controller.
0D	BAT command to keyboard controller is issued. Going to verify the BAT command.
0E	Keyboard controller BAT result verified. Any initialization after keyboard controller BAT to be done next.
0F	Initialization after keyboard controller BAT done. Keyboard command byte to be written next.
10	Keyboard controller command byte is written. Going to issue Pin 23,24 blocking/unblocking command.
11	Pins 23, 24 of keyboard controller is blocked/unblocked. Going to check pressing of <Ins> key during power-on.
12	Checking for pressing of <Ins> key during power-on done. Going to disable DMA and interrupt controllers.
13	DMA controllers #1 and #2 and interrupt controllers #1 and #2 disabled. Video display is disabled and port B is initialized. Chipset init about to begin.
15	Chipset initialization over. 8254 timer test about to start.

PORT 80 CODES (continued)

Code	Description
19	8254 timer test over. About to start memory refresh test.
1A	Memory refresh line is toggling. Going to check 15 microsecond ON/OFF time.
20	Memory refresh period 30 microsecond test complete. Base 64KB memory to be initialized.
23	Base 64KB memory initialized. Going to set BIOS stack and do any setup before interrupt vector init.
24	Setup required before vector initialization complete. Interrupt vector initialization about to begin.
25	Interrupt vector initialization done. Going to read input port of the 8042 for turbo switch (if any) and clear password if POST diagnostic switch is on.
26	Input port of 8042 is read. Going to initialize global data for turbo switch.
27	Global data initialization for turbo switch is over. Any initialization before setting video mode to be done next.
28	Initialization before setting video mode is complete. Going for monochrome mode and color mode setting.
2A	Different Buses init (system, static, output devices) to start if present. (See end of Port 80H Codes for details of different Buses.)
2B	About to give control for any setup required before optional video ROM check.
2C	Processing before video ROM control is done. About to look for optional video ROM and give control.
2D	Optional video ROM control is done. About to give control to do any processing after video ROM returns control.
2E	Return from processing after the video ROM control. If EGA or VGA not found, then do display memory read/write test.
2F	EGA/VGA not found. Display memory read/write test about to begin.
30	Display memory read/write test passed. About to look for the retrace checking.
31	Display memory read/write test or retrace checking failed. About to do alternate display memory read/write test.

PORT 80 CODES (continued)

Code	Description
32	Alternate display memory read/write test passed. About to look for the alternate display retrace checking.
34	Video display checking over. Display mode to be set next.
37	Display mode set. Going to display the power-on message.
38	Different Buses init (input, IPL, general devices) to start if present. (See end of Port 80H Codes for details of different Buses.)
39	Display different Buses initialization error messages. (See end of Port 80H Codes for details of different Buses.)
3A	New cursor position read and saved. Going to display "Hit <DEL>" message.
3B	"Hit <DEL>" message displayed. The virtual mode memory test about to start.
40	Going to prepare the descriptor tables.
42	Descriptor tables prepared. Going to enter in virtual mode for memory test.
43	Entered virtual mode. Going to enable interrupts for diagnostics mode.
44	Interrupts enabled (if diagnostics switch is on). Going to initialize data to check memory wraparound at 0:0.
45	Data initialized. Going to check for memory wraparound at 0:0 and find the total system memory size.
46	Memory wraparound test done. Memory size calculation over. About to go for writing patterns to test memory.
47	Pattern to be tested written in extended memory. Going to write patterns in base 640KB memory.
48	Patterns written in base memory. Going to find out amount of memory below 1MB memory.
49	Amount of memory below 1MB found and verified. Going to find out amount of memory above 1MB memory.
4B	Amount of memory above 1MB found and verified. Check for soft reset and going to clear memory below 1MB for soft reset. (If power-on, go to checkpoint 4EH.)
4C	Memory below 1MB cleared. (SOFT RESET) Going to clear memory above 1MB.

PORT 80 CODES (continued)

Code	Description
4D	Memory above 1MB cleared. (SOFT RESET) Going to save the memory size. (Go to checkpoint 52H.)
4E	Memory test started. (NOT SOFT RESET) About to display the first 64KB memory size.
4F	Memory size display started. This will be updated during memory test. Going for sequential and random memory tests.
50	Memory testing/initialization below 1MB complete. Going to adjust the displayed memory size for relocation/shadow.
51	Memory size display adjusted due to relocation/shadow. Memory test above 1MB to follow.
52	Memory testing/initialization above 1MB complete. Going to save memory size information.
53	Memory size information is saved. CPU registers are saved. Going to enter in real mode.
54	Shutdown was successful, CPU in real mode. Going to disable Gate A20 line and disable parity/NMI.
57	A20 address line, parity/NMI disable successful. Going to adjust memory size depending on relocation/shadow.
58	Memory size adjusted for relocation/shadow. Going to clear "Hit <DEL>" message.
59	"Hit <DEL>" message cleared. "Wait..." message displayed. About to start DMA and interrupt controller tests.
60	DMA page register test passed. To do DMA#1 base register test next.
62	DMA#1 base register test passed. To do DMA#2 base register test next.
65	DMA#2 base register test passed. To program DMA units 1 and 2 next.
66	DMA units 1 and 2 programming over. To initialize the 8259 interrupt controller next.
67	8259 initialization over.
7F	Extended NMI sources enabling is in progress.
80	Keyboard test started. Clearing output buffer, checking for stuck key. About to issue keyboard reset command.

PORT 80 CODES (continued)

Code	Description
81	Keyboard reset error/stuck key found. About to issue keyboard controller interface test command.
82	Keyboard controller interface test over. About to write command byte and init circular buffer.
83	Command byte written, global data init done. About to check for lock-key.
84	Lock-key checking over. About to check for memory size mismatch with CMOS.
85	Memory size check done. About to display soft error and check for password or bypass Setup.
86	Password checked. About to do programming before Setup.
87	Programming before Setup complete. Going to uncompress Setup code and execute CMOS Setup.
88	Returned from CMOS Setup program and screen is cleared. About to do programming after Setup.
89	Programming after Setup complete. Going to display power-on screen message.
8B	First screen message displayed. "Wait..." message displayed. About to do video BIOS shadow.
8C	Video BIOS shadow successful. Setup options programming after CMOS Setup about to start.
8D	Setup options are programmed, mouse check and init to be done next.
8E	Mouse check and initialization complete. Going for hard disk controller reset.
8F	Hard disk controller reset done. Floppy setup to be done next.
91	Floppy setup complete. Hard disk setup to be done next.
94	Hard disk setup complete. To set base and extended memory sizes.
95	Memory size adjusted due to mouse support. Init of different Buses optional ROM's from C800 to start. (See end of Port 80H Codes for details of different Buses.)
96	Going to do any init before C800 optional ROM control.
97	Any init before C800 optional ROM control is over. Optional ROM check and control to be done next.

PORT 80 CODES (continued)

Code	Description
98	Optional ROM control is done. About to give control to do any required processing after optional ROM returns control.
99	Any initialization required after optional ROM test over. Going to set up timer data area and printer base address.
9A	Return after setting timer and printer base address. Going to set the RS-232 base address.
9B	Returned after RS-232 base address. Going to do any initialization before coprocessor test.
9C	Required initialization before coprocessor test is over. Going to initialize the coprocessor next.
9D	Coprocessor initialized. Going to do any initialization after coprocessor test.
9E	Initialization after coprocessor test is complete. Going to check extended keyboard, keyboard ID and Num Lock.
9F	Extended keyboard check is done, ID flag is set, Num Lock key on or off as specified in Setup. Keyboard ID command to be issued.
A0	Keyboard ID command issued. Keyboard ID flag to be reset.
A1	Keyboard ID flag reset. Cache memory test to follow.
A2	Cache memory test over. Going to display any soft errors.
A3	Soft error display complete. Going to set keyboard typematic rate.
A4	Keyboard typematic rate set. To program memory wait states next.
A5	Memory wait states programming over. Going to clear the screen and enable parity/NMI.
A7	NMI and parity enabled. Going to do any initialization required before giving control to optional ROM at E000.
A8	Initialization before E000 ROM control over. E000 ROM to get control next.
A9	Returned from E000 ROM control. Going to do any initialization required after E000 optional ROM control.
AA	Initialization after E000 optional ROM control is over. Going to display the system configuration.

PORT 80 CODES (continued)

Code	Description
B0	System configuration is displayed.
B1	Going to copy any code to a specific area.
00	Copying of code to a specific area done. Going to give control to INT 19H boot loader.

The System BIOS gives control to the different Buses at the following checkpoints to do various tasks on the different Buses.

Code	Description
2A	Different Buses init (system, static, output devices)
38	Different Buses init (input, IPL, general devices)
39	Display different Buses initialization error messages
95	Init of different Buses optional ROM's from C800

While control is inside the different Bus routines, additional checkpoints are output to Port 80H as WORD to identify the routines under execution. These are WORD checkpoints. The LOW BYTE of checkpoint is the system BIOS checkpoint from where the control is passed to the different Bus routines, and the HIGH BYTE of checkpoint is the indication of which routine is being executed in different Buses. The details of the HIGH BYTE of these checkpoints are as follows:

HIGH BYTE XY
   The upper nibble 'X' indicates the function # is being executed.
   'X' can be from 0 to 7.

        0 = func#0, disable all devices on the Bus concerned
        1 = func#1, static devices init on the Bus concerned
        2 = func#2, output device init on the Bus concerned
        3 = func#3, input device init on the Bus concerned
        4 = func#4, IPL device init on the Bus concerned
        5 = func#5, general device init on the Bus concerned
        6 = func#6, error reporting for the Bus concerned
        7 = func#7, add-on ROM init for all Buses

PORT 80 CODES (continued)

The lower nibble 'Y' indicates the Bus on which the different routines are being executed. 'Y' can be from 0 to 5.

    0 = Generic DIM (device initialization manager)
    1 = On-board system devices
    2 = ISA devices
    3 = EISA devices
    4 = ISA PnP devices
    5 = PCI devices

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APPENDIX B

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Type of Equipment: PCI Motherboard

Model Name(s):   SB586TCP/90, SB586TCP/100, SB586TCP/120
                       SB586TCP/133, SB586TCP/150, SB586TCP/166

Tested by: Rockford Engineering Services, Inc.
                       9959 Calaveras Road
                       Sunol, California 94586
                       USA

                       Telephone: (510) 862-2944
                             FAX: (510) 862-9013

Director: Mr. Bandele Adepoju

I, the undersigned, hereby declare that the specified equipment conforms to the Directive(s) and Standard(s) listed above.

_____   _____
Mr. Steven R. Peltier   (DATE)
President & Chief Executive Officer   San Diego, CA

Year of CE Labelling: 1996

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