INDUSTRIAL COMPUTER SOURCE®

Product Manual
SB686P(V) Series

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SB686PV5200

SB686P5200

SB686PV200

SB686P200

INDUSTRIAL COMPUTER SOURCE®

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FOREWARD

This product manual provides information to install, operate and or program the referenced product(s) manufactured or distributed by Industrial Computer Source. The following pages contain information regarding the warranty and repair policies.

Technical assistance is available at: **1-800-480-0044**.

Manual Errors, Omissions and Bugs: A "Bug Sheet" is included as the last page of this manual. Please use the "Bug Sheet" if you experience any problems with the manual that requires correction.

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Guarantee

A thirty day money-back guarantee is provided on all **standard** products sold. **Special order products** are covered by our Limited Warranty, *however they may not be returned for refund or credit. EPROMs, RAM, Flash EPROMs or other forms of solid electronic media are not returnable for credit - but for replacement only. Extended Warranty available. Consult factory.*

Refunds

In order to receive refund on a product purchase price, the product must not have been damaged by the customer or by the common carrier chosen by the customer to return the goods, and the product must be returned complete (meaning all manuals, software, cables, etc.) within 30 days of receipt and in as-new and resalable condition. The **Return Procedure** must be followed to assure prompt refund.

Restocking Charges

Product returned *after* 30 days, and *before* 90 days, of the purchase will be subject to a **minimum** 20% restocking charge and any charges for damaged or missing parts.

Products not returned within 90 days of purchase, or products which are not in as-new and re-saleable condition, are not eligible for credit return and will be returned to the customer.

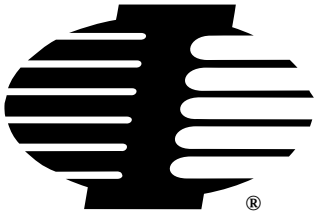
Limited Warranty

One-year limited warranty on all products sold with the exception of the "Performance Series" I/O products, which are warranted to the original purchaser for as long as they own the product, subject to all other conditions below, including those regarding neglect, misuse and acts of God. Within one year of purchase, Industrial Computer Source will repair or replace, at our option, any defective product. At any time after one year, we will repair or replace, at our option, any defective "Performance Series" I/O product sold. This does not include products damaged in shipment, or damaged through customer neglect or misuse. Industrial Computer Source will service the warranty for all standard catalog products for the first year from the date of shipment. After the first year, for products not manufactured by Industrial Computer Source, the remainder of the manufacturer's warranty, if any, will be serviced by the manufacturer directly.

The **Return Procedure** must be followed to assure repair or replacement. Industrial Computer Source will normally return your replacement or repaired item via UPS Blue. *Overnight delivery or delivery via other carriers is available at additional charge.*

The limited warranty is void if the product has been subjected to alteration, neglect, misuse, or abuse; if any repairs have been attempted by anyone other than Industrial Computer Source or its authorized agent; or if the failure is caused by accident, acts of God, or other causes beyond the control of Industrial Computer Source or the manufacturer. Neglect, misuse, and abuse shall include any installation, operation, or maintenance of the product other than in accordance with the owners' manual.

No agent, dealer, distributor, service company, or other party is authorized to change, modify, or extend the terms of this Limited Warranty in any manner whatsoever. Industrial Computer Source reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.



Shipments not in compliance with this Guarantee and Limited Warranty Return Policy will not be accepted by Industrial Computer Source.

Return Procedure

For any Limited Warranty or Guarantee return, please contact Industrial Computer Source's Customer Service at **1-800-480-0044** and obtain a Return Material Authorization (RMA) Number. All product(s) returned to Industrial Computer Source for service or credit **must** be accompanied by a Return Material Authorization (RMA) Number. Freight on all returned items **must** be prepaid by the customer who is responsible for any loss or damage caused by common carrier in transit. Returns for Warranty **must** include a Failure Report for each unit, by serial number(s), as well as a copy of the original invoice showing date of purchase.

> To reduce risk of damage, returns of product must be in an Industrial Computer Source shipping container. If the original container has been lost or damaged, new shipping containers may be obtained from Industrial Computer Source Customer Service at a nominal cost.

Limitation of Liability

In no event shall Industrial Computer Source be liable for any defect in hardware or software or loss or inadequacy of data of any kind, or for any direct, indirect, incidental, or consequential damages in connection with or arising out of the performance or use of any product furnished hereunder. Industrial Computer Source liability shall in no event exceed the purchase price of the product purchased hereunder. The foregoing limitation of liability shall be equally applicable to any service provided by Industrial Computer Source or its authorized agent.

Some *Sales Items* and *Customized Systems* are **not** subject to the guarantee and limited warranty. However, in these instances any deviations will be disclosed prior to sales and noted in the original invoice. ***Industrial Computer Source reserves the right to refuse returns or credits on software or special order items.***

Advisories

Three types of advisories are used throughout the manual to stress important points or warn of potential hazards to the user or the system. They are the Note, the Caution, and the Warning. Following is an example of each type of advisory:

Note: The note is used to present special instruction, or to provide extra information which may help to simplify the use of the product.

CAUTION!

A Caution is used to alert you to a situation which if ignored may cause injury or damage equipment.

WARNING!

A Warning is used to alert you of a situation which if ignored will cause serious injury.

Cautions and Warnings are accented with triangular symbols. The exclamation symbol is used in all cautions and warnings to help alert you to the important instructions. The lightning flash symbol is used on the left hand side of a caution or a warning if the advisory relates to the presence of voltage which may be of sufficient magnitude to cause electrical shock.

Use caution when servicing any electrical component. We have tried to identify the areas which may pose a Caution or Warning condition in this manual; however, Industrial Computer Source does not claim to have covered all situations which might require the use of a Caution or Warning.

You must refer to the documentation for any component you install into a computer system to insure proper precautions and procedures are followed.

Handling Precautions

This product has components which may be damaged by electrostatic discharge. To protect your processor board from electrostatic damage, be sure to observe the following precautions when handling or storing the board:

- Keep the processor board in its static-shielded bag until you are ready to perform your installation.
- Handle the processor board by its edges.
- Do not touch the I/O connector pins.
- Do not apply pressure or attach labels to the processor board.
- Use a grounded wrist strap at your workstation or ground yourself frequently by touching the metal chassis of the system before handling any components. The system must be plugged into an outlet that is connected to an earth ground. Use antistatic padding on all work surfaces.
- Avoid static-inducing carpeted areas.

Solder-Side Components

This processor board has components on both sides of the PCB. It is important for you to observe the following precautions when handling or storing the board to prevent solder-side components from being damaged or broken off:

- Handle the board only by its edges.
- Store the board in padded shipping material or in an anti-static board rack.
- Do not place an unprotected board on a flat surface.

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CE Declaration of Conformity

Current Revision 2B

September 1997

Chapter 1: Introduction

The SB686P full-featured ISA/PCI processors are single board computers which feature Pentium (Pro CPU, Intel 440FX (Natoma) chipset, optional Cirrus Logic video interface, DRAM, PCI Local Bus, cache, floppy controller, dual EIDE interface, PCI Ultra SCSI controller, two serial ports, parallel port, mouse port, speaker port and keyboard port on a single ISA card.

Models

Model Name	CPU Speed
SB686PV5200	Pentium Pro CPU at 200MHz with 512K cache and video interface
SB686P5200	Pentium Pro CPU at 200MHz with 512K cache
SB686PV200	Pentium Pro CPU at 200MHz with 256K cache and video interface
SB686P200	Pentium Pro CPU at 200MHz with 256K cache

Features

- Pentium Pro microprocessor at 200MHz
- Intel Pentium Pro 440FX (Natoma) chipset with PCI bandwidth greater than 100MB/second
- Optional Super VGA on-board video interface with support up to 1280 x 1024 and full-motion video modes
- DRAM error checking and correction (ECC) support
- 256K or 512K secondary write-back cache memory
- PCI Local Bus supports off-board PCI option cards, on-board PCI Ultra SCSI controller - Adaptec 7880 and optional Cirrus GD5446 SVGA controller
- Compatible with PCI Industrial Computer Manufacturers Group (PICMG) 2.0 Specification
- Supports up to 256MB of DRAM on-board — EDO or fast page mode
- Floppy drive and dual PCI EIDE drive interface
- Two serial ports and one parallel port
- Automatic or manual peripheral configuration
- Watchdog timer
- Supports 1Mx36, 2Mx36, 4Mx36, 8Mx36 and 16Mx36 SIMMs
- Shadow RAM for System BIOS and peripherals increases system speed and performance
- Full PC compatibility

How to remain CE Compliant

In order for computer systems to remain CE compliant, only CE compliant parts may be used. To keep a chassis compliant it must contain only compliant cards, and for cards to remain compliant they must be used in compliant chassis. Any modifications made to the equipment may affect the CE compliance standards and should not be done unless approved in writing by Industrial Computer Source.

The SB686P (V) is designed to be CE Compliant when used in an CE compliant chassis. Maintaining CE Compliance also requires proper cabling techniques. The user is advised to follow proper cabling techniques from external devices to the interface to ensure a complete CE Compliant system. Industrial Computer Source does not offer engineering services for designing cabling systems. Although Industrial Computer Source offers accessories, it is the user's responsibility to ensure they are installed with proper shielding to maintain CE Compliance.

FCC Compliance Statement for FCC Class B Devices

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

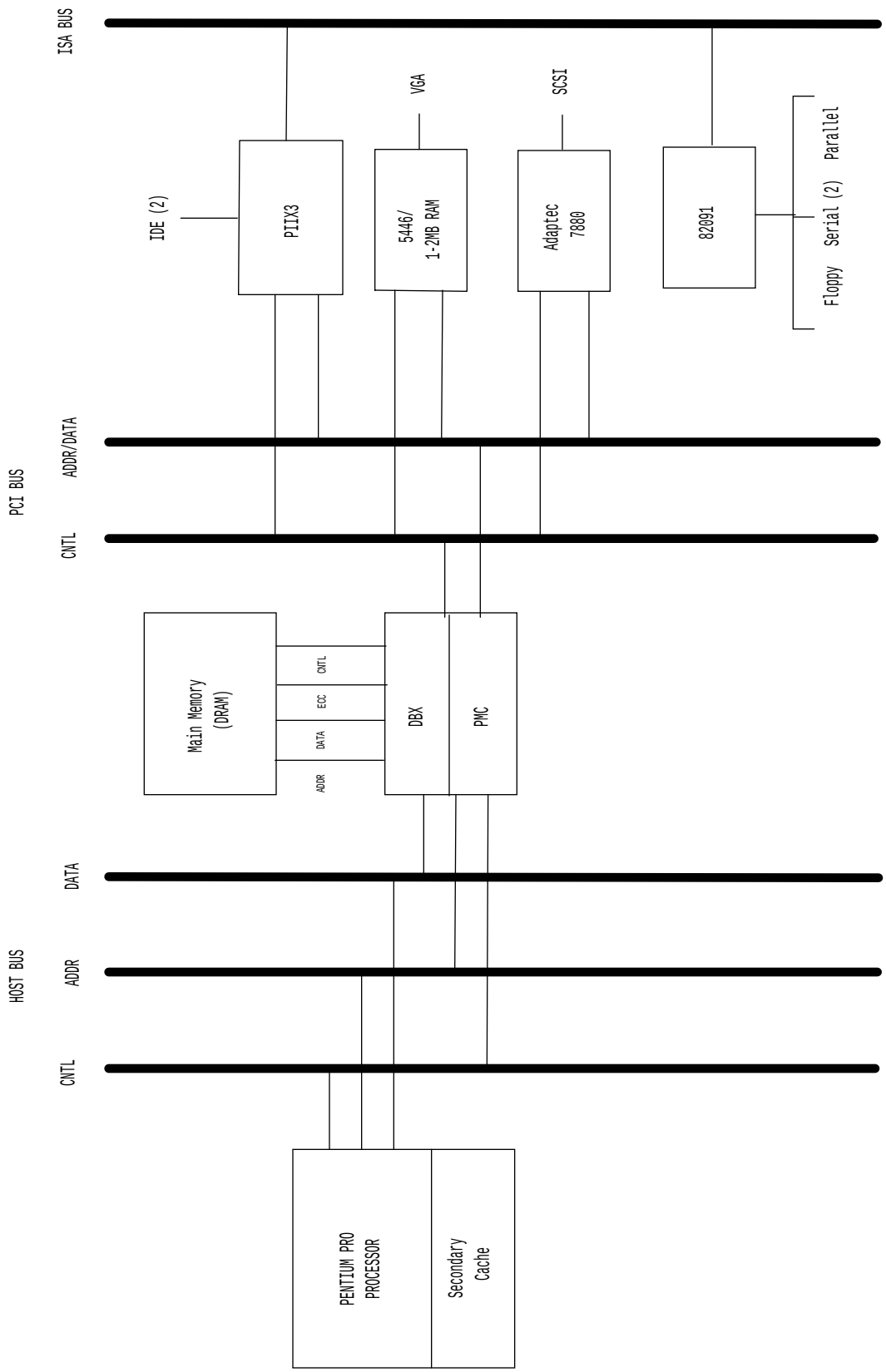
(2) this device must accept any interference received, including interference that may cause undesired operation.

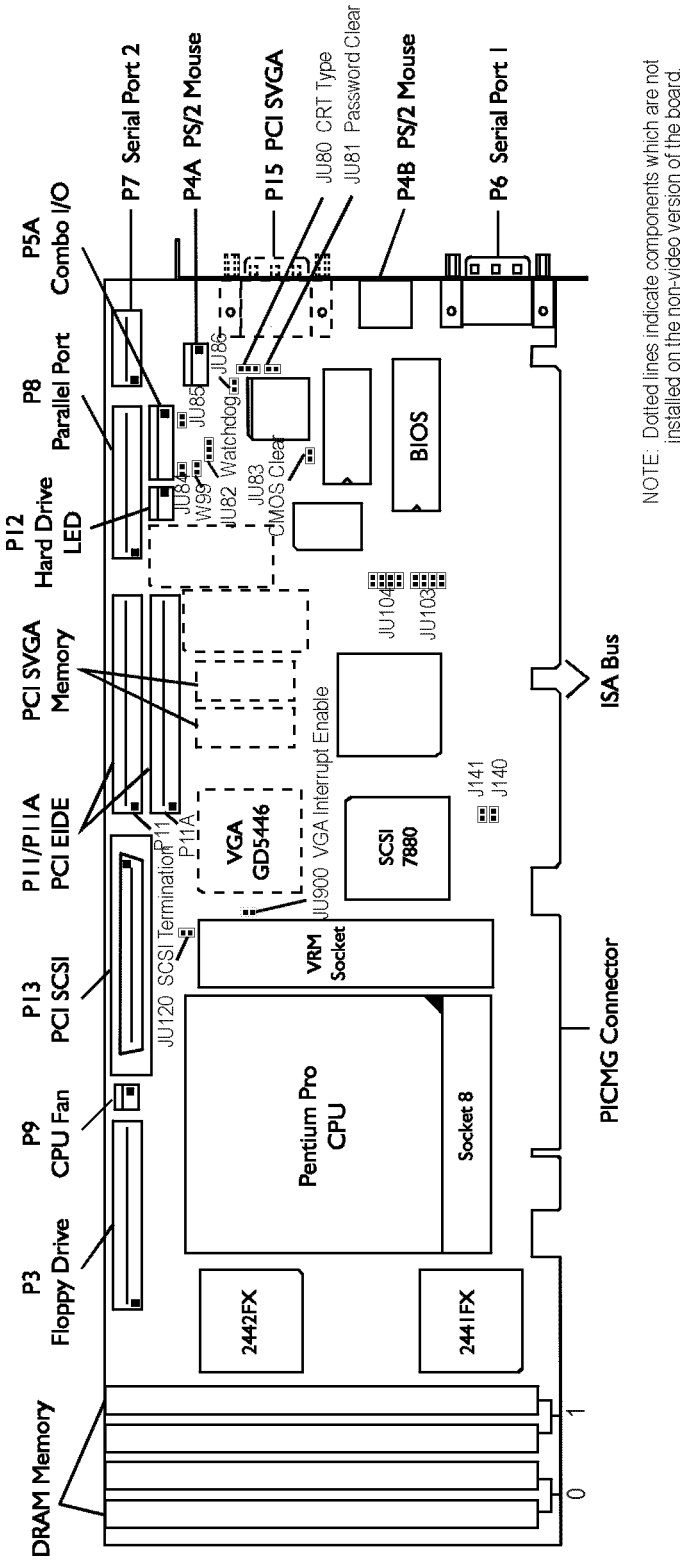
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to a radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

Note: The assembler of a personal computer system may be required to test the system and/or make necessary modifications if a system is found to cause harmful interference or to be non-compliant with the appropriate standards for its intended use.


ISA BUS
VGA
SCSI
IDE (2)
PIIX3
5446/
1-2MB RAM
Adaptec
7880
82091
Floppy
Serial (2)
Parallel
PCI BUS
ADDR/DATA
CNTL
Main Memory
(DRAM)
CNTL
ECC
DATA
ADDR
DBX
PMC
HOST BUS
DATA
ADDR
CNTL
PENTIUM PRO
PROCESSOR
Secondary
Cache


P5A Combo I/O
P7 Serial Port 2
P4A PS/2 Mouse
P15 PCI SVGA
JU80 CRT Type
JU81 Password Clear
P4B PS/2 Mouse
P6 Serial Port 1
P8 Parallel Port
P12 Hard Drive LED
JU86
JU85
JU84
W99
JU82 Watchdog
JU83 CMOS Clear
BIOS
JU104
JU103
PCI SVGA Memory
P11/P11A PCI EIDE
VGA GD5446
JU900 VGA Interrupt Enable
SCSI 7880
J141
J140
P13 PCI SCSI
JU120 SCSI Termination
P11A
VRM Socket
P9 CPU Fan
Pentium Pro CPU
Socket 8
P3 Floppy Drive
2442FX
2441FX
DRAM Memory
0
1
ISA Bus
PICMG Connector
NOTE: Dotted lines indicate components which are not installed on the non-video version of the board.

CPU

Intel Pentium Pro at 200MHz using Socket 8

Bus Interfaces

ISA and PCI Local Bus compatible. External 24 mAmp drivers for supporting up to 20-slot backplanes.

Data Path

DRAM/Memory - 64-bit

ISA Bus - 16-bit

PCI Bus - 32-bit

Video - 64-bit

Bus Speed - ISA

8.25MHz

Bus Speed - PCI

33MHz

DMA Channels

The board is fully PC compatible with seven DMA channels, each supporting type F transfers.

Interrupts

The processor board is fully PC compatible with interrupt steering for PCI plug and play compatibility.

BIOS (FLASH)

The BIOS is an American Megatrends Hi-Flex AMIBIOS with built-in advanced CMOS setup for system parameters, peripheral management for configuring on-board peripherals, PCI-to-PCI bridge support and PCI interrupt steering. The BIOS chip is a boot block Flash device - 28F001BX-T120. The BIOS may be upgraded from floppy disk by pressing <Ctrl> + <Home> immediately after reset or power-up with the floppy disk in drive A:.

Cache Memory

The dedicated internal 64-bit wide non-blocking second level (L2) cache supports 256K or 512K running at full CPU core speed.

DRAM Memory

The DRAM interface is a 64-bit path that supports up to 256MB of either Fast Page Mode (FPM) or Extended Data Out (EDO/Hyper Page Mode) memory. All 256MB is cacheable. The processor board supports 60ns (optimal) or 70ns industry standard 36-bit wide SIMM DRAM in four 72-pin SIMM sockets. The DRAM speed is selectable via Advanced Chipset Setup which is described in the Advanced Setup section of this manual.

The SIMM sockets are arranged in two banks. Bank 0 consists of sockets 1 and 2 (U52 & U53); bank 1 consists of sockets 3 and 4 (U62 & U63).

Note: Two SIMMs of the same memory capacity must be used to fill a memory bank. All SIMMs must have contacts.

The following SIMMs are supported:

1M x 36, 2M x 36, 4M x 36, 8M x 36, 16M x 36

Memory Hole

The processor board supports a 1MB memory hole option at 512KB-640KB or 15MB-16MB.

Error Checking and Correction/Parity

The memory interface includes parity checking and supports ECC mode (via BIOS setting) for single-error correction, double-error detection and detection of all errors confined to a single nibble.

Note: ECC is implemented using the eight parity bits available on the two SIMM modules in a bank. FPM or EDO parity SIMMs must be used for ECC to operate properly.

PCI Local Bus Interface

The processor board is fully compliant with the PCI Local Bus 2.1 Specification. It has optimized the PCI interface to allow the CPU to sustain the highest possible bandwidth (greater than 100MB/sec sustained) and low latency of the PCI Bus. It supports four PCI masters, pipelined snoop ahead feature and improved PCI to DRAM write-back policy. The PCI Local Bus interfaces to the on-board PCI Ultra SCSI controller, the optional Cirrus SVGA controller and to standard PCI option cards in the backplane. The PCI Local Bus interface to the backplane is compliant with the PCI Industrial Computer Manufacturers Group (PICMG) 2.0 Specification.

PCI Super VGA Interface (Optional)

The Cirrus Logic GD5446 video interface is a PCI Local Bus device which supports pixel resolutions up to 1280 x 1024 non-interlaced and 16.8 million colors at resolutions up to 1024 x 768. The processor board provides up to 2MB of on-board EDO display memory with a 64-bit wide data path and 80MHz memory clock. It displays in full-screen, full-motion up to 30 frames per second, true color at 1024 x 768. Independent graphics and video streams can be displayed on-screen with true-color video and 256-color graphics. Software drivers for enhanced performance and resolution are available for the most popular operating systems.

PCI Ultra SCSI Interface

The SCSI interface is a PCI Bus Master device which supports Ultra SCSI 16-bit data transfer up to 40MB per second and bursts data to the host at full PCI speeds. Active termination is provided with terminator voltage protected by self-resetting fuses. The SCSI controller is an Adaptec 7880.

PCI Enhanced IDE Interface (DUAL)

A high performance PCI Bus Master EIDE interface is capable of supporting up to four IDE Type 4 disk drives in a master/slave configuration. With LBA settings in the BIOS parameters, disk drives greater than 528MB are supported. The interface supports transfer rates to 16.7MB per second.

Floppy Drive Interface

The processor board supports two floppy disk drives. Drives can be 360K to 2.88MB, in any combination.

Serial Interface

Two high-speed FIFO (16C550) serial ports with independently programmable baud rates are supported. Each port has BIOS selectable addressing. A filtered connector is provided to minimize FCC interference.

Enhanced Parallel Interface

The processor board provides a PC/AT compatible bidirectional parallel port and supports enhanced parallel port (EPP) mode and extended capabilities port (ECP) mode. The ECP mode is IEEE 1284 compliant. The parallel port has BIOS selectable addressing.

PS/2 Mouse Interface

The processor board provides compatibility with a PS/2-type mouse. The mouse connection can be made by using either the PS/2 mouse header or the bracket mounted PS/2 mouse mini DIN connector.

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 a system in which an application becomes hung on an external event. When the application is hung, it no longer refreshes 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.

The second level is done in two phases. First, access to the watchdog timer gate, ADRx, via a user-defined I/O port must be enabled and configured in registers 3, 8 and 9 of the FDC37C665GT configuration registers. Bits 7 and 2 of register 3 set ADRx mode, while registers 8 and 9 define the I/O port address used to write a 0 or 1 to the ADRx bit. The ADRx bit is physically wired to the gate that is enabled by the jumper.

Second, the ADRx mode bit must be set to 0, which blocks the clock to the watchdog timer circuit, thus scheduling a hardware reset in about 1.5 seconds.

Refreshing the watchdog timer consists of the software in the application first toggling the ADRx bit to 1, thus clearing the watchdog timer delay, and then setting it to 0, which schedules a system reset in 1.5 seconds.

A set of watchdog timer software code and sample programs are available from Technical Support.

Power Fail Detection

A hardware reset is issued when on-board voltage drops below 4.75 volts.

Keyboard Interface

The processor board is compatible with an AT type keyboard. The keyboard connection can be made by using the P5A Combo I/O connector. Keyboard voltage is protected by a self-resetting fuse.

Battery

A built-in lithium battery is provided, for ten years of data retention for CMOS memory.

Power Requirements

+3.3V @ 700 mAmps typical
+5V @ 6.2 Amps typical
+12V @ < 100 mAmps typical
-12V @ < 100 mAmps typical

Temperature/Environment

Operating Temperature:	0º C. to 60º C.
Storage Temperature:	- 40º C. to 70º C.
Humidity Maximum:	90% non-condensing

Mean Time Between Failures (MTBF)

> 75,000 POH (Power-On Hours)

System Performance (Norton SI 32)

200MHz/512K cache - 2.35
200MHz/256K cache - 2.35

Agency Approvals

FCC Conformity with:
47CFR Part 15, Subpart B
CE Conformity with:
EU EMC Directive 89/336/EEC
EU Low Voltage Directive 72/23/EEC

Chapter 2: Configuration & Setup

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 I/O connector (P5A). * Remove to disconnect.
JU85	P5A Reset Connect Install to connect reset data signal to pin 1 of the Combo I/O connector (P5A). * Remove to disconnect.
JU86	Interrupt 12 (IRQ12) Select Install to dedicate IRQ12 to the PS/2 mouse. * Remove to make IRQ12 available for system use.

Jumper	Description	
JU103	Parallel Port DACK	
		Pins
	DACK #7	1-2
	DACK #6	3-4
	DACK #5	5-6
	DACK #3	7-8
JU104	Parallel Port DREQ	
		Pins
	DREQ #7	1-2
	DREQ #6	3-4
	DREQ #5	5-6
	DREQ #3	7-8
JU120	SCSI Termination	
	Install to disable on-board active termination for the SCSI interface.	
	Remove to enable active termination. *	
JU900	VGA Interrupt Enable (Optional)	
	Install to enable the VGA interrupt.	
	Remove to disable the interrupt. *	

CPU Speed Jumpers

There are three jumpers (J140, J141 and W99) which must be set correctly to allow the processor board to take full advantage of the speed of the Pentium CPU. These jumpers must be set as specified below.

CPU	Synthesizer	Jumpers		Bus Clock
Speed	Frequency	J140	J141	W99
200MHz	66MHz	Out	In	In

Connectors

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

P3 - Floppy Drive Connector

34 pin dual row header, Robinson Nugent #IDH-34LP-S3-TR

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	2	N-RPM
3	Gnd	4	NC
5	Gnd	6	D-Rate0
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

P4A - PS/2 Mouse Header

5 pin single row header, Amp #640456-5

PIN	SIGNAL
1	Ms Data
2	Reserved
3	Kbd Gnd
4	Kbd Power (+5V fused) with self-resetting fuse
5	Ms Clock

P4B - PS/2 Mouse Connector

6 pin mini DIN, Leoco #MDSL06SC00

PIN	SIGNAL
1	Ms Data
2	Reserved
3	Gnd
4	Kbd Power (+5V fused) with self-resetting fuse
5	Ms Clock
6	Reserved

P5A - Combo I/O 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) with self-resetting fuse
8	Speaker Data

P6 - Serial Port 1 Connector

9 pin D, Foxconn International #UDBA11S2LA

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, Robinson Nugent #IDH-10LP-S3-TR

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

26 pin dual row header, Robinson Nugent #IDH-26LP-S3-TR

PIN	SIGNAL	PIN	SIGNAL
1	Strobe	2	Auto Feed XT
3	Data Bit 0	4	Error
5	Data Bit 1	6	Init
7	Data Bit 2	8	Slct In
9	Data Bit 3	10	Gnd
11	Data Bit 4	12	Gnd
13	Data Bit 5	14	Gnd
15	Data Bit 6	16	Gnd
17	Data Bit 7	18	Gnd
19	ACK	20	Gnd
21	Busy	22	Gnd
23	Paper End	24	Gnd
25	Slct	26	NC

P9 - CPU Fan

3 pin header, Molex #22-23-2031

PIN	SIGNAL
1	Gnd
2	+12V
3	NC

P11 - Primary IDE Hard Drive Connector

40 pin dual row header, Robinson Nugent #IDH-40LP-S3-TR

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	DRQ 0	22	Gnd
23	IOW	24	Gnd

P11 - Primary IDE Hard Drive Connector (cont.)

40 pin dual row header, Robinson Nugent #IDH-40LP-S3-TR

PIN	SIGNAL	PIN	SIGNAL
25	IOR	26	Gnd
27	IORDY	28	+5V
29	DACK 0	30	Gnd
31	IRQ 14	32	IOCS16
33	Add 1	34	NC
35	Add 0	36	Add 2
37	CS 1P	38	CS 3P
39	IDEACTP	40	Gnd

P11A - Secondary IDE Hard Drive Connector

40 pin dual row header, Robinson Nugent #IDH-40LP-S3-TR

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	DRQ 1	22	Gnd
23	IOW	24	Gnd
25	IOR	26	Gnd
27	IORDY	28	+5V
29	DACK 1	30	Gnd
31	MIRQ 0	32	IOCS16
33	Add 1	34	NC
35	Add 0	36	Add 2
37	CS 1S	38	CS 3S
39	IDEACTS	40	Gnd

P12 - Hard Drive LED Connector

4 pin single row header, Amp #640456-4

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

P13 - PCI Ultra SCSI Controller Connector

50/68 high density SCSI connector, Amp #749069-7

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	35	SCZDB12
2	Gnd	36	SCZDB13
3	Gnd	37	SCZDB14
4	Gnd	38	SCZDB15
5	Gnd	39	SCZDBPH
6	Gnd	40	SCZDB0
7	Gnd	41	SCZDB1
8	Gnd	42	SCZDB2
9	Gnd	43	SCZDB3
10	Gnd	44	SCZDB4
11	Gnd	45	SCZDB5
12	Gnd	46	SCZDB6
13	Gnd	47	SCZDB7
14	Gnd	48	SCZDBP
15	Gnd	49	Gnd
16	Gnd	50	Gnd
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	NC	53	NC
20	Gnd	54	Gnd
21	Gnd	55	SCZATN
22	Gnd	56	Gnd
23	Gnd	57	SCZBSY
24	Gnd	58	SCZACK
25	Gnd	59	SCZRST
26	Gnd	60	SCZMSG
27	Gnd	61	SCZSEL
28	Gnd	62	SCZCD

P13 - PCI Ultra SCSI Controller Connector (cont.)

50/68 high density SCSI connector, Amp #749069-7

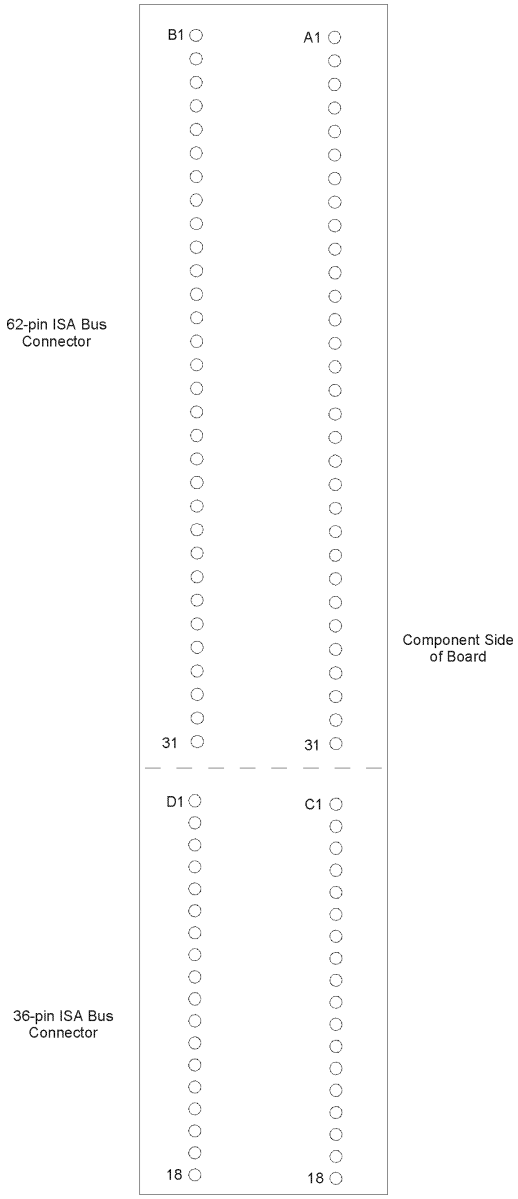
PIN	SIGNAL	PIN	SIGNAL
29	Gnd	63	SCZREQ
30	Gnd	64	SCZIO
31	Gnd	65	SCZDB8
32	Gnd	66	SCZDB9
33	Gnd	67	SCZDB10
34	WIDEPS	68	SCZDB11

P15 - PCI SVGA Interface Connector (Optional)

15 pin VGA connector, Amp #748390-5

PIN	SIGNAL	PIN	SIGNAL	PIN	SIGNAL
		6	Gnd		
1	Red			11	NC
		7	Gnd		
2	Green			12	EEDI
		8	Gnd		
3	Blue			13	HSYNC
		9	NC		
4	NC			14	VSYNC
		10	Gnd		
5	Gnd			15	EECS

ISA Bus Pin Numbering



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	Gnd	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 1wait-state, 16bit, 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 15microseconds, 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 tristate 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-ODF	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	PS/2 Mouse
IRQ13	Coprocessor
IRQ14	Fixed Disk Controller
IRQ15	Unassigned (may be assigned by the system to the system to the secondary IDE)

* These are typical parameters, which may not reflect your current system.

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.

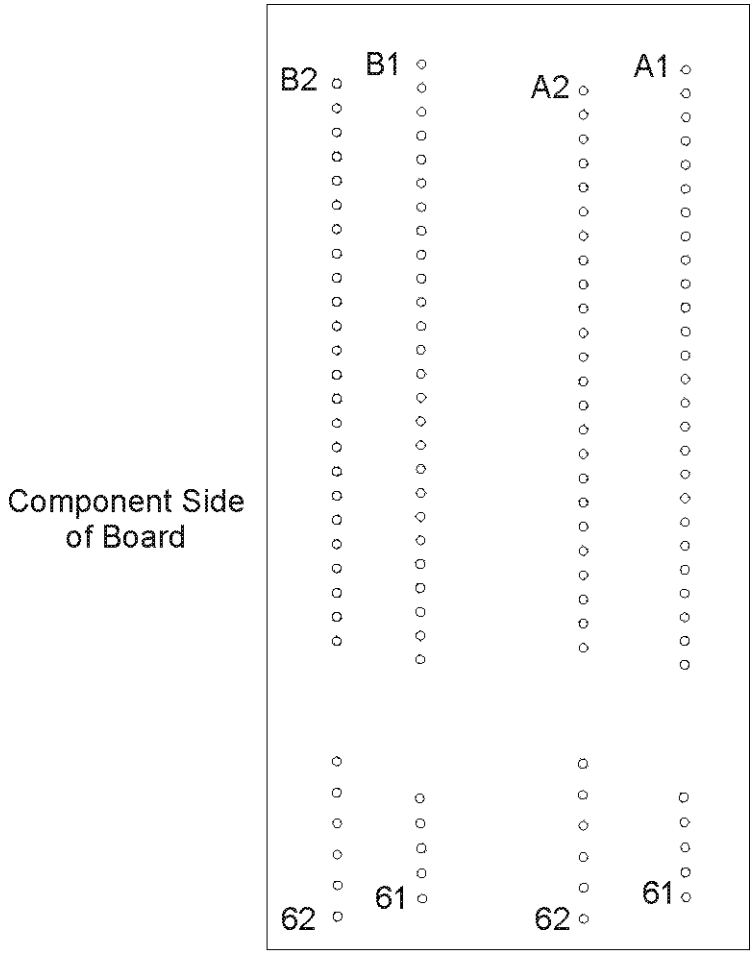
The PCI component and add-in card interface is processor independent, enabling an efficient transition to future processor generations, by bridges or by direct integration, and use with multiple processor architectures.

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.

PCI Local Bus Pin Numbering



5-volt/32-bit PCI Connector

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	PRSNT1#
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#
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
B45	+3.3V
B46	AD13
B47	AD11
B48	Gnd
B49	AD9
B50	Connector key ††
B51	Connector key ††
B52	C/BE0#
B53	+3.3V
B54	AD6
B55	AD4
B56	Gnd
B57	AD2
B58	AD0
B59	+V (I/O)
B60	REQ64#
B61	+5V
B62	+5V

PCI Local Bus Pin Assignments (continued)

I/O Pin	Signal Name
Connector Key Connector Key	
B63	Reserved
B64	Gnd
B65	C/BE6#
B66	C/BE4#
B67	Gnd
B68	AD63
B69	AD61
B70	+V (I/O)
B71	AD59
B72	AD57
B73	Gnd
B74	AD55
B75	AD53
B76	Gnd
B77	AD51
B78	AD49
B79	+V (I/O)
B80	AD47
B81	AD45
B82	Gnd
B83	AD43
B84	AD41
B85	Gnd
B86	AD39
B87	AD37
B88	+V (I/O)
B89	AD35
B90	AD33
B91	Gnd
B92	Reserved
B93	Reserved
B94	Gnd

I/O Pin	Signal Name
Connector Key Connector Key	
A63	Gnd
A64	C/BE7#
A65	C/BE5#
A66	+V (I/O)
A67	PAR64
A68	AD62
A69	Gnd
A70	AD60
A71	AD58
A72	Gnd
A73	AD56
A74	AD54
A75	+V (I/O)
A76	AD52
A77	AD50
A78	Gnd
A79	AD48
A80	AD46
A81	Gnd
A82	AD44
A83	AD42
A84	+V (I/O)
A85	AD40
A86	AD38
A87	Gnd
A88	AD36
A89	AD34
A90	Gnd
A91	AD32
A92	Reserved
A93	Gnd
A94	Reserved

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 64bits. 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 significant byte (msb).

AD[63::32] (optional)

Address and Data are multiplexed on the same pins and provide 32<N>additional bits. During an address phase (when using the DAC command and when REQ64# is asserted), the upper 32bits. of a 64-bit address are transferred; otherwise, these bits are reserved but are stable and indeterminate. During a data phase, an additional 32bits. 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/applies to byte(lsb) and 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 byte4 and C/BE7# applies to byte7

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 deserted, 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 multifunction 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 multifunction 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, nonexclusive 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 deserted 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 deserted, 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.

Chapter 3: BIOS Operation

Sections 3 through 7 of this manual describe the operation of the American Megatrends Hi-Flex AMIBIOS and the AMIBIOS Setup Utility. Refer to Running AMIBIOS Setup later in this section for standard Setup screens, options and defaults.

When the system is powered on, AMIBIOS 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 some of the Power-On Self Tests (POST's) which are performed when the system is powered on:

- CMOS Checksum Calculation
- Keyboard Controller Test
- CMOS Shutdown Register Test
- 8254 Timer Test
- Memory Refresh Test
- Display Memory Read/Write Test
- Display Type Verification
- Entering Protected Mode
- Memory Size Calculation
- Conventional and Extended Memory Test DMA Controller Tests
- Keyboard Test
- System Configuration Verification and Setup

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

AMIBIOS checks all system and cache memory and reports them on both the initial AMIBIOS screen and the AMIBIOS System Configuration screen which appears after POST is completed. AMIBIOS attempts to initialize the peripheral devices by verifying the validity of the system setup information stored in the system CMOS RAM. (See the Running AMIBIOS Setup section of this manual.) If AMIBIOS detects a fault, the screen displays the error condition(s) which has/have been detected. If no errors are detected, AMIBIOS attempts 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)1996 American Megatrends Inc.
INDUSTRIAL COMPUTER SOURCE
Hit DEL if you want to run SETUP
```

Initial Power-On Screen

You have two options:

- Press <Del> to access the AMIBIOS Setup Utility.

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

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

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

- Allow the bootup process to continue without invoking the AMIBIOS Setup Utility.

  In this case, after AMIBIOS 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, AMIBIOS 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 ROMs.

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 AMIBIOS Setup. The password function may also be disabled so that the password prompt does not appear under any circumstances.

The Password Check option in the Advanced CMOS Setup program allows you to specify when the password prompt displays: Always or only when Setup is attempted. The supervisor and user passwords may be changed using the Change Supervisor Password and Change User Password options on the AMIBIOS Setup Main Menu. If the passwords are null, the password prompt does not display at any time. A more detailed description of the password setup function may be found in the Running AMIBIOS 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 has been corrupted. In this case, the password prompt does not display. To set up passwords, you may use the Change Supervisor Password and Change User Password options on the AMIBIOS Setup Main Menu. (See the Running AMIBIOS Setup section 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 Check option on the Advanced CMOS Setup screen:

1. If the Password Check 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 Check 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 nonfatal 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 Port80H. These codes may be helpful as a diagnostic tool and are listed in Appendix A - BIOS Messages .

If certain nonfatal error conditions occur, you are requested to run the AMIBIOS Setup Utility. The error messages are followed by this screen:

```
AMIBIOS (C)1996 American Megatrends Inc.
INDUSTRIAL COMPUTER SOURCE
RUN SETUP UTILITY
Press F1 to Resume
```

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

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

Running AMBIOS Setup

AMIBIOS Setup keeps a record of system parameters, such as date and time, disk drives, display type and other user-defined parameters. 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. AMIBIOS 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 AMIBIOS Setup Utility 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 AMIBIOS Setup.

If certain nonfatal 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 AMIBIOS Setup by pressing <F1>.

System BIOS Setup Utilities

The System BIOS is an American Megatrends Hi-Flex AMIBIOS with ROM-resident setup utilities. The following Setup utilities are selectable from the AMIBIOS Hi-Flex Setup Utility Menu:

- Standard CMOS Setup
- Advanced CMOS Setup
- Advanced Chipset Setup
- PCI/Plug and Play Setup
- Peripheral Setup
- Auto-Detect Hard Disks
- Change User Password
- Change Supervisor Password
- Auto Configuration with Optimal Settings
- Auto Configuration with Fail Safe Settings
- Save Settings and Exit
- Exit Without Saving

AMIBIOS Setup Main 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 AMIBIOS Setup Program, the following screen displays:

AMIBIOS Setup Main Menu

Use the Down Arrow key to highlight the desired option and press <Enter> .

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

- Date/Time
- Floppy Drive A:/Floppy Drive B: Types
- Primary Master and Slave Disk Types
- Secondary Master and Slave Disk Types
- Logical Block Address (LBA) Mode
- Block Mode
- PIO Mode
- 32Bit Mode
- Boot Sector Virus Protection

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

- Quick Boot
- BootUp Sequence
- BootUp Num-Lock
- Floppy Drive Swap
- Floppy Drive
- Mouse Support
- System Keyboard
- Primary Display
- Password Check
- Parity Check
- OS/2 Compatible Mode
- Wait For ‘F1’ If Error
- Hit ‘DEL’ Message Display
- Internal Cache
- System BIOS
- Video and Adapter ROM Shadow

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

- DRAM Speed
- DRAM Integrity Mode (ECC) DRAM Fast Leadoff
- DRAM Refresh Queue
- VGA Frame Buffer USWC
- PCI Frame Buffer USWC
- Fixed Memory Hole
- CPU to IDE Posting
- USWC Write Posting
- CPU to PCI Posting
- PCI to DRAM Pipeline
- PCI Burst Write Combine
- Read Around Write
- TypeF DMA Buffer Controls 1 and 2 USB Function Enable
- USB Keyboard Support
- USB Passive Release Enable

- Select PCI/Plug and Play Setup to make changes to PCI/Plug and Play Setup parameters. The Setup program is described in the PCI/Plug and Play Setup section of this manual. The following options may be changed:

- Plug and Play Aware O/S
- PCI Latency Timer
- PCI VGA Palette Snoop
- PCI IDE BusMaster
- OffBoard PCI IDE Card
- OffBoard PCI IDE Primary and Secondary IRQs
- DMA Channels 0, 1, 3, 5, 6 and 7
- IRQ5 /IRQ9/IRQ10/IRQ11/
- Reserved Memory Size and Address
- On Board SCSI
- On Board VGA

- Select Peripheral Setup to make changes to the Peripheral Setup parameters. The Setup program is described in the Peripheral Setup section of this manual. The following op tions may be changed:

- OnBoard FDC
- OnBoard Serial Ports 1 and 2
- OnBoard Parallel Port
- Parallel Port Mode

- OnBoard IDE

- Select Auto-Detect Hard Disks to have AMIBIOS automatically detect the type and pa rameters of each hard drive if you have IDE drive(s). This option is described later in this section.

- Select Change User Password to establish or change the password for the user. This function is described later in this section.

- Select Change Supervisor Password to establish or change the password for the supervi sor. This function is described later in this section.

- Select Auto Configuration with Optimal Settings to load the Optimal default settings. These settings are best-case values which should provide the best performance characteris tics. This function is described later in this section.

- Select Auto Configuration with Fail Safe Settings to load the Fail Safe default settings. These settings are more likely to configure a workable computer, but they may not provide optimal performance. This function is described later in this section.

- Select Save Settings 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 AMIBIOS and the booting process continues, using the new CMOS values. This function is described later in this section.

- Select Exit Without Saving to pass control back to the AMIBIOS without writing any changes to the CMOS. AMIBIOS continues with the booting process. This function is described later in this section.

Auto-Detect Hard Disks

The Auto-Detect Hard Disks option allows you to have AMIBIOS 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 on the Standard CMOS Setup screen.

AMIBIOS searches first for the primary master and slave hard disk drives, then for the secondary master and slave drives. If it can access a drive, it reads the disk parameters. It then searches the AMIBIOS drive type 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, AMIBIOS 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, AMIBIOS times out and specifies that the disk drive is “Not Installed.”

Note : The auto detect feature displays disk parameter values as established 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 CMOS Setup to enter parameters which match the current format of the drive.

If you do not want to accept the hard disk type and its associated parameters as reported by AMIBIOS or if the drive is "Not Installed," you may use Standard CMOS Setup to set up the correct parameters for the drive.

Once the parameters are correct for all of the drives, you may exit from the Standard CMOS Setup screen and save the settings in the CMOS.

Change Password

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

The Change Supervisor Password and Change User Password options on the AMIBIOS Setup Main Menu allow you to establish passwords, change the current passwords or disable the password prompts by entering null passwords. The passwords are stored in CMOS RAM. The Change User Password function is accessible only if the supervisor password has been established previously. If you have signed on under the user password, you cannot change the supervisor password.

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

Change Supervisor Password

If you select the Change Supervisor Password option, the following window displays:

```
Enter new supervisor password: _
```

This is the message which displays before you have established a password, or if the last password entered was the null password. If a password has already been established, you are asked to enter the current password before being prompted to enter the new password.

Type the new password and press <Enter> . The password cannot exceed six (6) characters in length. The screen does not display the characters as you type them.

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

```
Enter new supervisor password: _
```

Re-key the new password as described above.

If the password confirmation is mis-keyed, AMIBIOS Setup displays the following message:

```
Incorrect password, press any key to continue
```

No retries are permitted; you must restart the procedure from the AMIBIOS Setup Main Menu.

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

```
New supervisor password installed, press any key to continue
```

When you press any key, the screen returns to the AMIBIOS Setup Main Menu screen, which allows you to save the password change or exit from Setup without saving the new password. To save the new password in CMOS memory, be sure to select Save Settings and Exit .

If you save the changes when you exit AMIBIOS 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 CMOS 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.

Change User Password

The Change User Password function is accessible only if the supervisor password has been established previously.

The Change User Password option is similar in functionality to the Change Supervisor Password and displays the same messages, except that "user" replaces "supervisor." If you have signed on under the user password, you cannot change the supervisor password.

Disabling the Password(s)

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

When you press any key, the screen returns to the AMIBIOS Setup Main Menu, which allows you to save the password change or exit from Setup without saving the null password. To save the null password(s) in CMOS memory, be sure to select Save Settings and Exit .

Auto Configuration Options

Each AMIBIOS Setup option has two default settings (Optimal and Fail Safe). These settings can be applied to all AMIBIOS Setup options when you select the appropriate auto configuration option from the AMIBIOS Setup Main Menu.

You can use these auto configuration options to quickly set the system configuration parameters which should provide the best performance characteristics, or you can select a group of settings which have a better chance of working when the system is having configuration-related problems.

Auto Configuration with Optimal Settings

This option allows you 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.

If you select the Auto Configuration with Optimal Settings option, the following window displays:

```
Load high performance settings (Y/N) ? N
```

You have two options:

- Press ‘ N ‘ and <Enter> to leave the current values in effect.
- Press ‘ Y ‘ and <Enter> to load the Optimal default settings.

Auto Configuration with Fail Safe Settings

This option allows you to load the Fail Safe default settings when you cannot boot your computer successfully. These settings are more likely to configure a workable computer. They may 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.

If you select the Auto Configuration with Fail Safe Settings option, the following window displays:

```
Load fail-safe settings (Y/N) ? N
```

You have two options:

- Press ‘ N ‘ and <Enter> to leave the current values in effect.
- Press ‘ Y ‘ and <Enter> to load the Fail Safe default settings.

Save Settings and Exit

The features selected and configured in the Setup screens are stored in the CMOS when this option is selected. The CMOS checksum is calculated and written to the CMOS. Control is then passed back to the AMIBIOS and the booting process continues, using the new CMOS values.

If you select the **SAVE SETTINGS AND EXIT** option, the following window displays:

```
Save current settings and exit (Y/N) ? Y
```

You have two options:

- Press ‘ N ‘ and <Enter> to return to the AMIBIOS Setup Main Menu.
- Press ‘ Y ‘ and <Enter> to save the system parameters and continue with the booting process.

Exit Without Saving

This option passes control back to AMIBIOS without writing any changes to the CMOS.

If you select the EXIT WITHOUT SAVING option, the following window displays:

```
Quit without saving the current settings (Y/N) ? N
```

You have two options:

- Press ‘ N ‘ and <Enter> to return to the AMIBIOS Setup Main Menu.
- Press ‘ Y ‘ and <Enter> to continue with the booting process without saving any system parameters.

Key Conventions

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

Key	Task
<ESC>	Close the current operation and return to the previous level.
<TAB>	Move to the next field.
Arrow Keys	Move to the next field in the desired direction.
<ENTER>	Select the current item.
<F2>/<F3>	Change background and foreground colors.
<F10>	Save all changes made to Setup and exit from the AMBIOS Setup Utility.
Plus Key (+), <PgUp>	Increment a value.
Minus Key (-), <PgDn>	Decrement a value.

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Chapter 4: Standard CMOS Setup

When you select Standard CMOS Setup from the AMIBIOS Setup Main Menu, the following Setup screen displays:

AMIBIOS SETUP - STANDARD CMOS SETUP

(C)1996 American Megatrends, Inc. All Rights Reserved

Date (mm/dd/yyyy): **Mon Jan 01,1980**
Time (hh/mm/ss): **12:30:00**

Floppy Drive A: **1.44 MB 3 1/2**
Floppy Drive B: **Not Installed**

	Type	Size	Cyln	Head	Wpcom	Sec	LBA Mode	Blk Mode	PIO Mode	32Bit Mode
Pri Master :	**Auto**						On	On	Auto	Off
Pri Slave :	**Auto**						On	On	Auto	Off
Sec Master :	**Auto**						On	On	Auto	Off
Sec Slave :	**Auto**						On	On	Auto	Off

Boot Sector Virus Protection **Disabled**

Month: Jan - Dec
Day: 01 - 31
Year: 1901 - 2099

ESC: Exit ↓↑:Sel
PgUp/PgDn: Modify
F2/F3: Color

The Standard CMOS Setup Screen

When you display the Standard CMOS Setup screen, the format is similar to the sample shown above. If values display for all parameters, the Setup parameters have been defined previously. The available values for each option are displayed at the bottom of the screen when you tab or arrow into the field.

Note: The values on this screen do not necessarily reflect the values appropriate for your processor board. Refer to the explanations below for specific instructions about entering correct information.

Standard CMOS Options

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

Date

The Setup screen displays the system option:

Date (mm/dd/yyyy): Mon Jan 01, 1980

The Help window displays allowable settings:

Month: Jan - Dec
Day: 01 - 31
Year: 1901 - 2099

There are three fields for entering the date. Use the left and right arrow keys or the tab key to move from one field to another; use the plus and minus (or PgUp and PgDn) keys to scroll through the allowable values for the field. As you scroll through the month, day or year field, the day of the week changes automatically to reflect the new date.

Time

The Setup screen displays the system option:

Time (hh/mm/ss): 00:00:00

The Help window displays:

Time is 24 hour format:-
Hour:00-23 Minute:00-59 Second:00-59
(1:30AM = 01:30:00, 1:30PM = 13:30:00)

There are three fields for entering the time. Use the left and right arrow keys or the tab key to move from one field to another; use the plus and minus (or PgUp and PgDn) keys to scroll through the allowable values for the field.

Floppy Drive A:/Floppy Drive B:

The floppy drive type(s) in your system can be configured using these options.

The Setup screen displays the system options:

Floppy Drive A: 1.44 MB 3-1/2
Floppy Drive B: Not Installed

Available options are:

Not Installed	
360	KB 5-1/4
1.2	MB 5-1/4
720	KB 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.

Primary and Secondary Hard Disk Drives

The processor board supports up to four hard disk drives through a primary and secondary controller in a master/slave configuration. The primary controller uses I/O port addresses 1F0H through 1F7H, 3F6H and IRQ14. The secondary controller uses I/O port addresses 170H through 177H, 376H and IRQ15.

The AMIBIOS enhanced IDE (EIDE) interface can support IDE Type4 disk drives. This EIDE interface allows disk drives greater than 528MB to be used.

The hard disk drives can be detected automatically by AMIBIOS (if they are IDE drives) or can be defined manually by the user, as described below.

The Setup screen displays the system options:

Pri Master:	**Auto**
Pri Slave:	**Auto**
Sec Master:	**Auto**
Sec Slave:	**Auto**

The Help window displays:

1-46:	Predefined types
USER:	Enter parameters manually
AUTO:	Set parameters automatically on each boot
CD-ROM:	Use for ATAPI CD-ROM drives Or press ENTER to set all DD parameters automatically

To set up the hard disk drive parameter(s), use the plus (+) key or PgDn key to scroll through the drive types to locate the correct type of disk drive(s) in your computer.

As you scroll through the disk types, the drive Type displays, along with values for size, cylinders, heads, write precompensation and sectors. Available predefined hard disk 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 have AMIBIOS detect the drive type automatically (if it is an IDE drive), or you may select the User drive type to enter the parameters manually as described below.

Set the drive type to CD-ROM to boot from a CD-ROM drive.

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

Automatic Detection of Drive Type

If any of the hard disks are IDE drives, AMIBIOS can automatically configure the drive type by detecting the IDE drive parameters and reporting them on the Standard CMOS Setup screen.

You may invoke automatic detection of IDE drives in one of three ways:

- Press Enter when the cursor is in the Type field. AMIBIOS detects the drive type and parameters as requested. If the drive type is not defined in the drive type table, this option displays User as the drive type and displays the parameters which were detected by AMIBIOS. The detected drive type values may then be saved in the CMOS.
- Set the drive type to Auto to have AMIBIOS detect the drive type and parameters automatically each time the system is booted up. This option does not display the drive type on the Standard CMOS Setup screen, but does display it on the System Configuration screen shown after a successful bootup.
- Select the Auto-Detect Hard Disks option on the AMIBIOS Setup Main Menu to have AMIBIOS automatically detect the type and parameters of each hard drive and place the information into the Standard CMOS Setup screen. The detected drive type values may then be saved in the CMOS. This option is described in the Running AMIBIOS Setup section of the System BIOS chapter of this manual.

Note: The auto detect feature displays disk parameter values as established 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 the User type to enter parameters which match the current format of the drive.

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 Hard Disk Drive Types table at the end of this section, you may enter the parameters manually.

The user-defined parameters for each of the four drives may be different, which effectively allows four different user-definable hard disk types.

Scroll to the end of the drive type list to the User type. You can manually enter the Cyln, Head, WPcom and Sec parameters. The Size parameter is automatically calculated and displayed by the system based on the other parameters entered.

Use the arrow keys or tab key to move between fields. Once you have placed the cursor in a field, type in the correct value.

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

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

Write Precompensation (WPcom) 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.

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

IDE Drive Type Setup Options

For each of the four hard disk drives which is an IDE drive, the following options are also available for the drive:

Logical Block Addressing (LBA) Mode

This option allows you to enable IDE LBA (Logical Block Addressing) Mode for the specified primary or secondary IDE drive. Data is accessed by block addresses rather than by the traditional cylinder-head-sector format. This allows you to use drives larger than 528MB. In LBA mode, the maximum drive capacity supported is 8.4GB (gigabytes).

If LBA Mode is set to On and is supported by the hard disk drive, and if the drive is formatted, AMIBIOS enables LBA mode and translates the physical parameters of the drive to logical parameters. If a hard disk drive which supports LBA mode and has a capacity greater than 528MB was formatted with LBA mode disabled, AMIBIOS does not enable LBA mode even if the LBA Mode parameter is set to On in Standard CMOS Setup.

If LBA Mode is set to Off, AMIBIOS uses the physical parameters of the hard disk and does not translate parameters. The operating system which uses the parameter table then sees only 528MB of hard disk space even if the drive contains more than 528MB.

Available options are:

Off

On

Block Mode

This option supports transfer of multiple sectors to and from the specified primary or secondary IDE drive.

Block mode boosts IDE drive performance by increasing the amount of data transferred during an interrupt. Block mode allows transfers of up to 64KB per interrupt, whereas only 512 bytes of data can be transferred per interrupt if block mode is not used.

If Block Mode is set to On and is supported by the IDE drive, AMIBIOS enables multi-sector transfers. AMIBIOS sets the number of sectors to be transferred per interrupt to the value returned by the "identify drive" command.

Available options are:

Off
On

Programmed I/O Mode

IDE PIO mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

Set the **PIO Mode** option to **Auto** to have AMIBIOS select the PIO mode used by the IDE drive being configured. If you select a specific value for the PIO mode, you must make absolutely certain that you are selecting the PIO mode supported by the IDE drive being configured.

Available options are:

Auto
0 3
1 4
2 5

32Bit Mode

Hard disk drives connected to the processor board via the ISA Bus transfer data 16 bits at a time. An IDE drive on the PCI Local Bus can use a 32-bit data path.

If the 32Bit Mode parameter is set to On, AMIBIOS enables 32-bit data transfers. If the host controller does not support 32-bit transfer, this feature must be disabled.

Available options are:

Off
On

Boot Sector Virus Protection

This option allows you to request AMIBIOS 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.

The Setup screen displays the system option:

Boot Sector Virus Protection Disabled

Available options are:

Disabled
Enabled

If the Boot Sector Virus Protection 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 boot sector virus protection when formatting a hard drive.

The DOS hard disk Format utility does not use INT13H function AH=05H to format the hard disk. It only verifies the hard disk using the INT13H Verify function (AH=04H). The virus warning message is Not displayed during DOS hard disk drive formatting.

Saving and Exiting

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

You may make changes to other Setup options before exiting from AMIBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

Using a Worksheet for Setup

Copy this worksheet to record the values needed for the initial CMOS 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 Drive A: Type

Floppy Drive B: Type

Primary Master Disk Type

				LBA	Blk	PIO	32Bit
Cyln*	Head*	WPcom*	Sec*	Mode	Mode	Mode	Mode

Primary Slave Disk Type

				LBA	Blk	PIO	32Bit
Cyln*	Head*	WPcom*	Sec*	Mode	Mode	Mode	Mode

Secondary Master Disk Type

				LBA	Blk	PIO	32Bit
Cyln*	Head*	WPcom*	Sec*	Mode	Mode	Mode	Mode

Secondary Slave Disk Type

				LBA	Blk	PIO	32Bit
Cyln*	Head*	WPcom*	Sec*	Mode	Mode	Mode	Mode

* Values required only if Type = User (user-defined type)

Hard Disk Drive Types

Default hard disk drive types defined in the standard BIOS are as follows:

Cyln	=	Cylinders per drive
Head	=	Heads per drive
Wpcom	=	Write precompensation (blank = all; 65535 = none)
Sec	=	Nbr of sectors per cylinder
Size	=	Total storage size (Megabytes)

Type	Cyln	Head	Wpcom	Sec	Size
1	306	4	128	17	10
2	615	4	300	17	20
3	615	6	300	17	30
4	940	8	512	17	62
5	940	6	512	17	46
6	615	4	65535	17	20
7	462	8	256	17	30
8	733	5	65535	17	30
9	900	15	65535	17	112
10	820	3	65535	17	20
11	855	5	65535	17	35

Type	Cyln	Head	Wpcom	Sec	Size
12	855	7	65535	17	49
13	306	8	128	17	20
14	733	7	65535	17	42
15		Invalid			
16	612	4	(blank)	17	20
17	977	5	300	17	40
18	977	7	65535	17	56
19	1024	7	512	17	59
20	733	5	300	17	30
21	733	7	300	17	42
22	733	5	300	17	30
23	306	4	(blank)	17	10
24	925	7	(blank)	17	53
25	925	9	65535	17	69
26	754	7	754	17	43
27	754	11	65535	17	68
28	699	7	256	17	40
29	823	10	65535	17	68
30	918	7	918	17	53
31	1024	11	65535	17	93
32	1024	15	65535	17	127
33	1024	5	1024	17	42
34	612	2	128	17	10
35	1024	9	65535	17	76
36	1024	8	512	17	68
37	615	8	128	17	40
38	987	3	987	17	24
39	987	7	987	17	57
40	820	6	820	17	40
41	977	5	977	17	40
42	981	5	981	17	40
43	830	7	512	17	48
44	830	10	65535	17	68
45	917	15	65535	17	114
46	1224	15	65535	17	152
User					
Auto					
CDROM					
Not Installed					

Chapter 5: Advanced CMOS Setup

When you select **Advanced CMOS Setup** from the AMIBIOS Setup Main Menu, the following Setup screen displays:

AMIBIOS SETUP - ADVANCED CMOS SETUP

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Quick Boot	**Disabled**	**Available Options:**	
BootUp Sequence	**C:,A:,CDROM**	**Disabled**	
BootUp Num-Lock	**On**	**Enabled**	
Floppy Drive Swap	**Disabled**		
Floppy Drive Seek	**Disabled**		
Mouse Support	**Enabled**		
System Keyboard	**Present**		
Primary Display	**VGA/EGA**		
Password Check	**Setup**		
Parity Check	**Enabled**		
OS/2 Compatible Mode	**Disabled**		
Wait For 'F1' If Error	**Enabled**		
Hit 'DEL' Message Display	**Enabled**		
Internal Cache	**WriteBack**		
System BIOS Cacheable	**Enabled**		
C000,16k, Shadow	**Cached**		
C400,16k, Shadow	**Cached**		
C800,16k, Shadow	**Disabled**		
CC00,16k, Shadow	**Disabled**		
D000,16k, Shadow	**Disabled**		
D400,16k, Shadow	**Disabled**	**ESC**:	Exit ↓↑: Sel
D800,16k, Shadow	**Disabled**	**PgUp/PgDn**:	Modify
DC00,16k, Shadow	**Disabled**	**F2/F3**:	Color

The Advanced CMOS Setup Screen

When you display the Advanced CMOS Setup screen, the format is similar to the sample shown above, except the screen displays only twenty options at a time. If you need to change other options, use the down arrow key to locate the appropriate option. The available values for each option are displayed on the right side of the screen when you tab or arrow into the field. If values display for all parameters, the Setup parameters have been defined previously.

Note : The values on this screen do not necessarily reflect the values appropriate for your processor board. Refer to the explanations below for specific instructions about entering correct information.

Advanced CMOS Setup Options

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

Quick Boot

This option allows you to have the AMIBIOS boot quickly when the computer is powered on or go through more complete testing.

When this option is set to **Disabled** , AMIBIOS tests all system memory. It waits up to 40 seconds for a READY signal from the IDE hard disk drive. It waits for .5 seconds after sending a RESET signal to the IDE drive to allow the drive time to get ready again. It also checks whether the user has pressed the **<Del>** key and runs the AMIBIOS Setup program if the key has been pressed.

If the option is set to **Enabled** , AMIBIOS checks only the first 1MB of system memory. If a READY signal is not received immediately from the IDE drive, AMIBIOS does not configure the drive. It does not wait for .5 seconds after sending a RESET signal to the IDE drive to allow the IDE drive time to get ready again.

The Setup screen displays the system option:

Quick Boot Disabled

Available options are:

Disabled
Enabled

BootUp Sequence

This option specifies the disk drive sequence the AMIBIOS uses to search for a bootable device after the AMIBIOS POST routines have completed.

AMIBIOS 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 Swap** option described below). The **BootUp Sequence** option allows you to change the bootup sequence to search for the floppy drive and/or the CD-ROM drive before searching for the C: drive.

The CD-ROM behaves like drive A: if it has a floppy boot image. If it boots as a floppy, it becomes drive A: and the first floppy drive becomes drive B:. The CD-ROM behaves like a hard drive if it has a hard disk boot image. If it boots as a hard drive, it becomes drive C: and all other hard disk drives are shifted one letter (the hard disk drive becomes drive D:).

The Setup screen displays the system option:

BootUp Sequence C:,A:,CDROM

Available options are:

A:, C:, CDROM
A:,CDROM,C:
C:, A:, CDROM
C:,CDROM,A:
CDROM,A:,C:
CDROM, C:, A:

BootUp Num-Lock

This option enables you to turn off the Num-Lock option on the enhanced 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:

BootUp Num-Lock On

Available options are:

Off
On

Floppy Drive Swap

This option allows AMIBIOS 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 **BootUp Sequence** option described above.

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 Swap Disabled

Available options are:

Disabled
Enabled

Floppy Drive Seek

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 **Disabled**

Available options are:

Disabled
Enabled

Mouse Support

This option indicates whether or not a mouse is supported. If it is set to **Enabled** , AMIBIOS supports a PS/2-type mouse.

The Setup screen displays the system option:

Mouse Support **Enabled**

Available options are:

Disabled
Enabled

System Keyboard

This option indicates whether or not a keyboard is attached to the computer.

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 **Absent** option can be used for network file servers.

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)

Password Check

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

The Setup screen displays the system option:

Password Check Setup

Two options are available:

- Select **Setup** to have the password prompt appear only when an attempt is made to enter the AMIBIOS Setup program.
- 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 **Change Supervisor Password** or **Change User Password** function in the **AMIBIOS Setup Main Menu.** (See the *Running AMIBIOS Setup* section of this manual.) The null password is the system default and is in effect if a password has not been assigned or if the CMOS has been corrupted.

Parity Check

This option allows you to enable parity checking of all system memory.

The Setup screen displays the system option:

Parity Check Enabled

Available options are:

Disabled
Enabled

OS/2 Compatible Mode

This option, when enabled, allows AMIBIOS to run with IBM OS/2 or any other operating system that does not support Plug and Play.

The Setup screen displays the system option:

OS/2 Compatible Mode Disabled

Available options are:

Disabled
Enabled

Wait For ‘F1’ If Error

Before the system boots up, AMIBIOS 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 nonfatal error has occurred. AMIBIOS responds with an appropriate error message followed by:

Press F1 to Resume

If this option is disabled, a nonfatal error does not generate the “Press F1 to Resume” message. AMIBIOS 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 nonfatal error condition message. Nonfatal error messages are listed in Appendix *A - BIOS Messages* .

The Setup screen displays the system option:

Wait For ‘F1’ If Error **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

Internal Cache

This option specifies the caching algorithm used for L1 and L2 internal cache memory.

The Setup screen displays the system option:

Internal Cache **WriteBack**

Three options are available:

- Select **Disabled** to disable both L1 internal cache memory on the processor board and L2 secondary cache memory.
- Select **WriteBack** to use the write-back caching algorithm.
- Select **WriteThru** to use the write-through caching algorithm.

System BIOS Cacheable

The System BIOS, which is in the F000H memory segment, is automatically shadowed to RAM for faster execution. This option indicates that this memory segment can be read from or written to L2 secondary cache memory.

The Setup screen displays the system option:

System BIOS 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 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.

Video BIOS shadowing may be done in two 16KB segments at C000H and C400H. Enabling shadowing can speed up the operation of a machine because RAM can be accessed more rapidly than ROM and the data bus is wider to RAM. The default setting for the video BIOS segments is Cached .

Other 16KB ROM segments 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:

XXXX,16K Shadow Disabled

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

Three options are available:

- Select **Enabled** to write the contents of the specified ROM area to the same address in system memory (RAM) for faster execution.
- Select **Cached** to write the contents of the specified ROM area to the same address in system memory (RAM), if an adapter ROM is using the ROM area. This also indicates that the contents of the RAM area can be read from and written to cache memory.
- Select **Disabled** if you do not want to copy the specified ROM area to RAM. The contents of the video ROM cannot be read from or written to cache memory.

Saving and Exiting

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

You may make changes to other Setup options before exiting from AMIBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

Advanced Chipset Setup

When you select **Advanced Chipset Setup** from the AMIBIOS Setup Main Menu, the following Setup screen displays:

AMIBIOS SETUP - ADVANCED CHIPSET SETUP
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DRAM Speed (ns)	**70**	**Available Options:**	
DRAM Integrity Mode (ECC)	**Disabled**	**50**	
DRAM Fast Leadoff	**Disabled**	**60**	
DRAM Refresh Queue	**Enabled**	**70**	
VGA Frame Buffer USWC	**Disabled**		
PCI Frame Buffer USWC	**Disabled**		
Fixed Memory Hole	**Disabled**		
CPU To IDE Posting	**Enabled**		
USWC Write Posting	**Disabled**		
CPU To PCI Posting	**Enabled**		
PCI To DRAM Pipeline	**Enabled**		
PCI Burst Write Combine	**Enabled**		
Read Around Write	**Enabled**		
TypeF DMA Buffer Control1	**Disabled**		
TypeF DMA Buffer Control2	**Disabled**		
USB Function Enable	**Disabled**	**ESC:**	Exit ↓↑: Sel
USB Keyboard Support	**Disabled**	**PgUp/PgDn:**	Modify
USB Passive Release Enable	**Enabled**	**F2/F3:**	Color

The Advanced Chipset Setup Screen

When you display the Advanced Chipset Setup screen, the format is similar to the sample shown above. The available values for each option are displayed on the right side of the screen when you tab or arrow into the field. If values display for all parameters, the Setup parameters have been defined previously.

Note : The values on this screen do not necessarily reflect the values appropriate for your processor board. Refer to the explanations below for specific instructions about entering correct information.

Advanced Chipset Setup Options

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

DRAM Speed (ns)

This option allows you to select the speed of the DRAMs being used in the processor board. 60 ns DRAMs provide the best performance.

The Setup screen displays the system option:

DRAM Speed (ns) **70ns**

Available options are:

50ns
60ns
70ns

DRAM Integrity Mode (ECC)

This option allows you to enable ECC (Error Checking and Correction) DRAM integrity mode.

The Setup screen displays the system option:

DRAM Integrity Mode (ECC) **Disabled**

Available options are:

Disabled
Enabled

Note : The **Parity Check** option on the Advanced Setup screen must be set to **Disabled** in order for DRAM error checking to perform correctly.

DRAM Fast Leadoff

The Setup screen displays the system option:

DRAM Fast Leadoff **Disabled**

Available options are:

Disabled
Enabled

DRAM Refresh Queue

The Setup screen displays the system option:

DRAM Refresh Queue **Enabled**

Available options are:

Disabled
Enabled

VGA Frame Buffer USWC

The Setup screen displays the system option:

VGA Frame Buffer USWC **Disabled**

Available options are:

Disabled
Enabled

PCI Frame Buffer USWC

The Setup screen displays the system option:

PCI Frame Buffer USWC **Disabled**

Available options are:

Disabled
Enabled

Fixed Memory Hole

This option may be used to specify an area in memory which cannot be addressed on the ISA bus.

The Setup screen displays the system option:

Fixed Memory Hole Disabled

Available options are:

Disabled
512KB-640KB
15MB-16MB

CPU To IDE Posting

This option is used to enable posted messages from the CPU to the IDE controller.

The Setup screen displays the system option:

CPU To IDE Posting Enabled

Available options are:

Disabled
Enabled

USWC Write Posting

When set to **Enabled** , this option indicates that your system is using USWC memory which is shared by both video memory and system memory.

The Setup screen displays the system option:

USWC Write Posting Disabled

Available options are:

Disabled
Enabled

CPU To PCI Posting

This option is used to enable posted messages from the CPU to the PCI Bus.

The Setup screen displays the system option:

CPU To PCI Posting Enabled

Available options are:

Disabled
Enabled

PCI To DRAM Pipeline

This option allows you to enable the pipeline from the PCI Bus to system memory.

The Setup screen displays the system option:

PCI To DRAM Pipeline **Enabled**

Available options are:

Disabled
Enabled

PCI Burst Write Combine

Setting this option to **Enabled** allows write instructions to be combined in PCI Burst mode.

The Setup screen displays the system option:

PCI Burst Write Combine **Enabled**

Available options are:

Disabled
Enabled

Read Around Write

When set to **Enabled** , this option allows read operations to bypass write operations in the memory controller.

The Setup screen displays the system option:

Read Around Write **Enabled**

Available options are:

Disabled
Enabled

Type F DMA Buffer Control 1/Type FDMA Buffer Control 2

The Setup screen displays the system options:

Type F DMA Buffer Control 1 **Disabled**

Type F DMA Buffer Control 2 **Disabled**

Available options are:

Channel-0
Channel-1
Channel-2
Channel-3
Disabled
Channel-5
Channel-6
Channel-7

USB Function Enable

This option allows you to set up the Universal Serial Bus (USB).

If this option is set to **Disabled** , the following two related Universal Serial Bus options are Not available for modification.

The Setup screen displays the system option:

USB Function Enable Disabled

Available options are:

Disabled
Enabled

USB Keyboard Support

If the **USB Function Enable** option described above is set to **Disabled** , this option is Not available for modification.

The Setup screen displays the system option:

USB Keyboard Support Disabled

Available options are:

Disabled
Enabled

USB Passive Release Enable

If the **USB Function Enable** option described above is set to **Disabled** , this option is Not available for modification.

The Setup screen displays the system option:

USB Passive Release Enable Enabled

Available options are:

Disabled
Enabled

Saving and Exiting

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

You may make changes to other Setup options before exiting from AMIBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

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Chapter 6: PCI/Plug and Play Setup

When you select PCI/Plug and Play Setup from the AMIBIOS Setup Main Menu, the following Setup screen displays:

AMIBIOS SETUP - PCI / PLUG AND PLAY SETUP

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Plug and Play Aware O/S	**No**	**Available Options**:	
PCI Latency Timer (PCI Clocks)	**64**	**No**	
PCI VGA Palette Snoop	**Disabled**	**Yes**	
PCI IDE BusMaster	**Disabled**		
OffBoard PCI IDE Card	**Auto**		
OffBoard PCI IDE Primary IRQ	**Disabled**		
OffBoard PCI IDE Secondary IRQ	**Disabled**		
DMA Channel 0	**PnP**		
DMA Channel 1	**PnP**		
DMA Channel 3	**PnP**		
DMA Channel 5	**PnP**		
DMA Channel 6	**PnP**		
DMA Channel 7	**PnP**		
IRQ5	**PCI/PnP**		
IRQ9	**PCI/PnP**		
IRQ10	**PCI/PnP**		
IRQ11	**PCI/PnP**		
IRQ15	**PCI/PnP**		
Reserved Memory Size	**Disabled**		
Reserved Memory Address	**C8000**	**ESC:**	Exit↓↑: Sel
On Board SCSI	**Enabled**	**PgUp/PgDn:**	Modify
On Board VGA	**Enabled**	**F2/F3:**	Color

The PCI / Plug and Play Setup Screen

When you display the PCI / Plug and Play Setup screen, the format is similar to the sample shown above, except the screen displays only twenty options at a time. If you need to change other options, use the down arrow key to locate the appropriate option. The available values for each option are displayed on the right side of the screen when you tab or arrow into the field. If values display for all parameters, the Setup parameters have been defined previously.

Note: The values on this screen do not necessarily reflect the values appropriate for your processor board. Refer to the explanations below for specific instructions about entering correct information.

PCI/Plug and Play Setup Options

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

Plug and Play Aware O/S

This option indicates whether the operating system installed in the computer is Plug and Play-aware. AMIBIOS only detects and enables PnP ISA adapter cards which are required for system boot. The Windows 95 operating system is PnP-aware and detects and enables all other PnP-aware adapter cards. Set the option to No if the operating system (such as DOS, OS/2, Windows 3.x) does not use PnP.

Note: You must set this option correctly or PnP-aware adapter cards installed in your computer will not be configured properly.

The Setup screen displays the system option:

Plug and Play Aware O/S No

Available options are:

No
Yes

PCI Latency Timer (PCI Clocks)

This option sets the latency of all PCI devices on the PCI Local Bus. The settings are in units equal to PCI clocks.

The Setup screen displays the system option:

PCI Latency Timer (PCI Clocks) 64

Available options are:

32	160
64	192
96	224
128	248

PCI VGA Palette Snoop

This option indicates whether any ISA adapter card installed in the system requires VGA palette snooping.

The Setup screen displays the system option:

PCI VGA Palette Snoop Disabled

Available options are:

Disabled
Enabled

PCI IDE BusMaster

This option specifies whether the IDE controller on the PCI Local Bus has bus mastering capability. AMIBIOS can perform bus master transfers using scatter/gather DMA on the PCI IDE interface. No special drivers are needed, but the IDE drive must support PCI bus mastering.

The Setup screen displays the system option:

PCI IDE BusMaster **Disabled**

Available options are:

Disabled
Enabled

OffBoard PCI IDE Card

This option specifies the PCI expansion slot on the processor board where the off-board PCI IDE controller is installed, if any. If an off-board PCI IDE controller is used, the on-board IDE controller on the processor board is automatically disabled.

If Auto is selected, AMIBIOS automatically determines the correct setting for this option.

This option forces IRQ14 and IRQ15 to PCI slots on the PCI Local Bus. This is necessary to support non-compliant PCI IDE adapter cards.

If this option is set to **Auto**, the **OffBoard PCI IDE Primary IRQ** and **OffBoard PCI IDE Secondary IRQ** options may not be modified.

The Setup screen displays the system option:

OffBoard PCI IDE Card **Auto**

Available options are:

Auto
Slot1
Slot2
Slot3
Slot4
Slot5
Slot6

OffBoard PCI IDE Primary IRQ/Secondary IRQ

These options specify the PCI interrupts used by the primary and secondary IDE channels on the off-board PCI IDE controller.

If the OffBoard PCI IDE Card option described above is set to Auto, these options are not available.

The Setup screen displays the system options:

OffBoard PCI IDE Primary IRQ **Disabled**

OffBoard PCI IDE Secondary IRQ **Disabled**

Available options are:

Disabled
INTA
INTB
INTC
INTD
Hardwired

DMA Channels 0, 1, 3, 5, 6 and 7

The Setup screen displays the system option:

DMA Channel# **PnP**

where # is the DMA Channel number.

Available options are:

PnP
ISA/EISA

IRQ5/IRQ9/IRQ10/IRQ11/IRQ15

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. This allows you to specify IRQs for use by legacy ISA adapter cards. The IRQ setup options indicate whether AMIBIOS should remove an IRQ from the pool of available IRQs passed to BIOS configurable devices. If more IRQs must be removed from the pool, you can set the IRQ option to **ISA/EISA**. On-board I/O is configurable by AMIBIOS; the IRQs used by on-board I/O are configured as **PCI/PnP**.

The Setup screen displays the system option:

IRQ# **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

Note: If the **OnBoard IDE** option on the **Peripheral Setup** screen is set to **Secondary** or **Both**, IRQ15 is assigned by the system and is not available to the user.

Reserved Memory Size

This option specifies the size of the memory area reserved for legacy ISA adapter cards.

If this option is set to **Disabled**, the Reserved Memory Address option is not available for modification.

The Setup screen displays the system option:

Reserved Memory Size **Disabled**

Available options are:

Disabled

16K

32K

64K

Reserved Memory Address

This option specifies the beginning address (in hexadecimal) of the ROM memory area reserved for use by legacy ISA adapter cards.

If the **Reserved Memory Size** option is set to **Disabled**, this option is not available for modification.

The Setup screen displays the system option:

Reserved Memory Address **C8000**

Available options are:

C0000	D0000
C4000	D4000
C8000	D8000
CC000	DC000

On Board SCSI

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

The Setup screen displays the system option:

On Board SCSI Enabled

Available options are:

Disabled
Enabled

On Board VGA (*Model SB686P**V**XXXX Only*)

This option allows you to enable or disable the on-board VGA controller and BIOS.

The Setup screen displays the system option:

On Board VGA Enabled

Available options are:

Disabled
Enabled

Saving and Exiting

When you have made all desired changes to PCI/Plug and Play Setup, press **<Esc>** to return to the AMIBIOS Setup Main Menu screen.

You may make changes to other Setup options before exiting from AMIBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

Chapter 7: Peripheral Setup

When you select the Peripheral Setup from the AMIBIOS Setup Main Menu, the following Setup screen displays:

AMIBIOS SETUP - PERIPHERAL SETUP

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OnBoard FDC	**Auto**	**Available Options:**
OnBoard Serial Port1	**Auto**	**Auto**
OnBoard Serial Port2	**Auto**	**Disabled**
OnBoard Parallel Port	**Auto**	**Enabled**
Parallel Port Mode	**Normal**	
OnBoard IDE	**Both**	

ESC:	Exit ↓↑: Sel
PgUp/PgDn :	Modify
F2/F3:	Color

The Peripheral Setup Screen

When you display the Peripheral Setup screen, the format is similar to the sample shown above. The available values for each option are displayed on the right side of the screen when you tab or arrow into the field. If values display for all parameters, the Setup parameters have been defined previously.

Note : The values on this screen do not necessarily reflect the values appropriate for your processor board. Refer to the explanations below for specific instructions about entering correct information.

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.

The AMIBIOS allows automatic or manual setup of peripheral devices. The floppy drive controller, serial port, parallel port and IDE controller options on the **Peripheral Management** screen can each be set to **Auto** , which causes AMIBIOS to configure the peripherals automatically as described under each heading below.

When you set these options to values other than **Auto** , the values you set up manually are used by AMIBIOS when booting the system. AMIBIOS 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.

When this option is set to **Auto** , AMIBIOS 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.

The Setup screen displays the system option:

OnBoard FDC **Auto**

Available options are:

Auto
Disabled
Enabled

OnBoard Serial Port 1/OnBoard Serial Port 2

Each of these options enables the specified serial port on the processor board and establishes the base I/O address for the port.

The interrupts used by Serial Port 1 and Serial Port 2 may be assigned by jumper settings.

The Setup screen displays the system options:

OnBoard Serial Port1 **Auto**

OnBoard Serial Port2 **Auto**

Available options are:

Auto
Disabled
3F8H
2F8H
3E8H
2E8H

When this option is set to **Auto** , AMIBIOS also attempts to avoid address conflicts. If the off-board serial ports are configured to specific starting I/O ports via jumper settings, AMIBIOS configures the on-board serial ports to avoid conflicts.

AMIBIOS 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 AMIBIOS 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)

OnBoard Parallel Port

This option enables the parallel port on the processor board and establishes the base I/O address for the port. The interrupt used by the Parallel Port may be assigned by a jumper setting.

The Setup screen displays the system option:

OnBoard Parallel Port Auto

Available options are:

Auto
Disabled
378H
278H
3BCH

When this option is set to **Auto** , AMIBIOS 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 AMIBIOS to place the active parallel port addresses in lower memory (BIOS data area) for configuration as logical LPT devices.

Parallel Port Mode

This option specifies the parallel port mode. ECP and EPP are both bidirectional data transfer schemes which adhere to the IEEE P1284 specifications.

The Setup screen displays the system option:

Parallel Port Mode Normal

Three options are available:

- **Normal** uses normal parallel port mode.
- **EPP** allows the parallel port to be used with devices which adhere to the Enhanced Parallel Port (EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bidirectional data transfer driven by the host device.
- **ECP** allows the parallel port to be used with devices which adhere to the Extended Capabilities Port (ECP) specification. ECP uses the DMA protocol to achieve transfer rates of approximately 2.5MB/second. ECP provides symmetric bidirectional communication.

OnBoard IDE

This option specifies the on-board integrated drive electronics (IDE) controller channel(s) to be used.

The Setup screen displays the system option:

OnBoard IDE **Both**

Available options are:

Both
Disabled
Primary
Secondary

Note : If this option is set to **Secondary** or **Both** , the system assigns interrupt request 15 (IRQ15).

Saving and Exiting

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

You may make changes to other Setup options before exiting from AMIBIOS Setup. You may save the changes you have just made or you may exit from Setup without saving your changes.

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.

Nonfatal 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.

Beep Count	Message	Description
7	Processor Exception Interrupt Error	The CPU on the processor board has generated an exception interrupt.
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 RAM 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 nonfatal 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 Utility.

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 BIOS Setup Utility 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 BIOS Setup Utility.
CMOS Display Type Mismatch	The type of video stored in CMOS does not match the type detected by the BIOS. Run the BIOS Setup Utility 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 BIOS Setup Utility to correct the error.
CMOS System Options Not Set	The values stored in the CMOS are either corrupt or nonexistent. Run the BIOS Setup Utility to correct the error.

Message	Description
CMOS Time & Date Not Set	Use Standard Setup in the BIOS Setup Utility 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 BIOS Setup Utility 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	Interrupt channel #1 has failed the POST routine.
INTR #2 Error	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.

Message	Description
KB/Interface Error	The BIOS has found an error with the keyboard connector on the processor board.
Keyboard Error	The BIOS has encountered a timing problem with the keyboard. The Keyboard option in the Standard Setup portion of the BIOS Setup Utility 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 Initialization Code Checkpoints	
D0	NMI is disabled. Power-on delay starting. Initialization code checksum to be verified next.
D1	Initializing DMA controller, performing keyboard controller BAT test, starting memory refresh and entering 4GB flat mode next.
D3	Starting memory sizing next.
D4	Returning to real mode. Executing any OEM patches and setting stack next.
D5	Passing control to uncompressed code in shadow RAM at E000:0000H. Initialization code copied to segment 0 and control to be transferred to segment 0.
D6	Control in segment 0. Checking if <Ctrl> + <Home> was pressed and verifying system BIOS checksum. If <Ctrl> + <Home> was pressed or system BIOS checksum is bad, going to checkpoint code E0H next. Otherwise, going to checkpoint code D7H.
D7	Main BIOS runtime code to be decompressed and control to be passed to main BIOS in shadow RAM. Boot Block Recovery Code Checkpoints:
E0	Onboard floppy controller initialized, if any. Beginning base 512KB memory test next.
E1	Initializing interrupt vector table next.
E2	Initializing DMA and interrupt controllers next.

Code	Description
E6	Enabling floppy drive controller and timer IRQ's. Enabling internal cache memory.
ED	Initializing floppy drive.
EE	Looking for floppy diskette in drive A:. Reading first sector of diskette.
EF	Read error occurred while reading floppy drive in drive A:.
F0	Searching for AMIBOOT.ROM file in root directory.
F1	AMIBOOT.ROM file not in root directory.
F2	Reading and analyzing floppy diskette FAT to find clusters occupied by AMIBOOT.ROM file.
F3	Reading AMIBOOT.ROM file next, cluster by cluster.
F4	AMIBOOT.ROM file not correct size.
F5	Disabling internal cache memory next.
FB	Detecting type of flash ROM next.
FC	Erasing flash ROM next.
FD	Programming flash ROM next.
FF	Flash ROM programming successful. Restarting system BIOS next.

Runtime code is uncompressed in F000 shadow RAM.

03	NMI is disabled. Checking for soft reset/power-on next.
05	BIOS stack has been built. Disabling cache memory next.
06	Uncompressing POST code next.
07	Initializing CPU and CPU data area next.
08	CMOS checksum calculation to be done next.
0A	CMOS checksum calculation done. Initializing CMOS status register for date and time next.
0B	CMOS status register initialized. Next, performing any required initialization before keyboard BAT command issued.
0C	Keyboard controller input buffer free. Issuing BAT command to keyboard controller next.
0E	Keyboard controller BAT command result verified. Performing any necessary initialization after keyboard controller BAT test next.
0F	Initialization after keyboard controller BAT command test done. Keyboard command byte to be written next.
10	Keyboard controller command byte is written. Issuing Pin 23,24 blocking/unblocking command next.
11	Checking if <End> or <Ins> keys were pressed during power-on next. Initializing CMOS RAM if the "Initialize CMOS RAM in every boot" AMIBIOS POST option was set in AMIBCP or the <End> key was pressed.
12	Disabling DMA controllers 1 and 2 and interrupt controllers 1 and 2 next.
13	Video display disabled and port B initialized. Initializing chipset next.
14	8254 timer test to begin next.
19	8254 timer test over. Starting memory refresh test next.
1A	Memory refresh line is toggling. Checking 15 microsecond on/off time next

Code	Description
23	Reading 8042 input port and disabling MEGAKEY Green PC feature next. Making BIOS code segment writable and performing any necessary configuration before initializing the interrupt vectors.
24	Configuration required before interrupt vector initialization complete. Interrupt vector initialization about to begin.
25	Interrupt vector initialization done. Clearing password if POST diagnostic switch is on.
27	Any initialization before setting video mode to be done next.
28	Initialization before setting video mode is complete. Configuring monochrome mode and color mode settings next.
2A	Bus initialization (system, static, output devices) to be done next, if present. (See end of Port 80H Codes for details of different buses.)
2B	Passing control to video ROM to perform any required configuration before video ROM test
2C	All necessary processing before passing control to video ROM is done. Looking for video ROM next and passing control to it.
2D	Video ROM has returned control to BIOS POST. Performing any required processing after video ROM had control.
2E	Completed post-video ROM test processing. If EGA/VGA controller not found, performing display memory read/write test next.
2F	EGA/VGA controller not found. Display memory read/write test about to begin.
30	Display memory read/write test passed. Looking for retrace checking next.
31	Display memory read/write test or retrace checking failed. Performing alternate display memory read/write test next.
32	Alternate display memory read/write test passed. Looking for alternate display retrace checking next.
34	Video display checking over. Setting display mode next.
37	Display mode set. Displaying power-on message next.
38	Initializing bus (input, IPL, general devices) next, if present. (See end of Port 80H Codes for details of different buses.)
39	Displaying bus initialization error messages. (See end of Port 80H Codes for details of different buses.)
3A	New cursor position read and saved. Displaying “Hit <DEL>” message next
3B	“Hit <DEL>” message displayed. Protected mode memory test about to start.
40	Preparing descriptor tables next.
42	Descriptor tables prepared. Entering protected mode for memory test next.
43	Entered protected mode. Enabling interrupts for diagnostics mode next.
44	Interrupts enabled (if diagnostics switch is on). Initializing data to check memory wraparound at 0:0 next
45	Data initialized. Checking for memory wraparound at 0:0 and finding total system memory size next.
46	Memory wraparound test done. Memory size calculation done. Writing patterns to test memory next.
47	Memory pattern written to extended memory. Writing patterns to base 640KB memory next.

Code	Description
48	Patterns written in base memory. Determining amount of memory below 1MB memory next.
49	Amount of memory below 1MB found and verified. Determining amount of memory above 1MB memory next.
4B	Amount of memory above 1MB found and verified. Checking for soft reset and clearing memory below 1MB for soft reset next. (If power-on situation, going to checkpoint 4EH next.)
4C	Memory below 1MB has been cleared via soft reset. Clearing memory above 1MB next.
4D	Memory above 1MB has been cleared via soft reset. Saving memory size next. (Going to checkpoint 52H next.)
4E	Memory test started, but not as result of soft reset. Displaying first 64KB memory size next.
4F	Memory size display started. Display is updated during memory test. Performing sequential and random memory tests next.
50	Memory below 1MB has been tested and initialized. Adjusting displayed memory size for relocation and shadowing next.
51	Memory size display adjusted for relocation and shadowing. Testing memory above 1MB next.
52	Memory above 1MB has been tested and initialized. Saving memory size information next.
53	Memory size information and CPU registers are saved. Entering real mode next.
54	Shutdown was successful. CPU in real mode. Disabling Gate A20 line, parity and NMI next.
57	A20 address line, parity and NMI are disabled. Adjusting memory size depending on relocation and shadowing next.
58	Memory size adjusted for relocation and shadowing. Clearing “Hit <DEL>” message next.
59	“Hit <DEL>” message cleared. “Wait...” Message displayed. Starting DMA and interrupt controller tests next.
60	DMA page register test passed. Performing DMA controller 1 base register test next.
62	DMA controller1 base register test passed. Performing DMA controller 2 base register test next.
65	DMA controller_2 base register test passed. Programming DMA controllers 1 and 2 next.
66	Completed programming DMA controllers 1 and 2. Initializing 8259 interrupt controller next.
67	Completed 8259 interrupt controller initialization.
7F	Extended NMI sources enabling in progress.
80	Keyboard test started. Clearing output buffer, checking for stuck keys. Issuing keyboard reset command next.
81	Keyboard reset error or stuck key found. Issuing keyboard controller interface test command next.

Code	Description
82	Keyboard controller interface test completed. Writing command byte and initializing circular buffer next.
83	Command byte written, global data initialization completed. Checking for locked key next.
84	Locked key checking over. Checking for memory size mismatch with CMOS RAM data next.
85	Memory size check done. Displaying soft error and checking for pass- word or bypassing Setup next.
86	Password checked. Performing any required programming before Setup next.
87	Programming before Setup complete. Uncompressing Setup code and executing Setup utility next.
88	Returned from Setup program and screen is cleared. Performing any necessary programming after Setup next.
89	Programming after Setup complete. Displaying power-on screen message next.
8B	First screen message displayed. "Wait..." message displayed. Performing PS/2 mouse check and extended BIOS data area allocation check next.
8C	Programming Setup options next.
8D	Setup options are programmed. Resetting hard disk controller next.
8F	Hard disk controller reset done. Configuring floppy drive controller next.
91	Floppy drive controller configured. Configuring hard disk drive controller next.
95	Initializing bus option ROM's from C800 next. (See end of Port 80H Codes for details of different buses.)
96	Initializing before passing control to adapter ROM at C800.
97	Initialization before C800 adapter ROM gains control completed. Adapter ROM check next.
98	Adapter ROM had control and has returned control to BIOS POST. Performing any required processing after option ROM returned control.
99	Any initialization required after option ROM test has completed. Configuring timer data area and printer base address next.
9A	Set timer and printer base addresses. Setting RS-232 base address next.
9B	Returned after setting RS-232 base address. Performing any required initialization before coprocessor test next.
9C	Required initialization before coprocessor test is over. Initializing coprocessor next.
9D	Coprocessor initialized. Performing any required initialization after coprocessor test next.
9E	Initialization after coprocessor test is complete. Checking extended key board, keyboard ID and Num Lock key next. Issuing keyboard ID command next.
A2	Displaying any soft errors next.
A3	Soft error display complete. Setting keyboard typematic rate next.
A4	Keyboard typematic rate set. Programming memory wait states next.
A5	Memory wait state programming over. Clearing screen and enabling parity and NMI next.
A7	NMI and parity enabled. Performing any initialization required before passing control to adapter ROM at E000H next.

Code	Description
A8	Initialization before passing control to adapter ROM at E000H completed. Passing control to adapter ROM at E000H next.
A9	Returned from E000 ROM control. Going to do any initialization required after E000 option ROM control.
AA	Initialization after E000H option ROM control completed. Displaying system configuration next.
AB	Uncompressing DMI data and executing DMI POST initialization next.
B0	System configuration is displayed.
B1	Copying any code to specific areas.
00	Copying of code to specific areas done. Passing control to INT 19H boot loader next.

The System BIOS passes control to the different buses at the following checkpoints to do various tasks:

Code	Description
2A	Initializing different bus system, static and output devices, if present.
38	Initializing bus input, IPL and general devices, if present.
39	Displaying bus initialization error messages, if any.
95	Initializing bus adapter ROM's from C8000H through D8000H.

Additional BUS Checkpoints

While control is in the different bus routines, additional checkpoints are output to Port 80H as WORD to identify the routines being executed. These are WORD checkpoints. The LOW BYTE of checkpoint is the system BIOS checkpoint where control is passed to the different bus routines, and the HIGH BYTE of checkpoint indicates that the routine is being executed in different buses.

The information included in the high and low bytes of these checkpoints is detailed on the next page.

High Byte

The additional bus checkpoints listed above include the following information:

Bits		Description
Bits 7-4	0000	Function 0. Disable all devices on the bus.
	0001	Function 1. Initialize static devices on the bus.
	0010	Function 2. Initialize output devices on the bus.
	0011	Function 3. Initialize input devices on the bus.
	0100	Function 4. Initialize IPL devices on the bus.
	0101	Function 5. Initiate general devices on the bus.
	0110	Function 6. Initialize error reporting on the bus.
	0111	Function 7. Initialize add-on ROM's for all buses.

Bits 3-0 Specify the bus

0 Generic DIM Device Initialization Manager

1 Onboard system devices

2 ISA devices

3 EISA devices

4 ISA PnP devices

5 PCI devices **APPENDIX B**

Appendix B: Cirrus Logic 5446 VGA Display Drivers & Utilities

Introduction

This appendix provides operating instructions for user utilities and installation instructions for the display drivers supplied with your SB686PV VGA. The SB686PV VGA graphics system is VGA compatible. The CIRRUS LOGIC 5446 drivers and utilities supplied with the SB686PV VGA provide support for additional Super-VGA features of your VGA, such as greater speed, higher resolution and more available colors.

Before You Begin

The following instructions assume that you are familiar with DOS and certain DOS commands. Please review the associated DOS commands before performing the installation.

Throughout this appendix, the term 'DOS' refers to both MS-DOS and PC-DOS, except when noting features which are unique to one or the other.

Easy Installation

The CIRRUS LOGIC Display Drivers & Utilities installation utility program provides smooth installation of the display drivers and utility software. It is menu-driven and allows you to select and install display drivers for software and applications currently on your system.

Note: Some display drivers need to have the associated vendor's application program already installed on the system prior to loading the CIRRUS LOGIC 5446 VGA display drivers. In other cases, the loading of the display driver may be an integral part of the vendor's product installation process. Please review the driver product section below for specific instructions prior to running the installation utility.

Installation Utility

The installation utility is located on the diskette labeled CIRRUS LOGIC Drivers& Utilities. To install the desired display drivers and utilities, insert the diskette into the A: drive and type:

```
A:          <Enter>
INSTALL   <Enter>
```

Follow the instructions on the screen to install the listed display drivers. You may press <Esc> at any time to stop the installation process and return to DOS.

Selected drivers are simply copied to the specified disk and directory. Applications may require additional installation as described in the display drivers section of this appendix.

IMPORTANT

If you are using a multifrequency monitor, you may need a special 15-pin PS/2 compatible adapter cable. Make sure that your multifrequency monitor is configured properly for a PS/2 compatible analog VGA signal.

Some multifrequency displays have a switch to select 'TTL' or 'analog' operation; set this switch for 'analog'. Check the manual which came with your monitor for additional information on configuring it.

Utility Software

This section describes the utility programs which are supplied with your VGA and how to use them.

CLMode is a program which may be used to configure the various options of your 5446 VGA. CLMode is the DOS refresh utility used to increase the vertical refresh rate.

WinMode lets you change the operating resolution and the number of colors from within Windows.

CLMODE

The CLMode utility allows you to define the type of monitor attached to your system, set the video mode timings supported by the 5446 VGA and preview them.

Note: To use a mouse, a mouse driver should be installed prior to running the CLMode utility.

Using CLMode's Graphic Interface

CLMode requires that your processor have 300KB of standard memory and 3MB of extended or expanded memory available for it to run.

At the DOS prompt, type:

```
CD \VGAUTIL      <Enter>
CLMODE           <Enter>
```

When CLMode starts, the screen is blank for a short time. During this time, CLMode is attempting to identify the monitor's capabilities using the VESA Display Data Channel (DDC). In its graphics mode, CLMode looks and works just like a Windows application.

Select and configure the monitor that you connected to the graphics adapter. Use the drop-down boxes or press the **<Tab>** key until the **Monitor Brand** field is highlighted.

Resolutions and Refresh Rates

If the graphics adapter and the monitor both support a VESA Display Data Channel, this is the default choice. This means that CLMode was able to identify the monitor and knows what resolutions and refresh rates are available for the monitor.

Select the refresh rate for each resolution. If the monitor was selected by name, then selecting the highest refresh for each resolution gives the highest quality display. If **Other Brand** or **Other Model** was selected, consult the manual which came with the monitor to determine the proper refresh rates.

Hot Key Combinations

At the bottom of the screen are six buttons. Each button represents a different option or window. If you are using a mouse, click on the option desired. For keyboard use, the underlined letter of a button name specifies the hot key combination for that item. Press the **<Alt>** key and the underlined letter key simultaneously to select that option.

Configuration Information

In the lower right corner of the main window is configuration information about the graphics system. The information details the VGA BIOS version, the total display memory of the graphics controller, whether or not an EEPROM is present, and whether or not a centering TSR is loaded. This information is useful when installing software or getting technical support.

Preview Video Modes

Select the **Preview** button. The **Video Modes Preview** window displays a list of all of the modes supported based on the currently selected monitor timings and the amount of video memory present. This list of video modes tells you which are available in your current configuration for use with extended resolution drivers. To see what different video modes look like on your monitor, select the **Show** button. After each test screen is displayed, press **<Enter>** to advance to the next test. Press **<Esc>** to return to the **Video Modes Preview** window.

Centering Adjust

Centering is available while in Video Modes Preview (only for extended Graphics modes 58H and greater). While previewing a video mode, you have the option of using the arrow keys to adjust your screen accordingly. The screen adjustments have predefined limits. When you enter the Preview mode, you may find that the right side adjustment has already been reached. Once a mode has been adjusted, the new values for horizontal and/or vertical positioning are saved within CLMode.

CLMode prompts on whether you want to save these new parameters to the TSR (CENTER.COM). The values used for the adjusted modes are stored in CENTER.COM on exit. CENTER.COM can then be loaded outside of CLMode. Now all of the modes which you have adjusted are the active modes set when that mode request is made. Centering is not allowed if CENTER.COM has been loaded. You must unload CENTER.COM before attempting to save new adjustments.

You may only adjust and save 16 modes at a time to CENTER.COM. The information in the main window displays the VGA controller type, the BIOS version number, and the amount of video memory present.

Getting Help

Selecting the Help button from the main window displays instructions on using CLMode.

Information About CLMode

Selecting the **About** button displays version and copyright information about CLMode.

Undoing Changes

To return all settings to their state when CLMode was started, select the Undo button.

Exiting CLMode

To exit CLMode at any time, press the **<Alt>** and **<F4>** keys simultaneously, or click on the system button of the main window (i.e., the top left corner button of the window which is shown as a dot), or select the **Exit** button.

CLMode asks if the changes should be saved in the AUTOEXEC.BAT. In most cases, you should answer Yes. Answering No means that the next time the computer is booted, all of CLMode's configuration information is lost.

When the CLMode utility exits, the currently selected monitor brand, model, timings and centering information are saved. The current monitor timings are displayed.

Using CLMode's Command Line Options

When command line options for CLMODE.EXE are given at the DOS prompt, the menu-driven windows are not displayed. Instead, configuration, monitor type, video mode and refresh rate are set at the DOS prompt.

To display the available command line syntax for CLMode, type:

```
CLMODE /? <Enter>
```

Typing an invalid option displays the command line help text. Typing '**S**' as a command line option displays the current CLMode settings.

WINMODE

The WinMode utility configures your graphics system for Windows 3.X in either DOS or original OS/2 2.1. It allows you to change the monitor refresh rates, resolution, number of available colors, large or normal size fonts and font cache size.

After new options have been selected, you can either restart Windows, in which case the new resolution takes effect immediately, or continue working in the current resolution, in which case the new resolution takes effect the next time Windows is started. In some configurations the AUTOEXEC.BAT file needs to be modified to make the changes permanent.

WinMode assumes that the Windows drivers have been correctly installed and configured using the installation utility provided on the Windows 3.X Drivers & Utilities diskette.

For installation instructions, see the section on Windows 3.X drivers in this appendix.

Using WinMode

WinMode is run by selecting its icon. The icon is located in the group you specified during the installation process. When WinMode is started the screen may become blank for up to two seconds while WinMode attempts to discover the capabilities of the monitor. If it can determine the monitor's capabilities, you will see only one choice besides the **Other Brand** and **Other Model** choices in the **Monitor Brand** and **Monitor Model** drop-down boxes.

Monitor Brand

Select the brand of your monitor from the list provided in the drop-down box. This changes the list of monitors in the **Monitor Model** drop-down box to display only the models available for the selected brand. If your monitor brand is not listed, select **Other Brand**.

If your graphics adapter and monitor both support VESA Display Data Channel, this is the default choice. This means that WinMode was able to identify the monitor and knows what resolutions and refresh rates are available for the monitor.

Monitor Model

Select the current model from the list first presented. If your monitor is not listed, select **Other Monitor**. If your graphics adapter and monitor both support VESA Display Data Channel, this is the default choice. This means that WinMode was able to identify the monitor and knows what resolutions and refresh rates are available for the monitor.

Monitor Refresh Rates

The drop-down list boxes let you select the monitor refresh rates for each resolution. If you select **None** for any screen resolution, any higher resolutions will also be unavailable. This also turns off the corresponding choices in the **Resolution** box.

The only choices that are available are those available to the monitor which was selected in the **Monitor Brand** and **Monitor Model** fields. If **Other Brand** or **Other Model** were selected, all of the refresh rates available on the graphics adapter are listed. Consult the manual that came with your monitor to determine the best choices.

In general, the higher the refresh rate, the better the display quality and the lower the performance. This is because the graphics system can only do a fixed number of operations per second. The more time it spends redrawing the screen, the less time it has available to perform other operations.

Resolution

These buttons let you choose the resolution which WinMode will use to run Windows 3.X after Windows is restarted. Some of these buttons may be unavailable because of the amount of video memory in your system or if some of the monitor refresh rates have been set to Unavailable.

Colors

These buttons let you choose the number of colors which will be available to Windows 3.X after Windows is restarted. Some of the selections may be unavailable because of the amount of video memory in your system and the resolution you have selected. If you have chosen OS/2 v2.1 in the Operating System field, the only possible choices are for 16 or 256 colors. Generally, 256 color mode provides the best performance. If you need more colors there will be some slowdown in graphics performance.

Font Size

The small fonts are intended for lower resolutions and higher resolutions on large monitors. With smaller monitors, the large fonts are more readable at higher resolutions.

Font Cache Size

The **Font Cache Size** lets you set the amount of system memory which is available for font caching. Next to the font cache size are an up arrow and a down arrow. Click on the up arrow to increase the cache size. Click on the down arrow to decrease the cache size.

Font caching is a technique to increase the performance of Windows by saving the bitmaps of frequently used characters. Normally, when a character is displayed on the screen it first is created from the TrueType outline and then is copied to the screen. A cached character has already been created and stored and so it is just copied as needed. WinMode has tried to determine the correct setting for this field for you, but you may change it. However, remember that memory set aside for font caching is not available for Windows program and system usage.

Operating System

The **Operating System** buttons let you select the operating system on which you are running Windows.

This is very important because the configuration and capabilities of the drivers are very different in OS/2 and DOS. The most obvious difference is that the drivers only work in 16 and 256 color modes in OS/2. There are a number of other differences in the configuration of the drivers. Prior to installing OS/2 for Windows, you need to run WinMode and select the **OS/2** option.

Note: Not all versions of WinMode have the DOS/OS2 option. If yours does not, the option is not necessary for your configuration.

OK

The **OK** button closes the dialog box and accepts the selections you have made.

After you click on **OK**, your computer is reconfigured to use the selections you have made. These changes may need to be added to your AUTOEXEC.BAT file to become permanent. If this is necessary, you are prompted by the program.

If WinMode detects that you changed your Windows 3.X configuration, you are asked if Windows should be restarted. If you answer Yes, Windows restarts immediately. If you answer No, you have to exit Windows and restart it manually before the changes take effect.

Cancel

The Cancel button closes the dialog box and exits the program without making any changes. Selecting Close from the control menu or double clicking on the control menu box has the same effect.

About

The About button displays a dialog box with the version number of WinMode and a copyright notice.

Help

For help on WinMode, select the Help button. The main help screen contains an image of the WinMode screen. Place the cursor over the field(s) for which you need help. Click the mouse to display the help text for that field. Click again to make the pop-up text disappear.

Windows 3.1x Installation

You must use INSTALL.EXE (from Windows) to install the new graphics drivers and utility files. All graphics drivers and support files are copied to Windows sub-directories, and the utility files are copied to the drive and directory you specify. Messages displayed in this program automatically appear in the same language as the Windows language. For languages not supported, English appears instead.

At the end of the installation, the WinMode utility is executed to complete the new driver setup. This utility allows you to configure your graphics system for Windows 3.1x in either DOS or OS/2 Warp/2.X1. See the WinMode section earlier in this appendix for complete instructions on using this program.

Using Install

To run the installation program, first start Windows 3.1x.

1. Set the Windows display to **VGA**.
2. Insert the diskette labeled Windows 3.1x Drivers & Utilities into your floppy disk drive.
3. From the Windows Program Manager select the Run command from the File menu.
4. In the Run dialog box, type the floppy drive letter and install in the command line field. For example, type the following:

   ```
   a:\install
   ```

5. Press **<Enter>** or click on the **OK** button. An hourglass icon indicates that the program is being loaded.

If you need to leave the installation program, select the Exit button or continue by pressing the **<Enter>** key. (The optional dialog box may not appear, as defined by the installation script.)

Defining the Destination Path

The main installation dialog box contains an editable text line and a short instruction displayed in a vertical scroll box. The purpose of the box is for defining the destination path to which the utility files are copied. If you want the default drive and directory shown, press the **<Enter>** key to continue; otherwise, you may edit the path manually to another drive and directory.

Choose Browse to easily find and select an existing path. For keyboard access, press **<Tab>** to reach a list box or use the **<Alt>** key and underlined letter combination to quickly move to a list box. Once in a list box, use the up and down arrow keys to browse, and press the **<Enter>** key to select or double-click with the mouse. The complete browse path is shown toward the top of the dialog box. Select OK to overwrite the copy destination line in the main dialog box with the highlighted path, or click on Cancel to end the browse function without changing the path name. From the main dialog box, you may decide to exit the program, or continue to the next dialog box.

If you select Continue, a small dialog box displays so that you can verify the destination path you have selected. You may select the Go back button to return to the main dialog box to change the destination path or press **<Enter>** or the Install button to start the installation process using the selected path.

If the drive does not exist, a message box appears that indicates the problem. If the directory does not exist, the installation program creates one for you.

Installation Progress

A dialog box displays the installation progress as each file is copied to the hard disk. Press **<Cancel>** if you want to stop the installation procedure. From the message dialog box which displays, you may choose to continue the installation or exit the program. If you select Exit, the driver and utility installation is incomplete upon exiting.

Some installations use multiple diskettes. In this case, a message dialog box appears when the next diskette is required. Usually, the copy source path shown in this dialog box does not need to be changed, but may be changed to locate the next source diskette. Press **<Enter>** to continue copying.

After all the files have been installed, a dialog box displays allowing you to create a new group window or select an existing group. This is the group which is to be used for the utility program(s) you just installed. The selected group name is shown in the editable text line.

You may select Skip to bypass this part of the installation. However, if you do select Skip, no icon(s) are set up for you to use to invoke the WinMode utility program. (This dialog box may not appear as determined by the installation script.)

A final dialog box informs you that the installation is complete. (This dialog box may not appear as determined by the installation script.)

Resolution

These buttons let you choose the resolution WinMode will use to run Windows 3.X after Windows is restarted. Some of these buttons may be unavailable because of the amount of video memory in your system or if some of the monitor refresh rates have been set to None.

Colors

These buttons let you choose the number of colors which will be available to Windows 3.X after Windows is restarted. Some of these selections may be unavailable because of the amount of video memory in your system and the resolution you have selected. Generally, 256 color mode provides the best performance. If you need more colors there will be some slowdown in graphics performance.

Font Size

The small fonts are intended for lower resolutions and higher resolutions on large monitors. With smaller monitors, the large fonts are more readable at higher resolutions.

Monitor Refresh Rates

The drop-down list boxes let you select the monitor refresh rates for each resolution. If you select None for any screen resolution, any higher resolutions will also be unavailable. This also turns off the corresponding choices in the Resolution box.

In general, the higher the refresh rate, the better the display quality and the lower the performance. This is because the graphics system can only do a fixed number of operations per second. The more time it spends redrawing the screen, the less time it has available to perform other operations.

Consult the manual which came with your monitor to determine the proper settings for these fields.

Font Cache Size

The **Font Cache Size** lets you set the amount of system memory which is available for font caching. Next to the font cache size are an up arrow and a down arrow. Click on the up arrow to increase the cache size. Click on the down arrow to decrease the cache size.

Font caching is a technique to increase the performance of Windows by saving the bitmaps of frequently used characters. Normally, when a character is displayed on the screen it first is created from the TrueType outline and then is copied to the screen. A cached character has already been created and stored and so it is just copied as needed.

WinMode has tried to determine the correct setting for this field for you, but you may change it. However, remember that memory set aside for font caching is not available for Windows program and system usage.

OK

The **OK** button closes the dialog box and accepts the choices that you have made.

After you click on **OK**, your computer is reconfigured to use the selections you have made. These changes may need to be added to your AUTOEXEC.BAT file to become permanent. If this is necessary, you are prompted by the program.

If WinMode detects that you changed your Windows 3.X configuration, you are asked if Windows should be restarted. If you answer Yes, Windows restarts immediately. If you answer No, you have to exit Windows and restart it manually before the changes take effect.

Cancel

The Cancel button closes the dialog box and exits the program without making any changes. Selecting Close from the control menu or double clicking on the control menu box has the same effect.

About

The **About** button displays a dialog box with the version number of WinMode and a copyright notice.

Help

For help on WinMode, select the Help button. The main help screen contains an image of the WinMode screen. Place the cursor over the field(s) for which you need help. Click the mouse to display the help text for that field. Click again to make the pop-up text disappear.

After the extended resolution drivers and utilities have been installed, they can be reconfigured either from within the Windows 3.X Control Panel or from the DOS prompt.

Reconfiguring Windows 3.X

If you are in Windows, run WinMode to reconfigure the Windows 3.X drivers. Please refer to the W*inMode* section earlier in this appendix for information on WinMode.

If you are in DOS, proceed as follows to reconfigure the Windows 3.X drivers:

1. Ensure that Windows 3.X and the extended resolution drivers are already installed on your computer.
2. From your Windows directory, at the DOS prompt, type the following to run the Windows SETUP.EXE program:

   ```
   CD\WINDOWS <Enter>
   SETUP <Enter>
   ```

Follow the instructions on the screen. When you come to the screen which lists the hardware and software components such as display adapter (e.g. VGA, CGA, etc.), keyboard type, mouse type, etc., go to the Display selection by using cursor keys to move the highlighted bar and press **<Enter>**.

3. The list of drivers and their associated resolutions displays.
4. Highlight your selection by moving the cursor to the correct display driver, and then press **<Enter>**.
5. Setup prompts you that the driver is already in your Windows directory and gives you a chance to replace it. Use the existing driver.
6. Continue with the remainder of the setup procedure.

To Turn On/Off DDC Detection Support

To turn the DDC detection support on or off, the following changes must be made to the WINMODE.INI file.

To turn on DDC detection support:

```
MakeDdcCall=on
```

To turn off DDC detection support:

```
MakeDdcCall=off
```

To Turn On/Off Resolution-Change-on-the-Fly Support

To turn the resolution-change-on-the-fly support on or off, the following changes need to be made to the WINMODE.INI file.

To turn on resolution-change-on-the-fly support, locate the following line in the WINMODE.INI file and change the last word in the line to ‘on’:

```
system.ini,CL_WinAccel,changeres:lin=$winmode.ini,  Configuration,changeres,on
```

To turn off resolution-change-on-the-fly support, locate the following line in the WINMODE.INI file and change the last word in the line to ‘off’:

```
system.ini,CL_WinAccel,changeres:lin=$winmode.ini,  Configuration,changres,off
```

Windows NT 3.1

Windows NT 3.1 Display Drivers Installation

1. Start Windows NT.
2. From the Main window of the Program Manager run the Windows NT Setup program.
3. Select Change Systems Settings from the Options menu of Setup.
4. Click on the down arrow at the right side of the DISPLAY: line. Scroll to the end of the list of available display drivers and select Other display (requires a disk from the hardware manufacturer).
5. Insert the Windows NT display driver diskette into drive A: and type: A:\ as the pathname, then click on OK.
6. The list of available drivers, their associated resolution and monitor refresh rates is displayed.
7. Highlight by moving the cursor to the desired display driver, click on OK, and then click on Close.
8. Continue with the remainder of the setup procedure. The changes do not take effect until the computer is restarted.
9. After you have installed the Windows NT driver, to select another display resolution, follow steps 2 and 3 above, then click on the down arrow on the right side of the DISPLAY: line to select the desired resolution from the list of available display drivers.

Note: These Windows NT drivers only support systems or video adapters with 1MB of DRAM or more.

Windows NT 3.5

The following steps describe how to install Windows NT 3.5 display drivers:

1. Select Control Panel from the Main group.
2. Select the Display icon.
3. Select Change Display Type.
4. Select Change from the Adapter Type area.

5. Select Other.
6. Place the Windows NT 3.5 installation disk into drive A.
7. Select Install and click Yes when the Installing Driver dialog box appears.
8. When the Windows NT Setup dialog box appears, select Drive A:, and click on Continue. A message appears stating that the drivers were successfully installed. Click on OK. You must now restart Windows NT 3.5.

Selecting Resolution and Color Depth

1. Select Control Panel from the Main group.
2. Select the Display icon.
3. Select Color Palette to change between 16 colors, 256 colors and 65536 colors.
4. To select desktop resolution size, go to the Desktop area and use the slide bar to change the resolution from 640x480, 800x600, 1024x768 and 1280x1024.
5. Select Test to test the resolution. If the display test screen was good, select Yes when the Test Mode dialog box appears. If the display test screen was bad, select No. Windows NT gives you an error message.
6. If the display screen was good and you selected Yes, Windows NT 3.5 prompts you to restart Windows NT 3.5.

Power Management Screen Saver

About the Screen Saver

The Display Power Manager for Windows 3.X provides a mechanism to control the amount of power used by a computer's monitor. It provides a total of five levels of power saving.

The first level is a conventional screen saver that turns the screen black and bounces around a logo. The black screen provides substantial power saving and the animation lets you know that the computer is still active.

The other four levels of power saving are:

Reduced On Mode

Reduced on mode is an optional power saving state which allows the computer to use some power saving while still fully operational. Currently this is limited to some portable computers which can lower the power usage on their LCD displays. This causes some degradation of display quality.

StandBy Mode

Standby mode is an optional power saving state which gives minimal power saving, but provides the fastest recovery time.

Suspend Mode

Suspend mode is a mandatory state in which substantial power saving is achieved by the display. The trade-off is that recovery times are longer than from standby mode.

Off Mode

Off mode provides the highest level of power saving and the longest recovery times. With this mode the display is actually turned off so that recovery times are equivalent to switching the monitor on.

These four levels match the power saving modes defined by the VESA VBE/PM standard. As you move down from one mode to the next, the amount of power being saved is greater, but so is the amount of time that it takes for a monitor to recover and be ready to display data.

The screen saver cycles through all of the selected power saving modes one after another until the maximum selected power saving mode has been reached. The number of minutes specified for each level is the number of minutes after the previous mode has been enabled. It is not the total time before entering that mode.

To select a power saving mode:

1 Select Control Panel from the Main group.

2. Select Desktop.

3. In the group Screen Saver within the Desktop dialog box, select the Screen Saver named Display Power Manager.

4. Select the desired delay before entering a power saving mode.

5. Select Setup to further configure the power saving options.

The following sections describe these options. For further information on setting up Windows screen savers, please refer to the Windows User Guide.

Special Considerations

Some of these power saving modes are intended for specific display types, so not all of them are available on all video controllers. On some controllers, only the animated logo is available.

For the power saving modes to have any effect beyond just blanking the screen, the monitor being used must have specific power saving features.

Note that if the screen saver is in any of the power saving modes, moving the mouse does not wake it up. This is different from normal screen savers and is used to keep the monitor from waking up because of accidents such as bumping the desk where the computer is sitting. This is especially important if the password option is enabled, since once the password dialog box pops up, it stays there until the user turns it off. This is a limitation of the Windows 3.X screen saver interface.

Using the Screen Saver

When the screen saver is started, it initially displays a bouncing logo on a black background. To enable additional levels of power saving, select them from the Screen Saver Mode section of the Setup dialog box.

Screen Saver Mode

The Screen Saver Mode section has four check boxes in it. They are Reduced On, StandBy, Suspend and Off. The screen saver detects the type of graphics controller being used and the power saving capabilities it has.

If the text immediately to the right of any of the check boxes is unavailable, that option may not be selected. If a power saving mode is available, the text immediately to the right of the check box is black. If the box is selected with the mouse or the keyboard, the rest of the fields on the line also turn black. If the check box is deselected, the other fields turn gray.

Minutes Field

The minutes field for each line can be changed only if the check box for that line is selected. The amount of time can be set for any number between 1 and 60. The number be entered by manually typing or by clicking on the up or down arrow next to the number. Holding the mouse button down on the arrow quickly increases or decreases the minutes field.

The number of minutes specified for each level is the number of minutes after the previous mode has been enabled. It is not the total time before entering that mode.

Screen Saver Animation Speed

The scroll bar controls how fast the animation moves. The check box controls whether or not a bouncing sound is played whenever the logo hits an edge of the screen.

Password Options

If the password check box is enabled, the screen saver prompts the user for a password before it quits. The password is the same one used for other Windows 3.X screen savers.

Windows 95

This section describes the installation and setup instructions for Windows 95.

1. Click on the Start box and proceed to Settings, Control Panel. Open the Control Panel and select the Display icon or right click on your Windows 95 desktop to show the Display Properties dialog box.
2. From the Display Properties dialog box, select the Settings tab and then select the Change Display Type button.
3. From the Change Display Type dialog box under the Adapter Type section, select the Change button.
4. From the Select Device dialog box select Have Disk.
5. Insert the CIRRUS LOGIC Windows 95 Drivers & Utilities disk into floppy drive A: or B: and select the OK button.
6. From the Select Device dialog box select either the CIRRUS LOGIC 5446 PCI with VPM DirectDraw V1.00 or 5446 VLB Display Drivers. Select OK and then Close to exit the Change Display Type menu. Select Close again to exit the Display Properties folder. Select Yes to restart the computer before the new driver takes effect.

7. Reboot Windows 95 with the new drivers.
8. After rebooting, return to the Display Icon/Display Properties dialog box. Notice that there is a new tab called Refresh Rate. This tab allows you to select refresh rates which are supported in your monitor.
9. Select the Settings tab and you should now be able to select your resolution and color depth.

How to Change Color Depth

1. Make sure you have installed the CIRRUS LOGIC 5446 Windows 95 driver.
2. Click on the Start box in the lower left corner and proceed to Settings, Control Panel.
3. Inside the Control Panel group, click on the Display icon to open the Display Properties folder and select the Settings tab.
4. Click on the pull-down arrow from the Color palette area to select color depth.
5. Select OK to restart Windows 95.

How to Change Resolution

1. Make sure you have installed the CIRRUS LOGIC 5446 Windows 95 driver.
2. Click on the Start box in the lower left corner and proceed to Settings, Control Panel.
3. Inside the Control Panel group, click on the Display icon to open the Display Properties folder and select the Settings tab.
4. Adjust the sliding bar to either Less or More from the Desktop area.
5. Select OK and the new resolution takes effect.
6. The Change Resolution Utility will behave as if the display is OK. If the display is OK select Yes, if the display is corrupted, select No or Wait and the display returns to the previous resolution.

How to Change Monitor Refresh Rate and Display Type

1. Make sure you have installed the CIRRUS LOGIC 5446 Windows 95 driver.
2. Click on the Start box in the lower left corner and proceed to Settings, Control Panel.
3. Inside the Control Panel group, click on the Display icon to open the Display Properties folder and select the Refresh tab.
4. You can switch to different refresh rates for different resolutions and/or switch to different display types in the Active display area.
5. When you select a different Refresh rate for your current resolution, as the Refresh utility sets the new Refresh rate, it asks if the display is OK. Select Yes if the display is OK and No if the display is corrupted. Or you can wait and the display returns to its previous refresh setting.

OS/2 2.1, 2.11, 3.0

The following is the procedure to upgrade OS/2 2.X to support OS/2 3.0 drivers. You may also use these drivers to upgrade your OS/2 3.0 drivers.

Note: OS/2 version 2.X and 3.0 supports 16 color, 256 color, 64K color, and 16 million color resolutions.

You need the following programs for installation: CLMODE.EXE or Video Adapter Utility program to select monitor type.

Install From Floppy Diskette

1. Insert the OS/2 display driver disk into a floppy drive.
2. Invoke an OS/2 window session or an OS/2 full screen session.
3. Select the floppy drive containing the display driver disk.

For example, type:

```
a: <Enter>
```

4. Run SETUP.CMD from the floppy drive as follows:

```
SETUP a: c: <Enter>
```

This upgrades your OS/2 to allow you to use the drivers. When setup is finished it instructs you to reboot and run the Display Driver Install in your System Setup folder. Reinsert your driver disk.

5. Check the Primary Display check box from the DISPLAY DRIVER INSTALL dialog box.
6. Select the Accelerated Driver from the Cirrus Logic 5446 from the PRIMARY DISPLAY ADAPTER TYPE dialog box.
7. The MONITOR CONFIGURATION/SELECTION UTILITY dialog box appears. Click on OK for default monitor settings (which is monitor type 3) or select Display Adapter Utility Program and run your display adapter utility program to set your monitor type.

For example:

```
c:\vgautils\clmode.exe t640=75  t800=75
 t1024=75  t1280=75
```

CLMODE.EXE comes on your Display Drivers & Utilities disk.

8. Select the display resolution of choice from the S ELECT DISPLAY RESOLUTION list box.
9. Click on the Install button in the SOURCE DIRECTORY dialog box and follow the prompts.

System Setup

After the installation is complete, open the System Icon in the System Setup, located in the OS/2 System Folder.

On Page 1 of the System Settings: Screen, note the screen resolution and screen refresh rates.

On Page 2 of the System Settings: Screen, note the Change Display Configuration: Display Name which describes the current display monitor, and the View Current Configuration button. Select a monitor from the Display Name list. Go to Page 2 and click on the View Current Configuration button to display the Configuration screen which displays the maximum resolutions and refresh rates supported by the monitor you have selected. Select the desired resolution and the highest refresh rate for your selected monitor. This translates to the Screen Refresh Rate on page 1.

Win3.X Drivers for OS/2 2.X - 3.0

The new OS/2 drivers install Win-OS/2 drivers. No special installation is required.

Problems Running SVGA.EXE in DOS

If you encounter problems using SVGA.EXE in Windowed DOS or Full Screen DOS, follow the procedures below:

1. Have a DOS Boot Disk available and boot with the DOS operating system in drive A:.
2. Run CLMODE.EXE to set the monitor type.

For example:

```
c:\vgautils\clmode.exe t640=75 t800=75

t1024=75 t1280=75
```

3. Insert the OS/2 installation disk in drive A:, or go to the OS/2 sub-directory.

For example:

```
c:\OS/2
```

4. Run SVGA.EXE.

For example:

```
SVGA ON DOS
```

This creates an SVGADATA.DOS file on your diskette.

5. Copy this file to your OS/2 subdirectory on your hard drive. For example: copy a:\SVGADATA.DOS [BOOT DRIVE]:\os2\SVGADATA.PMI

If your C: drive is formatted with HPFS, boot from the OS/2 install disk and disk #1; then <Esc> out to an OS/2 command prompt, insert the diskette with the SVGADATA.DOS file and execute the copy command above.

6. Remove the diskette from drive A: and reboot the OS/2 operating system.

Any time SVGA.EXE does not run in DOS Windowed or DOS Full Screen, repeat this procedure.

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(according to ISO/IEC Guide 22 and EN 45014)

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-EN 55022 Measurement of radio interference characteristics of information technology equipment.

EN 50082-1:1992 Immunity, Generic Requirements.
-IEC 1000-4-2:1995 Immunity for radiated electromagnetic fields.
-IEC 1000-4-3:1995 Immunity for radiated RF electromagnetic fields.
-IEC 1000-4-4:1995 Immunity for AC and I/O lines, fast transients common mode.

EN 60950:1992 Safety of Information Technology Equipment.

September 18, 1997
San Diego, CA

Mr. Steven R. Peltier
President & Chief Executive Officer

Information supporting this declaration is contained in the applicable Technical Construction file available from:

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Printed Name of Party Responsible: Mr. Steven R. Peltier
President & Chief Executive Officer

Executed on (Date), at (Place): September 17, 1997
San Diego, CA

BUG REPORT

While we have tried to assure this manual is error free, it is a fact of life that works of man have errors. We request you to detail any errors you find on this BUG REPORT and return it to us. We will correct the errors/problems and send you a new manual as soon as available. Please return to:

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Please list the page numbers and errors found. Thank you!