TRENTON

PENTIUM® PRO
PROCESSOR

with Video

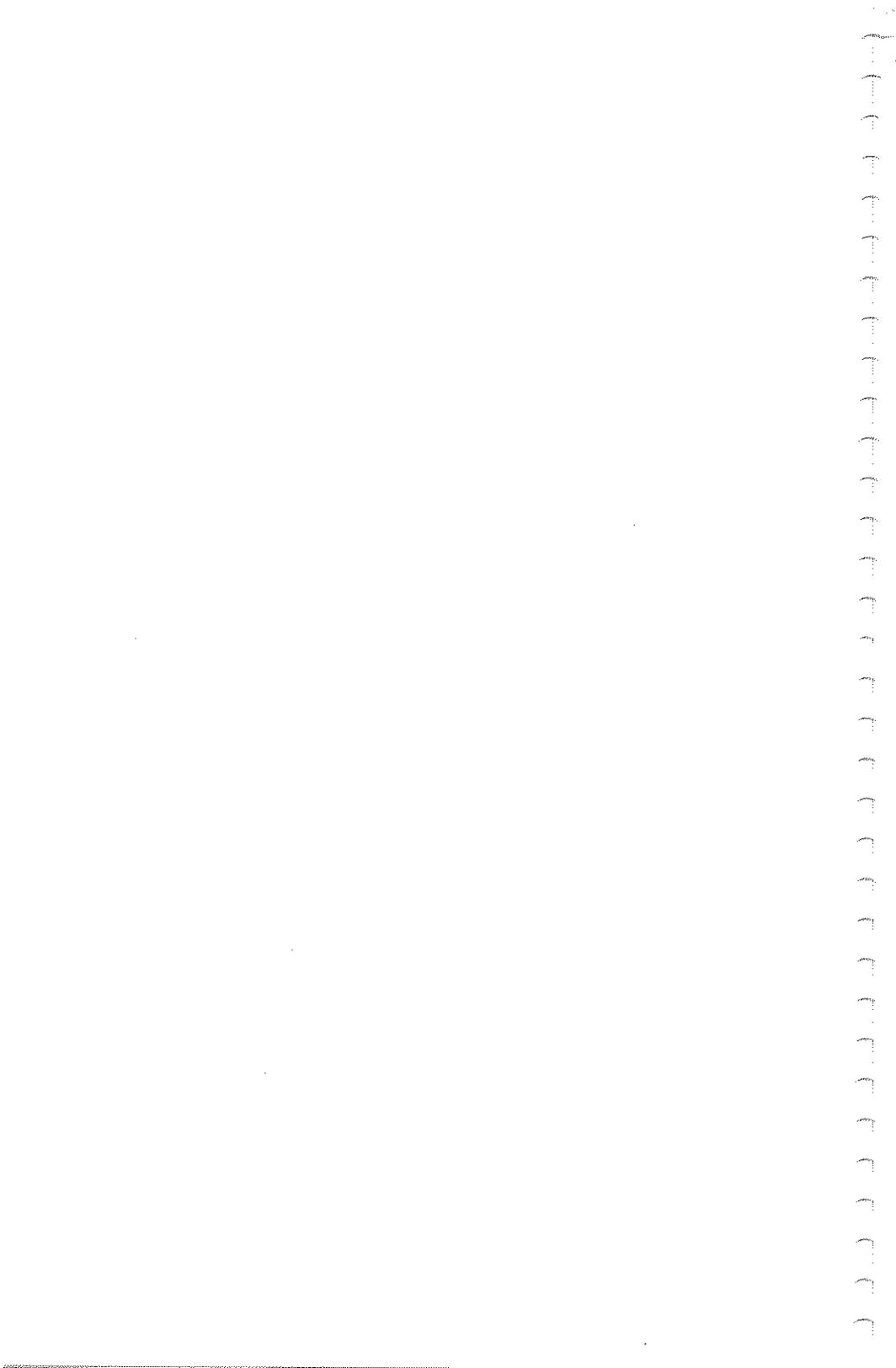No. 8705487   Revision C

Technical Reference

TR-P6V5/200

TR-P6V2/200

TR-P6V2/180

$C\epsilon$

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Return Address:

> TRENTON Technology Inc.
> 1001 Broad Street
> Utica, NY 13501
> Attn: Repair Department

For Return Authorization, call:

(800) 875-6031
or (770) 287-3100
Fax: (770) 287-3150

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HANDLING PRECAUTIONS

WARNING: 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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INTRODUCTION

The TR-P6V full-featured ISA/PCI processors are single board computers which feature Pentium® Pro CPU, Intel 440FX (Natoma) chipset, Cirrus Logic video interface, DRAM, PCI Local Bus, cache, floppy controller, dual EIDE interface, PCI Ultra SCSI controller, two serial ports, parallel port, speaker port, mouse port and keyboard port on a single ISA card. These single-slot, high performance processors plug into PICMG ISA/PCI passive backplanes and provide 100% PC compatibility for the system expansion slots.

MODELS

Model Name	Model #	CPU Speed
TR-P6V5/200/xM	5487-02	Pentium Pro CPU at 200MHz with 512K cache
TR-P6V2/200/xM	5487-01	Pentium Pro CPU at 200MHz with 256K cache
TR-P6V2/180/xM	5487-00	Pentium Pro CPU at 180MHz with 256K cache

where xM indicates memory size (0M = 0MB memory, 2M = 2MB memory, etc.)

FEATURES

- Pentium Pro microprocessor at 200MHz or 180MHz

- Intel Pentium Pro 440FX (Natoma) chipset with PCI bandwidth greater than 100MB/second

- 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 512KB secondary write-back cache memory

FEATURES (continued)

- PCI Local Bus supports off-board PCI option cards, Cirrus GD5446 SVGA controller and on-board PCI Ultra SCSI controller - Symbios Logic 53C860

- 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

- Board temperature monitor system (BTMS)

- Supports 1M x 36, 2M x 36, 4M x 36, 8M x 36 and 16M x 36 SIMMs

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

- Full PC compatibility

CPU

- Intel Pentium Pro at 200MHz or 180MHz using Socket 8

BUS INTERFACES

- ISA and PCI Local Bus compatible

DATA PATH

- DRAM/Memory - 64-bit
- ISA Bus - 16-bit
- PCI Bus - 32-bit
- Video - 64-bit

BUS SPEED - ISA

- 8.25MHz for 200MHz
- 7.50MHz for 180MHz

BUS SPEED - PCI

- 33MHz for 200MHz
- 30MHz for 180MHz

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 a 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:. Custom BIOSs are available.

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 gold finger 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 gold contacts.

DRAM MEMORY (continued)

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 Cirrus SVGA controller and to standard

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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.

UNIVERSAL SERIAL BUS (USB)

The Universal Serial Bus (USB) is an interface allowing for connectivity to many standard PC peripherals via an external port.

PCI SUPER VGA INTERFACE

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 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.

BTMS - BOARD TEMPERATURE MONITOR SYSTEM

The board temperature monitor system uses the Dallas Semiconductor DS1620 digital thermometer and thermostat. This device has a three-wire computer interface that provides the ability to read the current temperature of the DS1620 on the processor board. It also has three thermostat control pins that can be used to determine if the temperature lies within or outside limits programmed into the DS1620.

The three-wire computer interface to the DS1620 is wired via bits 3 and 4 of the on-board parallel port data latch (I/O address 278H, 378H or 3BCH) and bit 3 of the printer controls (27AH, 37AH or 3BEH).

DS1620 Signal	On-Board Parallel Bit
CLK/CONV	278, 378 or 3BC Bit 4
RST	278, 378 or 3BC Bit 3
DQ	27A, 37A or 3BE Bit 3 (inverted)

A non-volatile control register in the DS1620 contains control bits that set its "CPU USE" mode and "1SHOT" mode. Two other non-volatile registers set high and low temperature limits.

The significance of "CPU USE" mode is that when it is on, a three-wire command transfer is required to start the temperature conversion after power-up. If the "CPU USE" mode is off, the device is configured in "standalone" mode and temperature conversion after power-up starts when CLK/CONV goes low with RST already low.

If the DS1620 is configured with the "CPU USE" bit off, temperature conversion is enabled after power-up by virtue of the fact that data bits 4 and 3 in the data latch of the on-board parallel I/O port are cleared. Under these circumstances, however, if data is transferred via the parallel I/O port, the conditions on bits 4 and 3 affect whether or not the DS1620 has temperature conversion enabled. Printing over the on-board parallel port conflicts with using standalone mode.

The recommended alternative to standalone mode is the "CPU USE" mode. This mode requires that a three-wire command transfer be executed at least once after power-up, preferably during bootup, to start temperature conversion. Because this sequence affects the conditions on the on-board parallel port, it should not be executed while other parallel activity, such as background printing, is taking place.

After temperature conversion is started, the three thermostat control bits on the DS1620 reflect if the current temperature exceeds the limits programmed into the high and low temperature registers. The three thermostat control bits can be read via an input from the I/O port address programmed into the ADRx register that controls the watchdog timer.

The following is a list of the possible conditions for these thermostat control pins and the bits in the ADRx I/O port where they can be read:

TCOM (ADRx-0)	TLOW (ADRx-1)	THIGH (ADRx-2)	Current Temperature Condition
0	0	0	Inside limits
0	1	0	Below low temperature
1	0	1	Above high temperature
1	0	0	Inside limits but it did exceed the high and has not since gone under the low.

Sample program code and demonstration programs which exercise the board temperature monitor system are available from Technical Support. This includes a demo/utility program from Dallas Semiconductor which illustrates the constant display of the current temperature using the three-wire computer interface. This program also allows setting the high/low temperature limits.

PCI ULTRA SCSI INTERFACE

The SCSI interface is a PCI Bus Master device which supports Ultra SCSI data transfer up to 20MB per second and bursts data to the host at full PCI speeds. Active termination is provided with terminator voltage protected by self-resetting fuses. A jumper is provided to disable the termination. The SCSI controller is a Symbios Logic 53C860. SDMS 4.0 software drivers are available for the most popular operating systems.

The Symbios Logic SCSI Configuration Utility allows you to view and/or change the default configuration settings for the Ultra SCSI adapter. This utility is described in *Appendix D - SCSI Configuration Utility.*

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 22MB 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. The IRQ for each serial port is hardware selectable (via a jumper) and 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 IRQ for the parallel port is hardware selectable (via a jumper) and the 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/keyboard mini DIN connector. The function of the mouse/keyboard mini DIN connector is jumper selectable.

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 +5V voltage drops below 4.75 volts. In addition, if the 3.3V Monitor jumper (JU89) is enabled, a reset is issued if 3.3V is below tolerance. (See *Configuation Jumpers* later in this section.)

KEYBOARD INTERFACE

The processor board is compatible with an AT type keyboard. The keyboard connection can be made by using either the keyboard header or the bracket mounted PS/2 mouse/keyboard mini DIN connector. The function of the mouse/keyboard mini DIN connector is jumper selectable. 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

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

TEMPERATURE/ENVIRONMENT

Operating Temperature: 0° C. to 60° C.

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

Humidity Maximum: 90% non-condensing

MEAN TIME BETWEEN FAILURES (MTBF)

71,000 POH (Power-On Hours) at 40° C., per MIL-HDBK-217F

SYSTEM PERFORMANCE (Norton SI 32)

- 200MHz/512K cache - 2.35

- 200MHz/256K cache - 2.35

- 180MHz/256K cache - 2.11

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.

CONFIGURATION JUMPERS (continued)

Jumper   Description

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.

JU88   P4B PS/2 Mouse/Keyboard Interface Data Select

Install on the LEFT for keyboard data.
Install on the RIGHT for mouse data. *

JU88A   P4B PS/2 Mouse/Keyboard Interface Clock Select

Install on the LEFT for mouse clock. *
Install on the RIGHT for keyboard clock.

NOTE: Be sure that JU88 and JU88A are enabled to select the *same* function (either mouse or keyboard) or the peripheral will not function properly.

JU89   3.3V Monitor Enable

Install to enable the 3.3V monitor.
Remove to disable the monitor. *

NOTE: JU89 enables the 3.3 volt monitor, which monitors the 3.3V power plane of the backplane. This voltage is routed to the processor board via the PICMG connector. The monitor generates a RESET to the processor board if 3.3V is below tolerance. If your system does *not* supply 3.3V to the backplane, this jumper *must* be removed (disabled).

CONFIGURATION JUMPERS (continued)

Jumper   Description

JU100   On-Board Serial Port 1 Interrupt Select

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

JU101   On-Board Serial Port 2 Interrupt Select

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

JU102   On-Board Parallel Port Interrupt Select

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

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

Install to enable the VGA interrupt.
Remove to disable the interrupt. *

CPU Speed Jumpers

There are five jumpers (J140, J141, W200, W201 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 Speed	Synthesizer Frequency	Jumpers J140	J141	CPU Speed W200	W201	Bus Clock W99
200MHz	66MHz	Out	In	Out	In	In
180MHz	60MHz	In	Out	In	Out	In

SYSTEM BIOS SETUP UTILITIES

The System BIOS is a 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

CONNECTORS

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

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

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

P3 - Floppy Drive Connector
34 pin dual row header, 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

P4 - Keyboard Header

5 pin single row header, Amp #640456-5

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

P4A - PS/2 Mouse Header

6 pin single row header, Amp #640456-6

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

P4B - PS/2 Mouse/Keyboard Connector

6 pin mini DIN, Leoco #MDSL06SC00

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

NOTE: The function of the PS/2 Mouse/Keyboard Connector is controlled by the settings of jumpers JU88 and JU88A. See *Configuration Jumpers* earlier in this section for an explanation of the jumper settings.

P5 - Speaker Port Connector

4 pin single row header, Amp #640456-4

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

P5A - Combo I/O Connector

8 pin single row header, Amp #640456-8

PIN	SIGNAL
1	Reset (See JU85 in the *Configuration Jumpers* section.)
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

TECHNICAL REFERENCE

P7 - Serial Port 2 Connector (continued)

PIN	SIGNAL	PIN	SIGNAL
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
2 pin header, Amp #640456-2

PIN	SIGNAL
1	+12V
2	Gnd

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

PIN	SIGNAL
1	Negative External Reset
2	Gnd

P11 - 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
25	IOR	26	Gnd
27	IORDY	28	+5V
29	DACK 0	30	Gnd
31	IRQ 14	32	IOCS16
33	Add 1	34	Gnd
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

P11A - Secondary IDE Hard Drive Connector (continued)

PIN	SIGNAL	PIN	SIGNAL
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	Gnd
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	Light
3	Light
4	+5V Pullup

P13 - PCI Ultra SCSI Controller Connector

50 pin dual row header, Robinson Nugent #IDH-50LP-S3-TR

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	2	SCZDB0
3	Gnd	4	SCZDB1
5	Gnd	6	SCZDB2
7	Gnd	8	SCZDB3
9	Gnd	10	SCZDB4
11	Gnd	12	SCZDB5
13	Gnd	14	SCZDB6
15	Gnd	16	SCZDB7
17	Gnd	18	SCZDBP
19	Gnd	20	Gnd
21	Gnd	22	Gnd
23	Gnd	24	Gnd
25	NC	26	TERMPWR

P13 - PCI Ultra SCSI Controller Connector (continued)

PIN	SIGNAL	PIN	SIGNAL
27	Gnd	28	Gnd
29	Gnd	30	Gnd
31	Gnd	32	SCZATN
33	Gnd	34	Gnd
35	Gnd	36	SCZBSY
37	Gnd	38	SCZACK
39	Gnd	40	SCZRST
41	Gnd	42	SCZMSG
43	Gnd	44	SCZSEL
45	Gnd	46	SCZCD
47	Gnd	48	SCZREQ
49	Gnd	50	SCZIO

P15 - PCI SVGA Interface Connector
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

P140 - Universal Serial Bus 0 (USB 0) Connector

4 pin single row header, Amp #640456-4

PIN	SIGNAL
1	USB Power 0 (+5V fused) with self-resetting fuse
2	USB P0 -
3	USB P0 +
4	Gnd

P141 - Universal Serial Bus 1 (USB 1) Connector

4 pin single row header, Amp #640456-4

PIN	SIGNAL
1	USB Power 1 (+5V fused) with self-resetting fuse
2	USB P1 -
3	USB P1 +
4	Gnd

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TECHNICAL REFERENCE

ISA BUS PIN NUMBERING

```
        B1 o      A1 □
           o         o
           o         o
           o         o
           o         o
           o         o
           o         o
  62-pin ISA Bus     o         o
    Connector        o         o
           o         o
           o         o
           o         o
           o         o
           o         o
           o         o
           o         o
           o         o
           o         o         Component Side
           o         o            of Board
           o         o
           o         o
           o         o
        31 o      31 o


        D1 o      C1 o
           o         o
           o         o
           o         o
  36-pin ISA Bus     o         o
    Connector        o         o
           o         o
           o         o
           o         o
           o         o
           o         o
           o         o
           o         o
        18 o      18 o
```
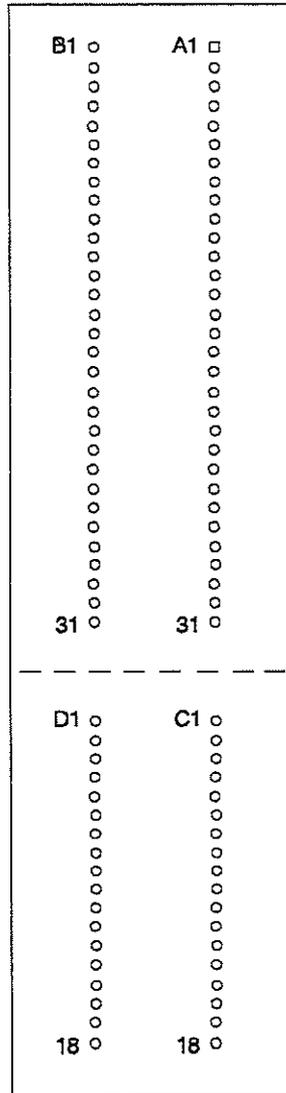
ISA BUS PIN ASSIGNMENTS

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

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

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

ISA BUS PIN ASSIGNMENTS (continued)

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

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

ISA BUS SIGNAL DESCRIPTIONS

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

AEN (O)

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

BALE (O) (Buffered)

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

BCLK (O)

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

CHRDY (I)

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

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

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

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

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

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

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

IO16# (I)

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

IOCHK# (I)

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

IORC# (I/O)

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

IOWC# (I/O)

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

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

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

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

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

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

M16# (I)

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

Master16# (I)

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

NOWS# (I)

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

OSC (O)

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

REFRESH# (I/O)

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

RESDRV (O)

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

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

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

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

SBHE# (I/O)

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

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

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

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

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

T-C (O)

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

I/O ADDRESS MAP *

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

INTERRUPT ASSIGNMENTS *

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

Required Pins:

Optional Pins:

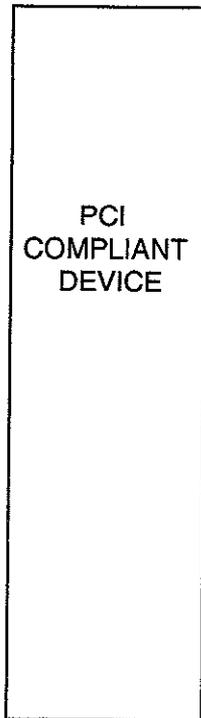| *Required Pins:*	PCI COMPLIANT DEVICE	*Optional Pins:*
Address & Data: AD[31::00] C/BE[3::0]# PAR *Interface Control:* FRAME# TRDY# IRDY# STOP# DEVSEL# IDSEL *Error Reporting:* PERR# SERR# *Arbitration* *(masters only):* REQ# GNT# *System:* CLK RST#		*64-bit Extension:* AD[63::32] C/BE[7::4]# PAR64 REQ64# ACK64# *Interface Control:* LOCK# INTA# INTB# INTC# INTD# *Cache Support:* SBO# SDONE *JTAG (IEEE 1149.1):* TDI TDO TCK TMS TRST#

PCI Pin List

PCI LOCAL BUS PIN NUMBERING

Component Side
of Board
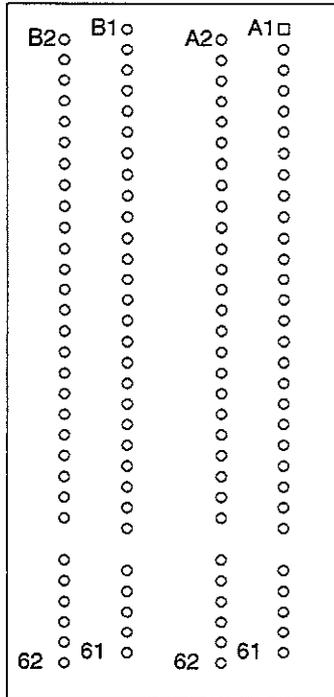
5-volt/32-bit PCI Connector

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	I/O Pin	Signal Name	
B1	-12V	A1	TRST#	32-bit connector start
B2	TCK	A2	+12V	
B3	Gnd	A3	TMS	
B4	TDO	A4	TDI	
B5	+5V	A5	+5V	
B6	+5V	A6	INTA#	
B7	INTB#	A7	INTC#	
B8	INTD#	A8	+5V	
B9	PRSNT1#	A9	Reserved	
B10	Reserved	A10	+V (I/O) *	
B11	PRSNT2#	A11	Reserved	
B12	Gnd †	A12	Gnd †	
B13	Gnd †	A13	Gnd †	
B14	Reserved	A14	Reserved	
B15	Gnd	A15	RST#	
B16	CLK	A16	+V (I/O) *	
B17	Gnd	A17	GNT#	
B18	REQ#	A18	Gnd	
B19	+V (I/O) *	A19	Reserved	
B20	AD31	A20	AD30	
B21	AD29	A21	+3.3V	
B22	Gnd	A22	AD28	

PCI LOCAL BUS PIN ASSIGNMENTS (continued)

I/O Pin	Signal Name		I/O Pin	Signal Name	
B23	AD27		A23	AD26	
B24	AD25		A24	Gnd	
B25	+3.3V		A25	AD24	
B26	C/BE3#		A26	IDSEL	
B27	AD23		A27	+3.3V	
B28	Gnd		A28	AD22	
B29	AD21		A29	AD20	
B30	AD19		A30	Gnd	
B31	+3.3V		A31	AD18	
B32	AD17		A32	AD16	
B33	C/BE2#		A33	+3.3V	
B34	Gnd		A34	FRAME#	
B35	IRDY#		A35	Gnd	
B36	+3.3V		A36	TRDY#	
B37	DEVSEL#		A37	Gnd	
B38	Gnd		A38	STOP#	
B39	LOCK#		A39	+3.3V	
B40	PERR#		A40	SDONE	
B41	+3.3V		A41	SBO#	
B42	SERR#		A42	Gnd	
B43	+3.3V		A43	PAR	
B44	C/BE1#		A44	AD15	
B45	AD14		A45	+3.3V	
B46	Gnd		A46	AD13	
B47	AD12		A47	AD11	
B48	AD10		A48	Gnd	
B49	Gnd		A49	AD9	
B50	Connector Key ††		A50	Connector Key ††	5-volt key
B51	Connector Key ††		A51	Connector Key ††	5-volt key
B52	AD8		A52	C/BE0#	
B53	AD7		A53	+3.3V	
B54	+3.3V		A54	AD6	
B55	AD5		A55	AD4	
B56	AD3		A56	Gnd	
B57	Gnd		A57	AD2	
B58	AD1		A58	AD0	
B59	+V (I/O) *		A59	+V (I/O) *	
B60	ACK64#		A60	REQ64#	
B61	+5V		A61	+5V	
B62	+5V		A62	+5V	32-bit connector end

PCI LOCAL BUS PIN ASSIGNMENTS (continued)

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

PCI LOCAL BUS SIGNAL DESCRIPTIONS

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

- System Pins
- Address and Data Pins
- Interface Control Pins
- Arbitration Pins (Bus Masters Only)
- Error Reporting Pins
- Interrupt Pins (Optional)
- Cache Support Pins (Optional)
- 64-Bit Bus Extension Pins (Optional)
- JTAG/Boundary Scan Pins (Optional)

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

The following are descriptions of the PCI Local Bus signals.

ACK64# (optional)

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

AD[31::00]

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

AD[63::32] (optional)

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

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

C/BE[3::0]#

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

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

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

CLK

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

DEVSEL#

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

FRAME#

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

GNT#

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

IDSEL

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

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

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

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

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

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

IRDY#

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

LOCK#

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

PAR

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

PAR64 (optional)

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

PERR#

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

PRSNT1# and PRSNT2#

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

REQ#

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

REQ64# (optional)

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

RST#

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

SBO# (optional)

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

SDONE (optional)

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

SERR#

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

STOP#

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

TCK (optional)

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

TDI (optional)

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

TDO (optional)

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

TMS (optional)

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

TRDY#

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

TRST# (optional)

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

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TECHNICAL REFERENCE

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. The available Setup screens, options and defaults may vary if you have a custom BIOS.

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 Con-
figuration 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.
TRENTON Technology Inc.



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.)

After the system completes the memory test and other post routines, if the Symbios Logic SCSI Configuration Utility is available, the following screen displays:

```
AMIBIOS (C)1996 American Megatrends Inc.
TRENTON Technology Inc.


Press Ctrl-C to start Configuration Utility
```

Press <Ctrl> + <C> to invoke the SCSI Configuration Utility, which allows you to view and/or change the default configuration settings for the Symbios Logic SCSI host adapter(s). The utility is detailed in *Appendix D - SCSI Configuration Utility*.

Once the POST routines complete successfully and you have made any desired changes to the SCSI adapter settings, 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:
```
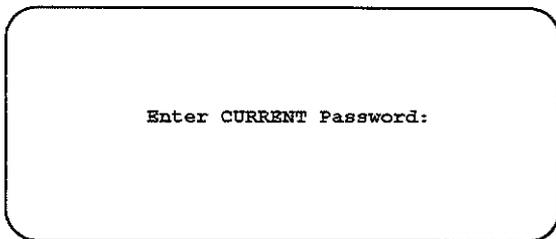
Type the password and press <**Enter**>.

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:
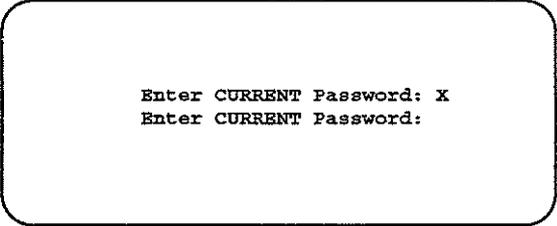
```
Enter CURRENT Password: X
Enter CURRENT Password:
```

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 non-fatal
   error, a prompt to press the <F1> key may also appear on the
   screen.

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

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

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

```
AMIBIOS (C)1996 American Megatrends Inc.
TRENTON Technology Inc.


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

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 HIFLEX SETUP UTILITY - VERSION X.XX
           (C)1996 American Megatrends, Inc. All Rights Reserved


                       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



  Standard CMOS Setup for changing time, date, hard disk type, etc.
```

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 Seek

  - Mouse Support

  - System Keyboard

  - Primary Display

  - Password Check

  - OS/2 Compatible Mode

  - Wait For 'F1' If Error

  - Hit 'DEL' Message Display

  - Internal Cache

  - System BIOS Cacheable

  - 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

TECHNICAL REFERENCE

- • 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/IRQ15

- • 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 options 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 parameters 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 supervisor. 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 charac-
teristics. 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 format-ted 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 In-stalled," 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:

```
Retype new supervisor password: _
```

Re-key the new password as described above.

If the password confirmation is miskeyed, AMIBIOS Setup displays
the following message:
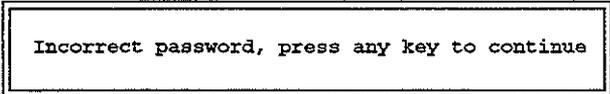
```
Incorrect password, press any key to continue
```

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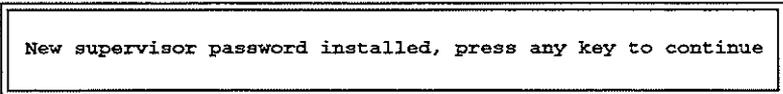
```
New supervisor password installed, press any key to continue
```

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:

```
Supervisor password disabled, press any key to continue
```

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 failsafe 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 naviga-
tion 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 AMIBIOS Setup Utility.
Plus key (+), <PgUp>	Increment a value.
Minus key (-), <PgDn>	Decrement a value.

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
                                         LBA  Blk  PIO 32Bit
              Type    Size Cyln Head WPcom Sec Mode Mode Mode 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               ESC:Exit  ↓↑:Sel
 Day:    01 - 31                PgUp/PgDn:Modify
 Year: 1901 - 2099              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 explana-
tions below for specific instructions about entering correct informa-
tion.

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 allow-
able 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
Type 4 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 HDD 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 (Blk) 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 (PIO) 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 INT 13H function AH=05H to format the hard disk. It only verifies the hard disk using the INT 13H Verify function (AH=04H). The virus warning message is *not* displayed during DOS hard disk drive formatting.

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

Primary Slave Disk Type _____

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

Secondary Master Disk Type _____

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

Secondary Slave Disk Type _____

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

* 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
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

HARD DISK DRIVE TYPES (continued)

Type	Cyln	Head	WPcom	Sec	Size
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					

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

  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
  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 explana-

tions 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.

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 non-fatal error has occurred. AMIBIOS responds with an appropriate error message followed by:

Press F1 to Resume

If this option is disabled, a non-fatal error does not generate the "Press F1 to Resume" message. 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 non-fatal error condition message. Non-fatal error messages are listed in *Appendix A - BIOS Messages.*

The Setup screen displays the system option:

Wait For 'F1' If 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 explana-
tions below for specific instructions about entering correct informa-
tion.

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 pro-
gram 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 Correc-
tion) or parity.

The Setup screen displays the system option:

DRAM Integrity Mode (ECC)   **Disabled**

Available options are:

> Disabled
> ECC
> Parity

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 Control1/Type FDMA Buffer Control2

The Setup screen displays the system options:

Type F DMA Buffer Control1   **Disabled**
Type F DMA Buffer Control2   **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.

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 explana-

tions 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

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.

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 explana-
tions below for specific instructions about entering correct informa-
tion.

PERIPHERAL SETUP OPTIONS

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

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.

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

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

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

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

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

BIOS BEEP CODES (continued)

Beep Count	Message	Description
8	Display Memory Read/Write Error	The system video adaptor is either missing or its memory is faulty. **NOTE:** This is *not* a fatal error.
9	ROM Checksum Error	The ROM checksum value does not match the value encoded in the BIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for the CMOS 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 non-fatal error occurs during the POST routines performed each time the system is powered on, the error message will appear on the screen in the following format:

> ERROR Message Line 1
> ERROR Message Line 2
> Press F1 to Resume

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

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

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

BIOS ERROR MESSAGES (continued)

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

Message	Description
8042 Gate-A20 Error	The gate-A20 portion of the keyboard controller (8042) has failed to operate correctly. Replace the 8042 chip.
Address Line Short!	An error has occurred in the address decoding circuitry of the processor board.
C: Drive Error	The BIOS is not receiving any response from hard disk drive C:. Check Standard Setup using the 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.

BIOS ERROR MESSAGES (continued)

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.
KB/Interface Error	The BIOS has found an error with the keyboard connector on the processor board.

BIOS ERROR MESSAGES (continued)

Message	Description
Keyboard Error	The BIOS has encountered a timing problem with the keyboard. The Keyboard option in the Standard Setup portion of the 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.
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.

PORT 80 CODES (continued)

Code	Description
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.

PORT 80 CODES (continued)

Code	Description
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.
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.

PORT 80 CODES (continued)

Code	Description
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.
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.

PORT 80 CODES (continued)

Code	Description
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 controller 1 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.

PORT 80 CODES (continued)

Code	Description
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.
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 password 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.

PORT 80 CODES (continued)

Code	Description
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.
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.

PORT 80 CODES (continued)

Code	Description
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 dvices 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

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APPENDIX B

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APPENDIX C

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 TR-P6V VGA.

The TR-P6V VGA graphics system is VGA compatible. The CIRRUS LOGIC 5446 drivers and utilities supplied with the TR-P6V 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 multi-frequency monitor, you may need a special 15-pin PS/2 compatible adapter cable. Make sure that your multi-frequency monitor is configured properly for a PS/2 compatible analog VGA signal.

Some multi-frequency 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
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** but-
ton. 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 ex-
tended 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 ad-
justed, the new values for horizontal and/or vertical positioning are
saved within CLMode.

CLMode prompts on whether you want to save these new para-
meters to the TSR (CENTER.COM). The values used for the ad-
justed 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.

NOTE: 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.

MICROSOFT WINDOWS 3.X

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 subdirectories, 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 in-
stalled, 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 *WinMode* 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 com-
    ponents such as display adapter (e.g. VGA, CGA, etc.), key-
    board 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 exist-
    ing 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:\ <Enter>
    ```

    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 substan-
tial 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

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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 **ReducedOn**, **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 com-
    puter 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 **SELECT
   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 resolu-
tion 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 **Con-
figuration** 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.

Win 3.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 subdirectory.

   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.

APPENDIX D

SCSI CONFIGURATION UTILITY

INTRODUCTION

This appendix provides operating instructions for the Symbios Logic SCSI Configuration Utility, which allows you to view and change the default configuration settings for the Symbios Logic SCSI adapter supplied on your processor board. It also allows you to change the configuration settings for other Symbios Logic SCSI adapters you may have installed in your system.

NOTE: This utility is a powerful tool. If, while using it, you inadvertently disable all of your controllers, pressing **<Ctrl> + <A>** after memory count allows you to recover and reconfigure.

Requirements

To perform the configuration described in this appendix, you must have SDMS BIOS version 4.x or higher, and it must include the Symbios Logic SCSI Configuration Utility. You can see the version number of your SDMS BIOS in a banner displayed on your monitor during boot-up.

Your Symbios Logic SCSI adapter is designed with NvRAM (non-volatile memory). The configuration changes described in this chapter are possible only if NvRAM is present.

Default Settings

The following tables list the default values for the configuration settings you can change using the Configuration Utility.

Global Default Settings

The global settings affect your host adapter and *all* SCSI devices which are connected to it. Refer to the *Adapter Setup* section later in this appendix for an explanation of these parameters.

Settings for the Host Adapter and All Devices	Default Settings
SCAM Support	On
Parity Checking	Enabled
Host Adapter SCSI ID	7
Scan Order	Low to High (0-Max)

Device Default Settings

The device settings affect only individual SCSI devices. Refer to the *Device Selections* section later in this appendix for an explanation of these parameters.

Settings for Individual SCSI Devices	Default Settings
Synchronous Transfer Rate (MB/sec)	20
Data Width	16
Disconnect	On
Read Write I/O Timeout (secs)	10
Scan for Devices at Boot Time	Yes
Scan for SCSI LUNs	Yes
Queue Tags	Enabled

STARTING THE CONFIGURATION UTILITY

If the Symbios Logic SCSI Configuration Utility is available, the following message displays on your monitor during boot-up:

Press Ctrl-C to start Configuration Utility

The message remains on your screen for about five seconds, giving you time to start the utility. If you press **<Ctrl> + <C>**, the following message displays:

Please wait, invoking Configuration Utility

After a brief pause, the Main Menu of the SCSI Configuration Utility displays.

There are two ways to select a line item for modification on the SCSI Configuration Utility screens:

- You may use the arrow keys to move to the line item and then press **<Enter>**.

- Where indicated by a letter or number, you may use that character to select the line item.

EXITING THE CONFIGURATION UTILITY

When you have completed all of your changes, exit the SCSI Configuration Utility using the **Quit (Q)** option on the Main Menu.

NOTE: Since some changes only take effect after your system reboots, it is important that you exit the SCSI Configuration Utility using the **Quit (Q)** option on the Main Menu. If you reboot the system without exiting the utility properly, some of your changes may be ignored.

This page intentionally left blank.

MAIN MENU

When you invoke the Symbios Logic SCSI Configuration Utility, a
screen similar to the following displays:

```
═════════ Symbios Logic SCSI Configuration Utility ═════════
                      Version x.xx
  ┌ MAIN MENU ─────────────────────────────────────────────


                   Port   Irq   ------Status------   NvRAM
                   Num    Level Current  Next-Boot   Found
      1. SYM53C860 E800   10      On        On       Yes
      2. SYM53C860 EC00   11      On        On       Yes
      B ... Adapter Boot Order.
      C ... Change Adapter Status.
      D ... Display Mode = Verbose.
      M ... Mono/Color.
      F1 .. Help.
      Q ... Quit.




      ┌──────────────────────────────────────────────────┐
      │ Use arrow keys to select from menu.  Then press ENTER. │
      └──────────────────────────────────────────────────┘
  ═══════════════ BIOS Code Segment: XXXX ═══════════════
```

Main Menu Screen

The Main Menu displays a list of up to four Symbios Logic PCI to
SCSI host adapters in your system.

Use the arrow keys to select the adapter or option you wish to view
and/or change and press **<Enter>**.

You may change settings for a SCSI host adapter or its devices only
if NvRAM (non-volatile memory) is present on the adapter and if the
Current Status is set to **On**. If you select a host adapter, the Adapt-
er Utilities Menu displays and allows you to change various
parameters for that adapter and/or its devices. These adapter utilities
are described later in this appendix.

Adapter Boot Order

The **Adapter Boot Order (B)** option allows you to set the order in which host adapters boot when you have more than one Symbios Logic host adapter in your system. If you have only one adapter in your system, this option does not appear on the Main Menu.

When you select this option from the Main Menu, a screen similar to the following displays:

```
============== Symbios Logic SCSI Configuration Utility==============
                          Version x.xx
  ┌─ MAIN MENU ──────────────────────────────────────────────────────
  │
  │ ┌─ Boot Order:──────────────────────────────────────────────────
  │ │            Port   Irq   ------Status------   NvRAM
  │ │            Num    Level Current  Next-Boot   Found
  │ │ 1. SYM53C860  B800  10      On        On        Yes
  │ │ 2. SYM53C860  EC00  11      On        On        Yes
  │ │
  │ └───────────────────────────────────────────────────────────────
  │
  │
  │
  │
  │ ┌───────────────────────────────────────────────────────────────
  │ │ Use arrow keys to select from menu.   Then press ENTER.
  │ └───────────────────────────────────────────────────────────────
  ============== BIOS Code Segment: XXXX ==============
```

Adapter Boot Order Screen

To change an adapter's boot order, select it using the arrow keys and press <Enter>. When you are prompted to enter the new boot sequence number, enter the position in which you want the selected adapter to boot. When the adapters are ordered in the proper sequence, press the <Esc> key to return to the Main Menu.

If you change the boot order, your system automatically reboots when you exit the SCSI Configuration Utility using the Quit option.

Change Adapter Status

The **Change Adapter Status** (**C**) option allows you to activate or deactivate a host adapter and all SCSI devices attached to it.

When you select this option from the Main Menu, a screen similar to the following displays:

```
━━━━━━━━ Symbios Logic SCSI Configuration Utility ━━━━━━━━
                      Version x.xx
┌─ MAIN MENU ─────────────────────────────────────────────
│
│  ┌─ Change Status on Next Boot: ──────────────────────
│  │
│  │               Port   Irq   ------Status------  NvRAM
│  │               Num    Level Current  Next-Boot  Found
│  │  1. SYM53C860 E800   10    On       On         Yes
│  │  2. SYM53C860 EC00   11    On       On         Yes
│  │
│  │
│  └───────────────────────────────────────────────────
│
│
│
│
│
│  ┌───────────────────────────────────────────────────
│  │ Use arrow keys to select from menu.  Then press ENTER.
│  └───────────────────────────────────────────────────
│     ━━━━━━━━ BIOS Code Segment: XXXX ━━━━━━━━
```

Change Adapter Status Screen

The **Current Status** on this screen indicates whether a particular adapter is active (**On**) or deactivated (**Off**). The **Next-Boot Status** indicates what the status will be after the next boot. After a reboot, these two options are set to the same value, until you change the Next-Boot Status.

If you make a change to any adapter's Next-Boot Status, your system automatically reboots when you exit the SCSI Configuration Utility using the Quit option. Your activation/deactivation request takes place after the reboot.

To change an adapter's status following the next boot:

- Select **On** to activate the adapter.
- Select **Off** to deactivate the adapter.

Press the <Esc> key to return to the Main Menu.

Display Mode

The **Display Mode (D)** option determines how much information about your host adapter(s) and SCSI devices is displayed on your screen during boot-up.

- Select **Verbose** for more complete information.
- Select **Terse** for a faster boot.

Mono/Color

The **Mono/Color (M)** option allows you to choose a monochrome or color display for the SCSI Configuration Utility.

- Select **Mono** to get a more readable screen on a monochrome monitor.
- Select **Color** for a color monitor.

Help

The **Help (F1)** option brings up a help screen containing information about the menu or screen which is currently displayed. **Help** options are available on each screen in the SCSI Configuration Utility. It might be helpful for you to view each Help screen the first time you use the utility as you become familiar with the utility's options.

The Help screen on the Main Menu displays the following message:

```
The adapters shown can be selected to either change or view
current adapter and/or device settings if the adapter is
currently on.  Changes are only possible if NvRAM is present.
Changes to the Boot Order, Adapter Status or the Display Mode
could affect all adapters and cause a system reboot.
```

Press <Esc> to remove the Help message from the screen.

Quit

The **Quit** (**Q**) option allows you to exit the SCSI Configuration Utility.

If you have changed any parameters which require a reboot of the system (e. g., Adapter Boot Order or Next-Boot Status), the following message displays when you select the **Quit** option:

Rebooting system to change global settings... Press any key.

After you press a key, the system reboots.

If you did not make any changes or if you made changes which do not require a reboot, the system continues with the boot-up which was in progress when you invoked the SCSI Configuration Utility.

NOTE: Since some changes only take effect after your system reboots, it is important that you exit the SCSI Configuration Utility using the **Quit** (**Q**) option on the Main Menu. If you reboot the system without exiting the utility properly, some of your changes may be ignored.

ADAPTER UTILITIES MENU

When you select a host adapter from the Main Menu, the SCSI Configuration Utility scans for SCSI devices in your system. While it is performing this function, the following message displays:

Scanning for Devices... Please Wait

When all SCSI devices have been located, a screen similar to the following displays:

```
========== Symbios Logic SCSI Configuration Utility ==========
                         Version x.xx
  ___ 1. SYM53C860 _____
  ___ Utilities _____




          A-Adapter Setup
          D-Device Selections
          F1 .. Help.
          ESC .. Exit this menu.






   _____
   Use arrow keys to select from menu.  Then press ENTER.
  ======== BIOS Code Segment: XXXX ========
```
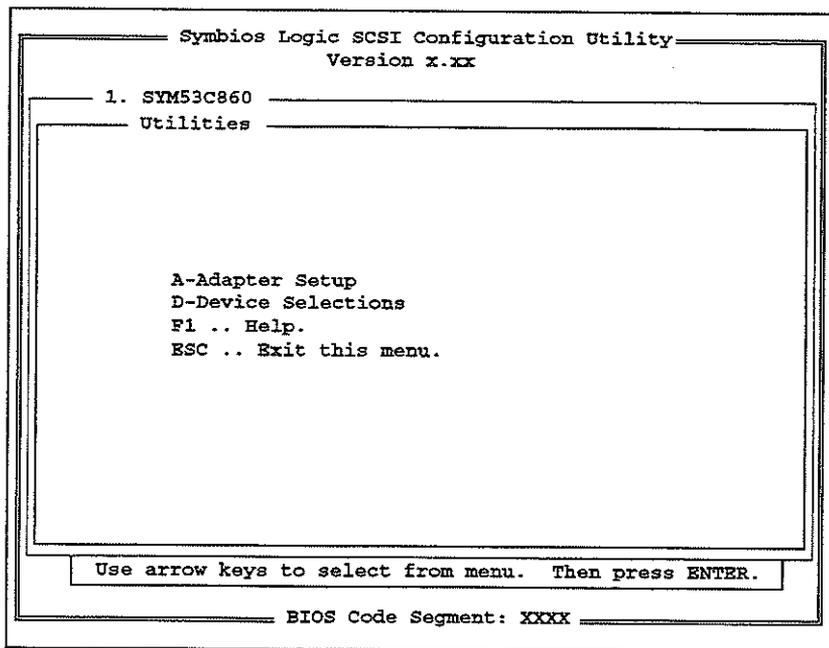
Adapter Utilities Menu Screen

The two main options available on this menu lead you to screens which allow you to change the adapter or device settings.

* Select **Adapter Setup** to view and/or change the settings for the host adapter you have selected.

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- Select **Device Selections** to view and/or change settings for
  devices attached to the adapter you have selected.

When you exit this menu, if you have made any changes to Adapter
Setup or Device Selections, you are prompted to save or cancel your
changes. The following window displays:

```
Save Changes
Cancel Changes
ESC - Cancel Exit
```

Available options are:

- Select **Save Changes** to save your changes and return to the
  Main Menu.

- Select **Cancel Changes** to return to the Main Menu *without*
  saving your changes.

- Select **ESC** to cancel the exit request and remain at the
  Adapter Utilities Menu.

ADAPTER SETUP

When you select **Adapter Setup** from the Adapter Utilities Menu, a screen similar to the following displays:

```
┌─────────────────────────────────────────────────────────────────┐
│ ═══════════════ Symbios Logic SCSI Configuration Utility ═══════  │
│                          Version x.xx                             │
│ ┌─── 1. SYM53C860 ──────────────────────────────────────────────┐ │
│ │ ─── Adapter Setup ──────────────────────────────────────────┐ │ │
│ │                                                             │ │ │
│ │                                                             │ │ │
│ │        S-SCAM Support ...........    On                      │ │ │
│ │        P-Parity .................    Enabled                 │ │ │
│ │        I-Host SCSI ID ...........    7                       │ │ │
│ │        O-Scan Order .............    Low to High (0..Max)    │ │ │
│ │        F1 .. Help.                                           │ │ │
│ │        F2 .. Restore Default Setup.                          │ │ │
│ │        ESC .. Exit this menu.                                │ │ │
│ │                                                             │ │ │
│ │                                                             │ │ │
│ │                                                             │ │ │
│ │                                                             │ │ │
│ │                                                             │ │ │
│ │   ┌─────────────────────────────────────────────────────┐   │ │ │
│ │   │ Use arrow keys to select from menu.  Then press ENTER.│   │ │ │
│ │   └─────────────────────────────────────────────────────┘   │ │ │
│ ═══════════════════ BIOS Code Segment: XXXX ════════════════════  │
└─────────────────────────────────────────────────────────────────┘
```

Adapter Setup Screen

The settings on this screen are *global* settings which affect the selected host adapter and *all* SCSI devices attached to it.

The screen above shows the global default values for the host adapter and its attached SCSI devices.

Select the option you wish to change and press <Enter> to display a window showing available settings. Use the arrow keys to select the appropriate setting and press <Enter> to accept the setting and return to the Setup screen. The Setup parameters and available settings are described on the following pages.

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SCAM Support

The **SCAM Support** (S) option allows you to turn off the SCAM protocol (SCSI Configured AutoMatically). This SCSI Plug and Play protocol is supported by Symbios Logic BIOS versions 4.x and above.

Available options are:

> Off
> On

Parity

The **Parity** (P) option allows you to disable parity checking if your SCSI device does not generate parity.

Symbios Logic PCI to SCSI host adapters always generate parity, but some SCSI devices do not.

Two options are available:

- Select **Disabled** if you are using a SCSI device which *does not* generate parity.

- Select **Enabled** if you are using a SCSI device which *does* generate parity.

NOTE: When disabling parity checking, you may have to disable disconnects for certain devices, as parity checking for the reselection phase is not disabled. If a device does not generate parity, and it disconnects, the I/O never completes because the reselection never completes. Refer to the *Device Selections Menu* section later in this appendix for details on how to disable disconnects.

Host SCSI ID

The **Host SCSI ID (I)** option allows you to change the ID of the host adapter you have selected.

In general, it is suggested that you *not* change your host adapter ID from the default value of 7, since this gives it the highest priority on the SCSI Bus. However, if you have two adapters sharing the same SCSI devices, you should give one of them a currently unassigned ID to avoid duplication of SCSI IDs.

Settings which are not available are shown in gray and cannot be selected.

Available options are:

0	4
1	5
2	6
3	7

Scan Order

The **Scan Order (O)** option allows you to change the order in which the host adapter BIOS and device drivers scan the SCSI IDs on the SCSI Bus. If you have more than one device on the SCSI Bus, changing the scan order changes the order in which drive letters are assigned by the system.

Two options are available:

- Select **Low to High (0..Max)** to scan the SCSI Bus from low to high SCSI ID.

- Select **High to Low (Max..0)** to scan the SCSI Bus from high to low SCSI ID.

DEVICE SELECTIONS MENU

When you select **Device Selections** from the Adapter Utilities Menu, a screen similar to the following displays:

```
═══════════ Symbios Logic SCSI Configuration Utility ═══════════
                        Version x.xx
 ─── 1. SYM53C860 ──────────────────────────────────────────────
    ─── Device Selections 0-7 ──────────────────────────────────

                Sync  Data  Disc Time  Scan  Scan Queue
                Rate  Width      Out   Bus   LUNS Tags

   0-Dev0 N/A          20    8   On   10    Yes   Yes  Enabled
   1-Dev1 N/A          20    8   On   10    Yes   Yes  Enabled
   2-Dev2 N/A          20    8   On   10    Yes   Yes  Enabled
   3-PLEXTOR CD-ROM    10    8   On   10    Yes   Yes  Enabled
   4-SEAGATE STXXXXXX  20    8   On   10    Yes   Yes  Enabled
   5-Dev5 N/A          20    8   On   10    Yes   Yes  Enabled
   6-Dev6 N/A          20    8   On   10    Yes   Yes  Enabled
   7-SYM53C860         20    8   On   10    Yes   Yes  Enabled
   D-Device Selections 8-15
   F1 .. Help.
   ESC .. Exit this menu.


    ┌──────────────────────────────────────────────────────┐
    │ Use arrow keys to select from menu.  Then press ENTER.│
    └──────────────────────────────────────────────────────┘
 ═══════════════ BIOS Code Segment: XXXX ═══════════════
```

Device Selections Menu Screen

This menu provides information about *individual* SCSI devices attached to the selected host adapter as well as information about the adapter itself.

Use the arrow keys to select the device you wish to change and press **<Enter>** to bring up the Device Setup screen for that individual device. If you select the last option (7), any changes you make to the settings apply to *all* devices attached to the specified host adapter.

DEVICE SETUP

When you select a specific device or the host adapter option from the
Device Selections Menu, a screen similar to the following displays:

```
============ Symbios Logic SCSI Configuration Utility============
                     Version x.xx
    ── 1. SYM53C860 ──────────────────────────────────
    ── SYM53C860 Setup for ALL devices on this adapter ──




         R-Sync Rate (Mega Bytes/sec) ..... 20 Mb/sec
         W-Width (bits) ................... 8
         D-Disconnect ..................... On
         T-Read Write I/O Timeout (secs) .. 10
         S-Scan for Device at Boot Time ... Yes
         L-Scan for SCSI LUNS ............. Yes
         Q-Queue Tags ..................... Enabled
         F1 .. Help.
         F2 .. Restore Default Setup.
         ESC .. Exit this menu.




    Use arrow keys to select from menu.  Then press ENTER.
    ================ BIOS Code Segment: XXXX ================
```

Device Setup Screen

Depending on the option you selected from the Device Selections
Menu, the settings in the Device Setup screen affect either *individual*
SCSI devices or *all* devices attached to the selected host adapter.
The heading at the top of the Setup window shows which device or
host adapter you have selected.

Changes made from this menu do *not* cause the system to reboot
upon exit from the SCSI Configuration Utility.

Select the option you wish to change and press <Enter> to display a
window showing available settings. Use the arrow keys to select the
appropriate setting and press <Enter> to accept the setting and

return to the Setup screen. The Setup parameters and available settings are described below.

Sync Rate (Mega Bytes/sec)

The **Sync Rate (R)** option defines the maximum transfer rate the host adapter attempts to negotiate. The host adapter and a SCSI device must agree to a rate they can both handle.

Available options are:

> Off
> 5 Mb/sec
> 10 Mb/sec
> 20 Mb/sec

Width (bits)

The **Width (W)** option defines the maximum data width the host adapter attempts to negotiate. The host adapter and a SCSI device must agree to a width they can both handle. Only host adapters which can do 16-bit data transfers have this option enabled.

Disconnect

The **Disconnect (D)** option tells the host adapter whether or not to allow a device to disconnect. SCSI devices have the ability to disconnect from the Bus during an I/O transfer. Some devices (mostly newer devices) run faster with disconnects enabled (**On**), while some (mostly older devices) run faster with disconnects disabled (**Off**).

Available options are:

> Off
> On

Read Write I/O Timeout (secs)

The **Read Write I/O Timeout** (T) option sets the time the host adapter waits for a read, write, verify or seek command to complete before trying the I/O transfer again. Since this provides a safeguard which allows the system to recover if an I/O operation fails, it is recommended that you always set the timeout to a value greater than zero. A value of zero indicates no timeout.

When the **Enter Seconds:** window displays, type in the value for the number of seconds for the timeout. The value can be between 0 and 999 seconds.

Scan for Device at Boot Time

The **Scan for Device at Boot Time** (S) option indicates whether or not the system should scan for this device during boot-up.

If there is a device you do not wish to make available to the system, set this option to **No** for that device. On a wide bus (16 devices) with only a few devices attached, you can speed up boot time by changing this setting to **No** for all unused SCSI IDs. The system then bypasses the device(s) when scanning during boot-up.

Available options are:

> No
> Yes

Queue Tags

The **Queue Tags** (Q) option allows you to enable or disable the issuance of queue tags during I/O requests, if your device driver has this capability.

Available options are:

> Disabled
> Enabled

Declaration of Conformity

APPLICATION OF COUNCIL DIRECTIVE(S)

89/336/EEC

Standard(s) to which Conformity is Declared:

EN55022
EN50082-2

Manufacturer's Name: Trenton Technology Inc.

Manufacturer's Address: 2350 Centennial Drive
Gainesville, Georgia 30504 USA

Telephone: (770) 287-3100
FAX: (770) 287-3150

Type of Equipment: PCI CPU Board with Video

Model Name(s):   92-005487 (Also Known As: TR-P6V5/200, TR-P6V2/200, and TR-P6V2/180)

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

Signature:

Name: Stephen W. McReynolds

Title: Senior Engineer

Date: August 20, 1997

TRENTON Technology Inc.
2350 Centennial Drive • Gainesville, Georgia 30504
Sales: (800) 875-6031 • Phone: (770) 287-3100 • Fax: (770) 287-3150

TRENTON

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