SBC-MaX

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REVISION HISTORY

Initial release Rev. B.01	ECO # 2456
Revision Rev. B.02	ECO # 2661
SF 15 and 16 correction	ECO #

FCC Testing

This subassembly is marketed to be sold to equipment manufacturers for incorporation into systems. This subassembly is not FCC tested. FCC testing is the responsibility of the final equipment manufacturer.

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1 INTRODUCTION

The SBC-MaX™ is a small form factor, industrial-strength single board computer with all the functionality of today's best desktop MMX machines. Its standard features include a Pentium™ MMX CPU to 200 MHz, the market's most advanced video controller (Chips &Technologies' CT65555), 100BaseT Ethernet, 16-bit Sound Blaster Pro™ compatible audio, and two Universal Serial Bus (USB) ports.

Multimedia is finding its way into many non-desktop applications -- machine control, OEM products, COTS military -- all of which demand the ruggedness and densely-packed features which the SBC-MaX provides.

The impressive video capabilities of the CT65555 equip the SBC-MaX™ with leading edge flat panel support, especially for the newer passive color LCDs. This 32-bit PCI chip includes up to 4Mbytes video memory for maximum color depth in all resolutions and operating systems. Its Temporal Modulated Energy Distribution (TMED) technology enables the display of 16.7 million flicker-free color images on color STN (passive) LCDs. TheCT65555 also supports NTSC overlay capabilities on flat panels, useful for displaying video window over graphics or full-screen video.

The SBC-MaX™ offers tremendous memory and storage options, starting with 128Mbytes DRAM, and 512kbyte pipelined burst level 2 cache. A hard disk drive can be mounted directly onto the board, and the 2-channel IDE hard disk interface supports up to four IDE (ATA/ATAPI) drives. The floppy disk controller supports two 1.44Mbyte or 2.88Mbyte floppy drives.

Other I/O features include two USB ports for extra peripheral interfaces, four serial ports and one printer port, plus keyboard, PS/2 mouse, PC speaker and IRDA interfaces. The board measures 244mm x 174mm (5.75" x 7.75" x 1.50"), and is rated at 0-60°C. Completing the list of features are PC/104 and ISA bus expansion.

Features:

- Intel Pentium, Pentium MMX, and AMD K5 and K6 MMX CPU
- System
  - High integration - built-in L2 cache controller, memory controller, data path unit, ISA bridge, PCI IDE controller, USB bridge, RTC and power management unit
  - Fully compliant with PCI specification v2.1
  - Fully compliant with ISA specification
- L2 Cache Controller
  - Supports pipeline synchronous SRAM for L2 cache
  - Direct map with write-back policy
  - Cache size 512kbytes
  - R/W cycles: 3-1-1-1-1-1 . . . with NA# function
- Memory
  - Supports two DRAM banks making total DRAM size ranging from 8Mbytes to 128Mbytes
  - Provides CPU-to-memory prefetch buffers and CPU-to-DRAM post-write buffers
    - burst write: 3-1-1-1
    - single write: 3 clocks
  - Supports CAS-before-RAS refresh, self refresh and slow refresh
  - Supports EDO DRAM
  - Read/Write performance at 66MHz bus speed
  - EDO DRAM: read X-2-2-2
  - DRAM post-write buffers retire rate - X-3-3-3/X-2-2-2

- PCI Bus for internal peripherals
  - Allows concurrent transactions between Host Bus and PCI Bus
  - Synchronous PCI Bus with speed up to 33MHz
  - PCI memory Read/Write snooping feature
  - Supports post-write feature for CPU-to-PCI transactions
  - post-write rate : 3
  - convert write posted data into PCI burst cycle (X-1-1-1...)
- ISA Bridge
  - Provides bridge function between PCI Bus and ISA Bus
  - Fully ISA compatible
  - Enhanced DMA functions
  - Two ISA DMA (82C37) compatible functions
    - 8- and 16-bit data transfers
    - 7 independently programmable channels
  - Compatible with type A, B and F timing
  - Incorporates two 82C59 interrupt controllers
  - 14 channel interrupt requests
  - Edge or level trigger option
  - One 82C54 16-bit counter/timer
  - 5V ISA Bus peripherals
- PCI IDE Controller
  - Built-in two-channel IDE controller
  - Supports master/DMA/slave mode IDE
  - Supports up to 4 IDE drives
  - Supports 32- and 16-bit data transfers
  - Supports 4-level 32-bit post-write buffer
  - Supports 4-level 16-bit prefetch buffer
  - Supports ATA33
  - Supports IDE PIO timing up to mode 4
  - Supports driver for all major OS's
- USB Bridge
  - Supports 2 USB ports
  - Supports device bandwidth ranging from 1.5Mbps to 12Mbps
  - Fully compliant with the latest USB specification version 1.0 (or later version) and compatible with open HCI spec. version 1.0 endorsed by Compaq and Microsoft
  - Supports power management mode to protect USB Bus power and overcurrent detector to protect USB Bus from abnormal overcurrent load
  - Supports drivers for all major OS's
- Power Management Unit
  - Pipeline synchronous SRAM clock control to reduce power consumption
  - 128KB SMM space
  - Supports PCI Bus CLKRUN function
  - Advanced power management functions:
  - Auto Power Reduction Mode
  - Smart Suspend Mode
  - Complete seven power saving modes:
  - FULL-ON, ON, DOZE, SLEEP, 5V SUSPEND, 0V SUSPEND and Auto Power-Off
  - Fully supports Microsoft APM 1.2 and ACPI
  - I/O trapping
  - Supports periodic SMI
- High Performance Multimedia Flat Panel/CRT GUI Accelerator
  - Highly integrated design Flat Panel and CRT GUI Accelerator & Multimedia Engine, Palette/DAC, and Clock Synthesizer

- Hardware Windows Acceleration
- 64-bit Graphics Engine
- System-to-Screen and Screen-to-Screen BitBLT
- 3-Operand Raster-Ops
- 8/16/24 Color Expansion
- Transparent BLT
- Optimized for Windows™ BitBLT format
- PCI Bus with Burst Mode capability
- Up to 4MB EDO - 64-Bit memory interface
- High Performance deep write buffers
- CRT Support
- 135 MHz RAMDAC
- Hardware Multimedia Support
- Zoom Video port
- YUV input from System Bus or Video Port
- YUV-RGB Conversion
- Capture / Scaling
- Video Zoom up to 8x
- Vertical interpolation of video data up to 720 pixels wide.
- Double Buffered Video
- Horizontal Interpolation
- Display centering and stretching features for optimal fit of VGA graphics and text on 800x600 and 1024x768 panels
- Simultaneous Hardware Cursor and Pop-up Window
- 64x64 pixels by 4 colors
- 128x128 pixels by 2 colors
- Video Acceleration
- Source Transparent BLT
- Destination Transparent BLT
- Double buffer support for YUV and 15/16bpp Overlay Engine
- Instant Full Screen Page Flip
- Read back of CRT Scan line counters
- Optimized for High-Performance Flat Panel Display at 3.3V and 5V
- 640 x 480 x 24bpp
- 800 x 600 x 24bpp
- 1024 x 768 x 24bpp
- 1280 x 1024 x 24bpp
- 36-bit direct interface to color and monochrome, single drive (SS), and dual drive (DD), STN & TFT panels
- Flexible On-chip Activity Timer facilitates ordered shutdown of the display system
- Advanced Power Management feature minimizes power usage in:
- Normal operation
- Standby (Sleep) modes
- Panel-Off Power-Saving Mode
- VESA Standards supported
- DPMS for CRT power-down (required for support of EPA Energy-Star program)
- DDC for CRT Plug-Play & Display Control
- Composite NTSC / PAL Support
- Fully Compatible with IBM VGA

- Super I/O
  - PC97 compliant hardware
  - Unique PnP device ID for each logical device compliant with Plug and Play specification V1.0a
  - Built-in resource data ROM

- 5 logical devices
- 16-bit address decoding
- 11 selectable IRQs
- 4 selectable DMA channels
- Flexible resource configure and dynamic disable
- 2.88MB floppy disk controller
- Base address 0X0100h-0X0FF8h, 11 IRQ and 4 DMA options
- Enhanced digital data separator
- A and B drives can be swapped
- 3-Mode supported
- Software write protection
- Supports two 360K/ 720K/ 1.2M/ 1.44M/2.88M floppy disk drives
- Multi-mode high performance parallel port
- Base address 0X0100h-0X0FFCh, 11 IRQ and 4 DMA options
    - Standard mode -- bi-directional SPP
    - Enhanced mode -- EPP V1.7 and EPP V1.9 compatible
    - High speed mode -- ECP, IEEE1284 compliant
- Printer power-on damage protection
- Serial ports – 2 RS-232
- Base address 0X0100h-0X0FF8h, 11 IRQ options
- Supports two 16C550 compatible enhanced serial ports
    - Supports SIR or ASKIR
- Keyboard Controller
- Base address 0X0000h-0X0FFFh, 11 IRQ options
    - 8042 compatible
    - 2KB programmable ROM
    - 256-byte data RAM
    - Supports PS/2 mouse
- Advanced Power Control
- Supports Ring wake up function
- Supports PS/2 wake up function
- Supports keyboard wake up function
- Supports soft-switch to turn on/off main power in ATX platform system

- Ethernet
    - 10 Mb/s and 100 Mb/s operation
    - Support 10 Mb/s and 100 Mb/s N-way auto-negotiation
    - Full compliance with PCI Revision 2.1
    - Full duplex capability
    - Support Full duplex flow control(IEEE 802.3x)
    - PCI bus master data transfers
    - Programmable PCI burst size
    - Boot ROM - 64K
    - Interface to 9346 (64 x 16-bit EEPROM) for storage of resource configuration and ID parameters
    - Three level power down modes : sleep, power-down with internal clock running, and power-down with internal clock halted
    - Large independent Rx and Tx FIFOs
    - LED interface for network activity indications
    - Digital and Analog loopback capability
- Audio
    - High-performance, mixed-signal, 16-bit stereo VLSI chip
    - High-quality, 20-voice ESFM™ music synthesizer
    - ESPCM ® compression
    - High-performance DMA supports demand transfer and F-type DMA

- Plug and Play (PnP) Features
- On-chip PnP support for audio, FM and MPU-401
- Software address mapping, and four DMA and six IRQ selections for motherboard implementation
- External EEPROM support for PnP configuration resource
- Record and Playback Features
- Record, compress, and play back voice, sound, and music
- 16-bit stereo ADC and DAC
- Programmable sample rates from 4 kHz to 44.1 kHz for record and playback
- Full-duplex monophonic mode, half-duplex stereo mode
- 6-bit (64 step) master volume control
- Stereo inputs for line-in, CD-ROM, and AUX, and a mono input for microphone
- Mixer Features
- 6-channel stereo mixer with stereo for line, CD audio, TV, music, and digitized audio, and mono for microphone
- Mixer-controlled record and playback with logarithmic volume controls
- Advanced power management with self-timed power-down, automatic wake-up, and suspend/resume Mixer Features
- Supports PC games and applications for Sound Blaster, Sound Blaster Pro, and OPL3 FM synthesizers
- PC/104/ISA expansion
- Licensed BIOS
- PC/AT keyboard port
- Battery-backed real-time clock
- Two additional PC-compatible serial ports (4 total) selectable as RS-232/RS-422/RS-485
- Year 2K compliant
- Front Panel Connector providing access to hardware reset, soft on/off and IDE activity LED

1.1 Specifications

Compatibility	100% IBM PC/AT hardware, BIOS/software compatible
CPU	100% compatible with:
	Intel Pentium, Pentium MMX
	AMD K5, K6-MMX
BIOS	100% compatible clean room Flash BIOS
DRAM Memory	Incremental steps ranging between 8Mbytes to 128Mbytes, EDO
DMA, CTC, INT	8237 DMA, 8254 CTC, 8259 PIC, 8284 clock and 8288 bus controller standard cells embedded into VLSI silicon
Operator Interface	PC/AT keyboard interface; speaker interface
Video/Display	VGA compatible with analog Super VGA color or monochrome video. Liquid crystal (LCD) and electroluminescent (EL) displays can be directly connected. Software initialization drivers included.
Communications	Four RS-232 ports, XT pinout (8250 standard cell) including all PC handshaking & true RS-232 levels, two support RS-422/485, one supports IRDA; one parallel printer port (with read back); speaker connection; 10/100BaseT Ethernet; stereo audio; two USB.

Disk Storage	Floppy disk interface (two 3.5/5.25" 250/500 kbps); dual PCI IDE interface
Additional	Battery-backed real-time clock with drivers
PC Expansion	PC/104 or optional ISA riser
Physical	244mm x 174mm (5.75" x 7.75"); operating ranges: 0-60° C, 5-95% RH (non-condensing), 0-10,000 feet
Power	+5 Volts, +12 Volts, -12 Volts

	Power consumption for selected CPU speeds and RAM capacities.			
	8 Mb	16 Mb	32 Mb	64 Mb
Pentium 100				
Pentium 200MMX				
AMD K6-MMX 200MHz				

	Maximum Ambient Operating Temperature			
	No Heat Sink	Still Air with Passive Heat Sink	Moving Air with Passive Heat Sink**	Fanned Heat Sink
Pentium 100				
Pentium 200MMX				
AMD K6-MMX 200MHz				

** Maximum ambient temperature is based on airflow at 200 ft/min.

2 HARDWARE CONFIGURATION

Before using your SBC you will want to attach your monitor, keyboard, speaker, floppy, IDE drive, printer, and RS-232 devices. The following drawing shows the location of the RS-232 ports (COM1, COM2, COM3 and COM4), printer port (LPT1), video connector, parallel connector, keyboard/speaker connector, floppy connector, and Hard Drive connector.

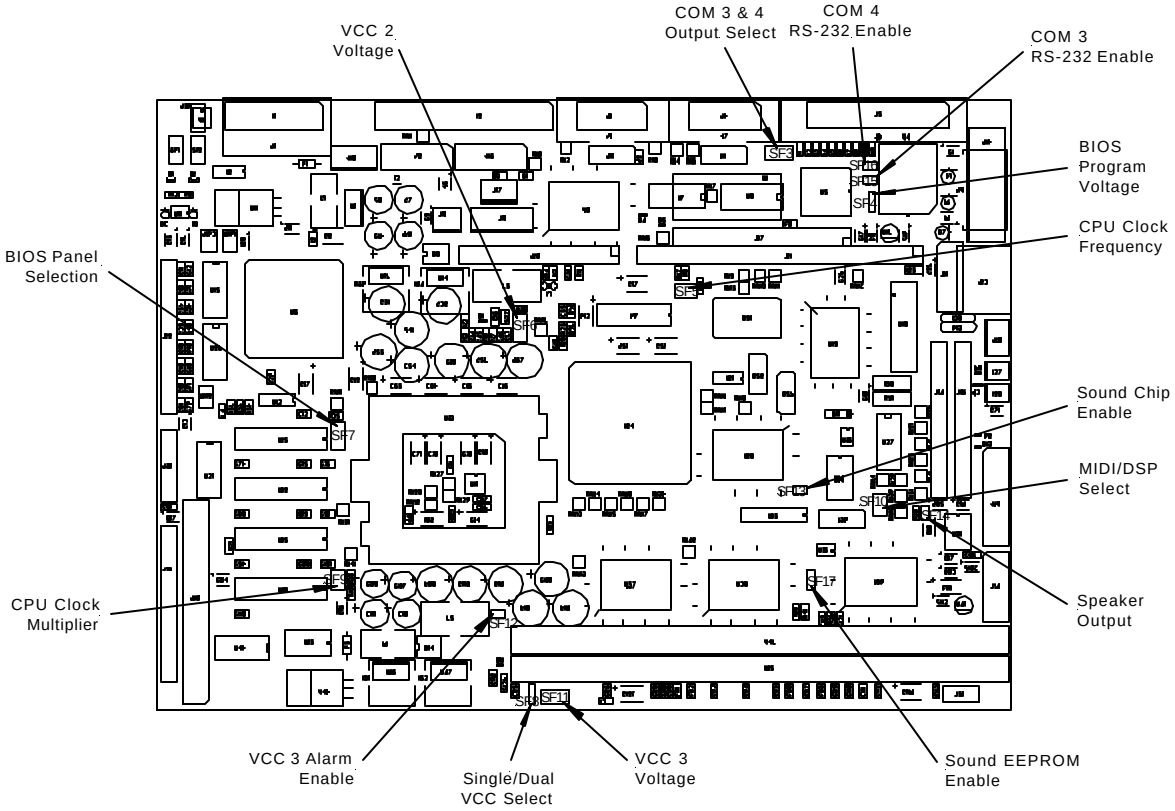


Figure 2-1. SBC-MaX Strapping Field Placement

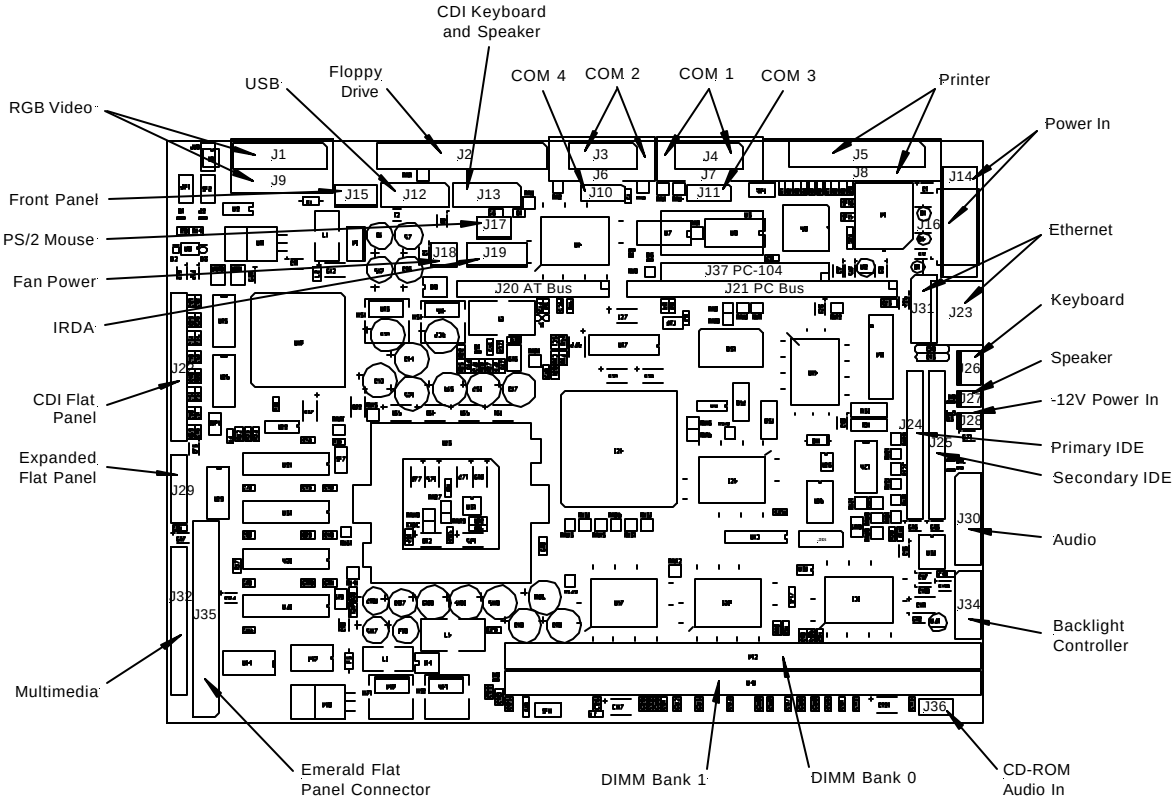


Figure 2-2. SBC-MaX Connector Placement

The SBC-MaX is built in 2 configurations.

1. COM1, COM2, Printer, and VGA connectors are metal DB-style connectors.
2. COM1, COM2, Printer and VGA connectors are Header connectors (.020” square posts on 0.1” centers).

Both connector styles are documented in ths manual.

All connector and strapping field orientations in this manual are relative to the board orientation as pictured in Figure 2-1.

Unless otherwise specified, horizontal double row connectors and single row strapping fields have pin 1 in the top right corner or to the right of the strapping field. Horizontal single row connectors have pin 1 to the left. All single row connectors are locking type.. Pin 1 always has a square pad. All other pins have round pads.

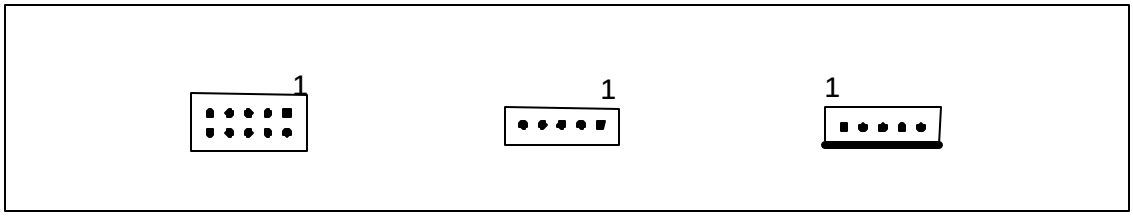


Figure 2-3. Horizontal Connectors and Strapping Fields.

Also if the connector is vertical, pin 1 is in the top left corner.

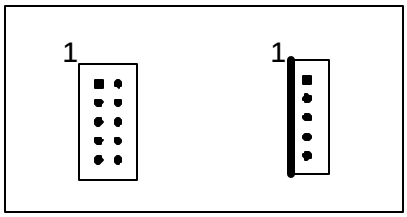


Figure 2-4. Vertical Connectors and Strapping Fields.

Single row connectors are numbered sequentially from top to bottom or one end to the other.

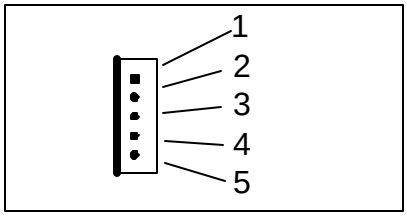


Figure 2-5. Single Row Connector and Strapping Field Pin Numbers.

Double row connectors are numbered with all even numbers on one side of the connector and all odd numbers on the other side.

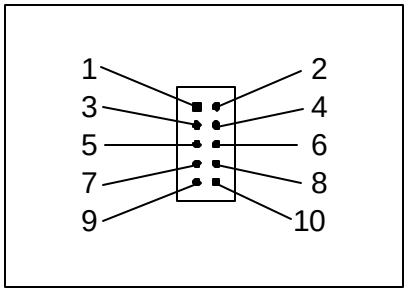


Figure 2-6. Double Row Connector and Strapping Field Pin Numbers.

2.1 UART3 and UART4 Signal Levels (SF3)

UART3 and UART4 are independently selectable as RS-232 or RS-422/RS-485 as shown in the following figure. The factory default is both UARTs are RS-232. Either or both can be converted to RS-422/RS-485 by moving the strap from RS-232 to RS-422/RS-485.

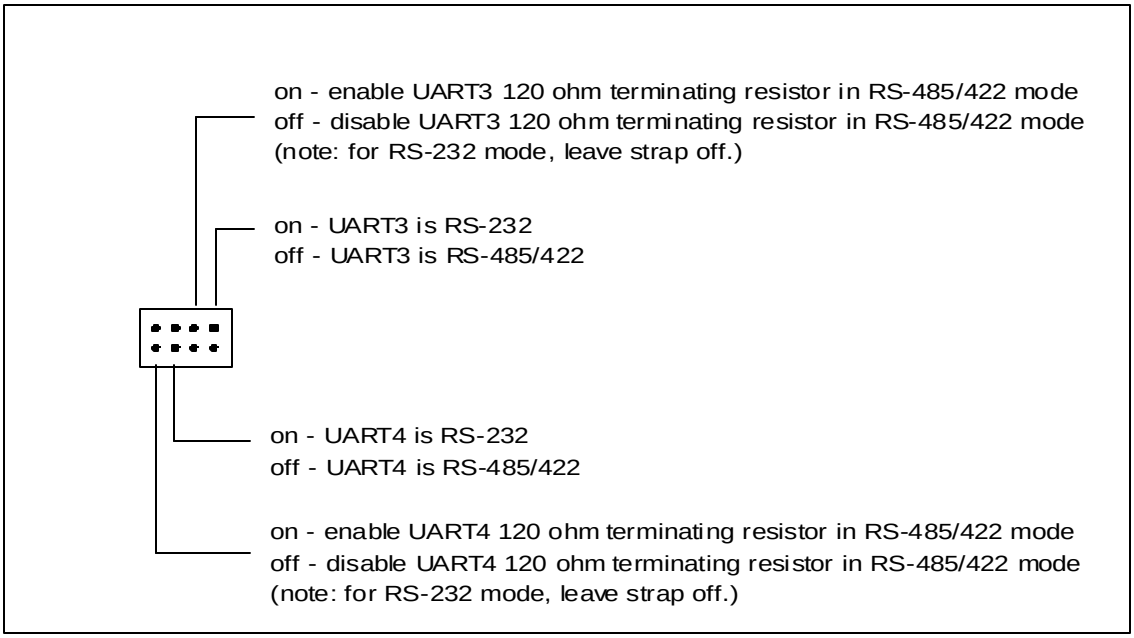


Figure 2-7. SF3 Definition

2.2 FLASH Programming Voltage (SF4)

Programming voltage for the FLASH BIOS is selected with SF4. This strapping field is factory set for the BIOS chip on your board. This setting does not need to be changed unless the BIOS ROM part is replaced.

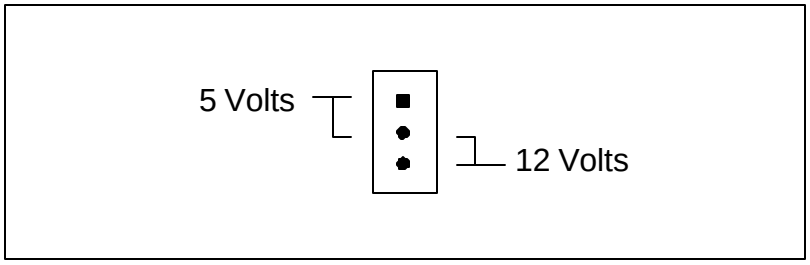


Figure 2-8. SF4 Pin Definitions

2.3 Bus Frequency (SF5)

SF5 selects processor and PCI Bus frequency. PCI Bus frequency is one half the processor bus frequency.

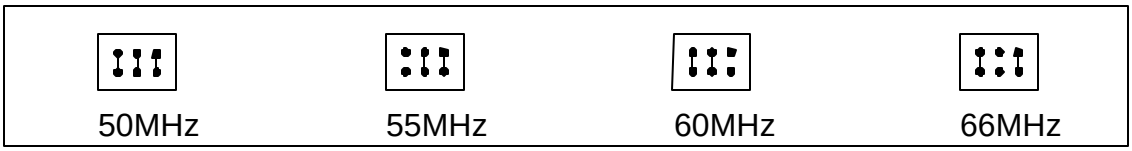


Figure 2-9. SF5 Pin Definitions

2.4 CPU Voltage Selection (SF6 and SF11)

SF6 sets the voltage for single supply processors and the core voltage on dual supply processors. SF11 sets the additional power supply voltage required for dual supply processors. For single supply processors, SF8 and SF12 turn off the power supply controlled by SF11. An X in the table indicates that the strap is installed.

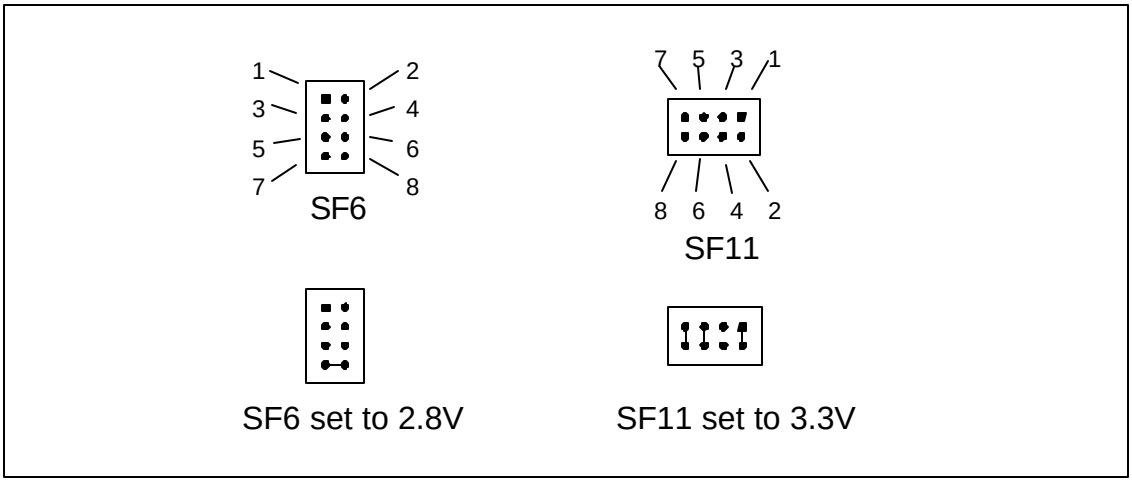


Figure 2-10. SF6 and SF11 Pin Locations

VCC2	SF6			
VOLTAGE	7-8	5-6	3-4	1-2
2.0V				
2.1V				X
2.2V			X	
2.3V			X	X
2.4V		X		
2.5V		X		X
2.6V		X	X	
2.7V		X	X	X
2.8V	X			
2.9V	X			X
3.0V	X		X	
3.1V	X		X	X
3.2V	X	X		
3.3V	X	X		X
3.4V	X	X	X	
3.5V	X	X	X	X

VCC3	SF11			
VOLTAGE	7-8	5-6	3-4	1-2
2.0V				
2.1V				X
2.2V			X	
2.3V			X	X
2.4V		X		
2.5V		X		X
2.6V		X	X	
2.7V		X	X	X
2.8V	X			
2.9V	X			X
3.0V	X		X	
3.1V	X		X	X
3.2V	X	X		
3.3V	X	X		X
3.4V	X	X	X	
3.5V	X	X	X	X

Figure 2-11. SF6 and SF11 Voltage Selections

2.5 VGA Panel Select (SF7)

Strapping field SF7 provides power-on default options for video. These straps will be set to the default value at the factory based on the flat panel configuration ordered.

Note:

Maintaining an up to date chart for video strapping in this manual is not possible due to the constant addition of new flat panel displays supported by the SBC product line. The straps in SF7 are pre-configured for the flat panel in your Display-Pac. If you are experiencing problems with your flat panel, or if you are implementing a panel and require additional information contact your Computer Dynamics Applications Engineer with the flat panel specifics. They will provide you with the appropriate information.

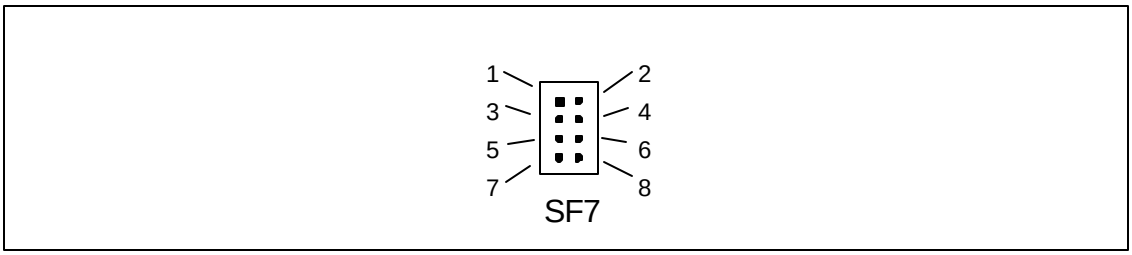


Figure 2-12. SF7 Pin Definitions

2.6 Single/Dual Supply Processor Selection (SF8 and SF12)

SF8 and SF12 select single or dual power supplies needed by the processor. Usually non-MMX processors use a single power supply.

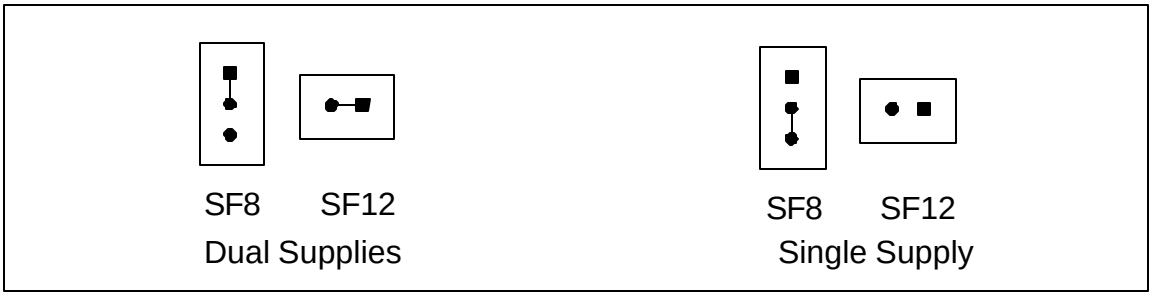


Figure 2-13. SF8 and SF12 Configuration Options.

2.7 CPU Clock Multiplier Selection (SF9)

SF9 selects the processor clock multiplier. An X indicates a strap is installed.

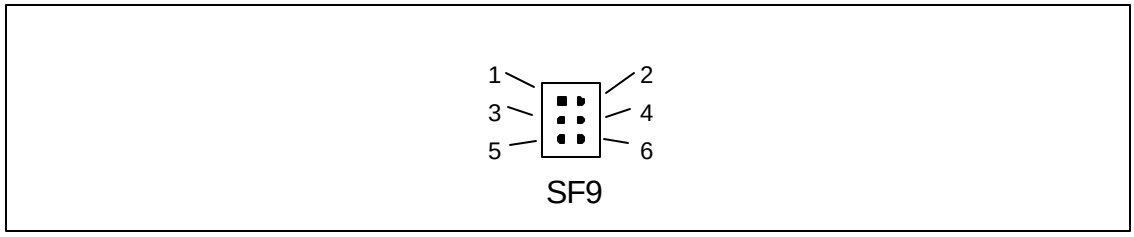


Figure 2-14. SF9 Pin Definitions

Intel Pentium	Intel Pentium MMX	Cyrix 6x86MMX 6x86	AMD K6	SF-9		
				1-2	3-4	5-6
x2.5	x2.5	x2.5	x2.5			
x3.0	x2.5	x3.0	x3.0	X		
x2.0	x2.0	x2.0	x2.0		X	
x1.5	x2.0	x1.5	x1.5	X	X	
x2.5	x3.0	x2.5	x2.5			X
x3.0	x3.0	x3.0	x3.0	X		X
x2.0	x2.5	x2.0	x2.0		X	X
x1.5	x2.5	x1.5	x1.5	X	X	X

Figure 2-15. Processor Clock Multipliers

2.8 NTSC Daughter Card Audio Selection (SF10)

SF10 selects MIDI or DSP/CODEC access to the Audio chip from the NTSC Connector.

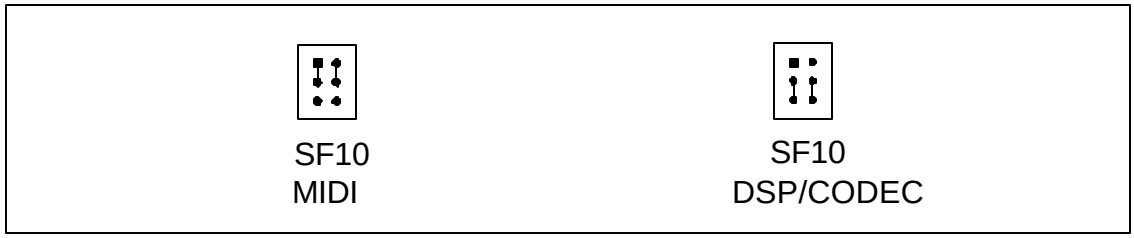


Figure 2-16. SF10 Strapping Options

2.9 Sound Chip Enable (SF13)

SF13 enables or disables the sound chip circuit. This option is only available on revision C and later. Disabling the sound chip frees up one Interrupt and two DMA signals. The default strapping is ENABLED.

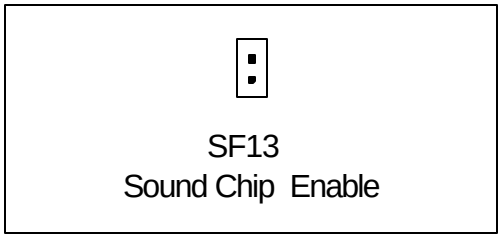


Figure 2-17. SF13 Strapping Options

2.10 Speaker Output Mode (SF14)

SF14 selects the speaker output mode. When the strap is installed the speaker outputs are in the Bridge Drive mode. With the strap not installed the speaker outputs are in Single Ended mode.

Bridge Drive Mode provides twice as much power to the speakers as single ended mode.

This option is only available on revision C and later.

The default strapping is Bridge Drive.

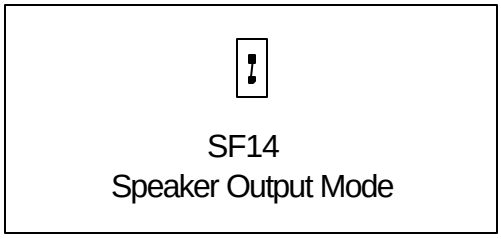


Figure 2-18. SF14 Strapping Options

2.11 UART3 and UART4 RTS Signal Enable (SF15 and SF16)

The RTS signal on COM3 and COM4 is used to turn on and off the RS-422/RS-485 driver. The state of RTS is controlled by bit 1 of the UART Modem Control Register (MCR). When bit 1 of the MCR is set to a 0, the RS-422/RS-485 transmitters are on. When bit 1 of the MCR is set to 1, the RS-422/RS-485 transmitters are tri-stated. . Many of the communications programs provided with a standard PC do not toggle RTS correctly for RS-422/RS-485 operation with SBC-MaX.

RS-422 requires that the driver be on at all times. If you are not writing your own communications program to control RTS, then you will want to disable the RTS signal from UART3 and/or UART4 by removing the shunt from SF15 and/or SF16.

RS-485 requires the RTS signal to control the driver so the shunt must be installed.

RS-232 also requires the RTS signal for signaling, so the shunt must be installed.

SF15 and SF16 are available on revision D and later SBC-MaX boards.

The factory default is both RTS signals enabled (RS-232 default).

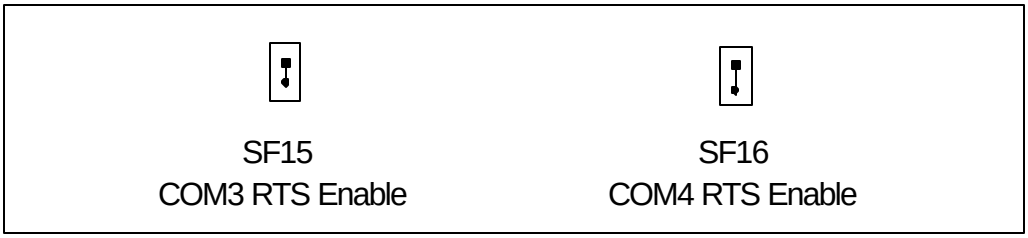


Figure 2-8. SF15 and SF16 Definition

2.12 Sound PnP EEPROM Enable (SF17)

SF17 enables or disables the PnP configuration EEPROM in the sound circuit. SF17 is for factory use only and is only available on revision D and later. The default strapping is ENABLED.

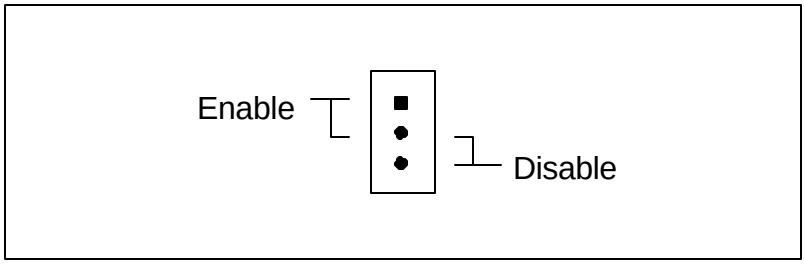
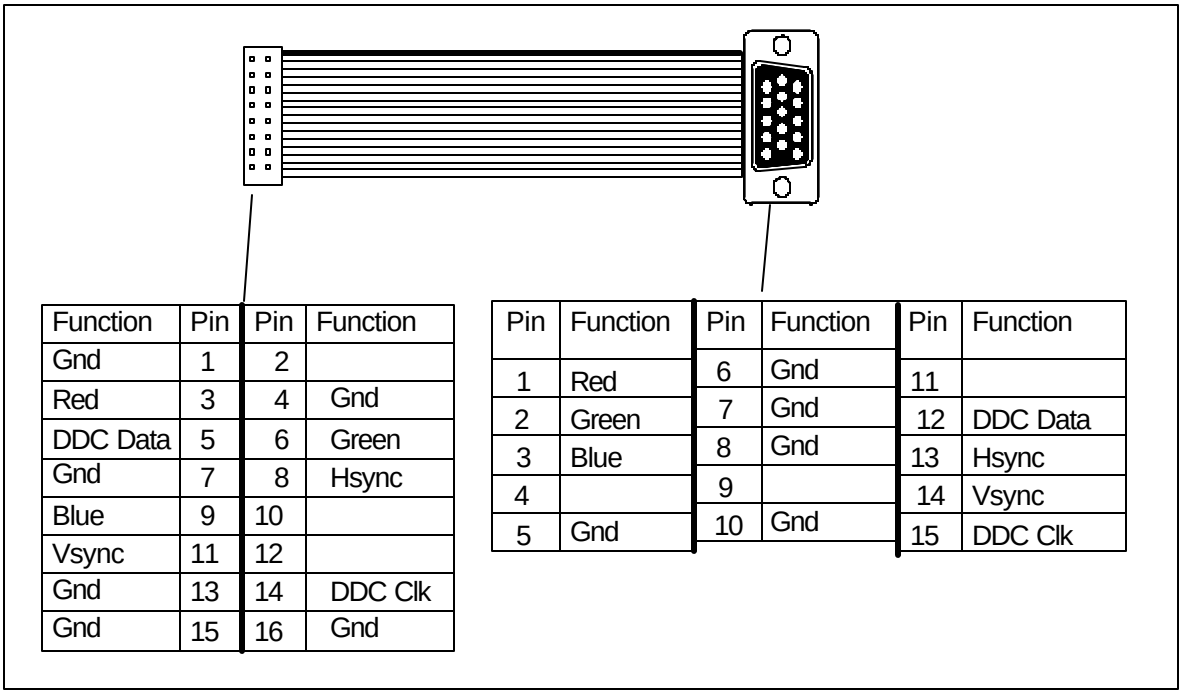


Figure 2-19. SF17 Strapping Options

2.13 VGA Video Interface (J1 or J9)

A VGA monitor is connected to SBC-MaX using the VGA adapter cable. This module re-routes the signals from the header connector, J1, to the industry standard 15-pin high density D-type connector as shown in the following figure. SBC-MaX can be ordered with an optional high density DB-15 mounted on the board. Contact your Computer Dynamics Applications Engineer for details.



Function	Pin	Pin	Function
Gnd	1	2	
Red	3	4	Gnd
DDC Data	5	6	Green
Gnd	7	8	Hsync
Blue	9	10	
Vsync	11	12	
Gnd	13	14	DDC Clk
Gnd	15	16	Gnd

Pin	Function	Pin	Function	Pin	Function
1	Red	6	Gnd	11	
2	Green	7	Gnd	12	DDC Data
3	Blue	8	Gnd	13	Hsync
4		9		14	Vsync
5	Gnd	10	Gnd	15	DDC Clk

Figure 2-20. VGA Interface

2.14 Floppy Interface (J2)

The SBC-MaX supports up to two floppy drives, which, under MS-DOS, can be any combination of 5.25” and 3.5”, drives.

The drive cable for the SBC-MaX is identical to that used in an IBM-PC. Wires 10 through 16 are swapped. This swap, or flip, provides the drive select to the drives. Attach drive A on the connector at the end of the cable. Drive B uses the middle connector on the cable. Set the straps or configuration switch on the drives so that both drives are configured as the **second** drive in the system. Note that 3.5" floppy drives require header-type connectors while 5.25" drives require card-edge connectors.

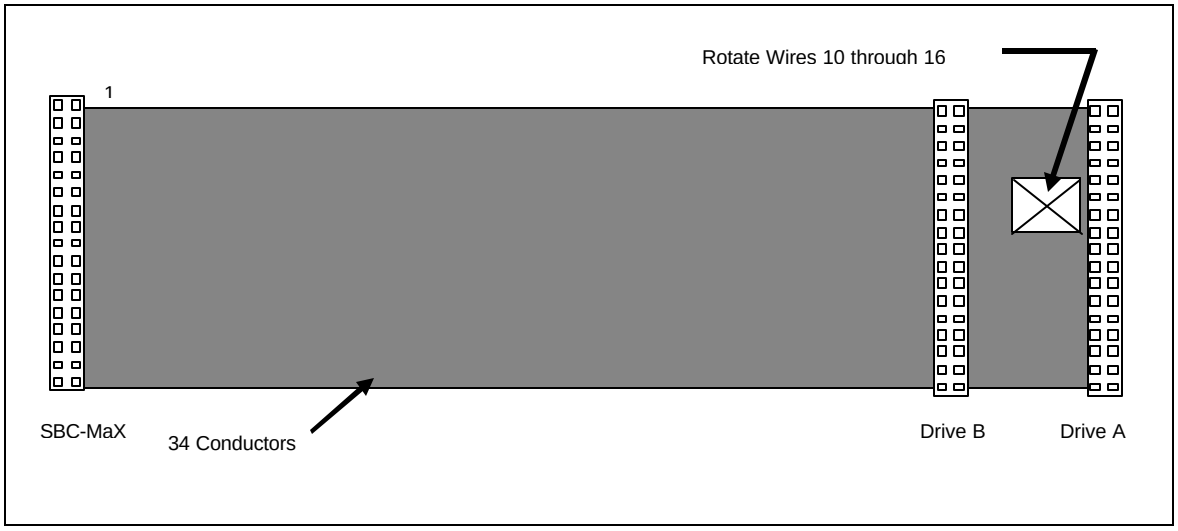


Figure 2-21. J2 Floppy Drive Cable

The BIOS for the SBC-MaX must be informed of the types of floppy drives attached to the system. This is accomplished using the BIOS Setup. See Section Error! Reference source not found..

2.15 Serial Port Interface (J3, J4, J6, J7, J10 and J11)

The SBC-MaX has four serial ports that are flat-cable-compatible with the standard PC 9-pin serial connector, as shown in the following figure. The 9-pin connector is typically a male connector indicating RS-232 DTE. Two of the serial ports have a DB-9 option. The flat cable compatible connectors are standard on SBC-MaX. If you prefer the DB-9 connectors, contact your Computer Dynamics Applications Engineer.

COM	Flat Cable	DB-9
1	J4	J7
2	J3	J6
3	J11	
4	J10	

Figure 2-23. COM Port Connector Reference Designators

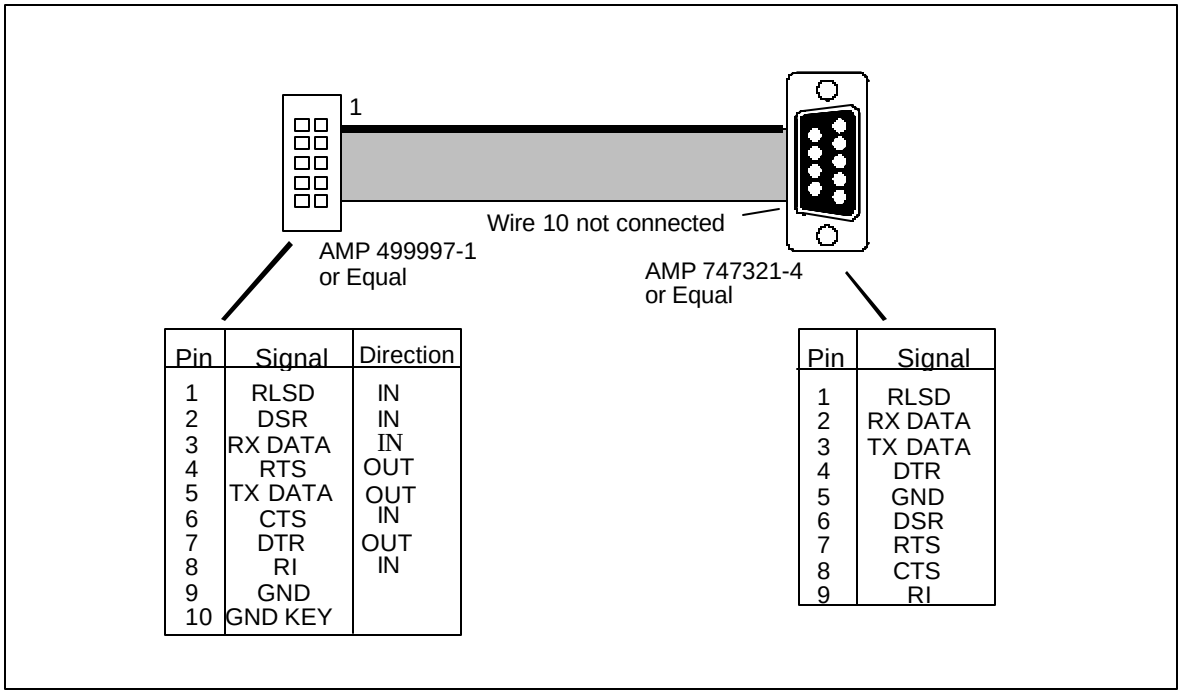


Figure 2-24. Flat Cable COM Connections

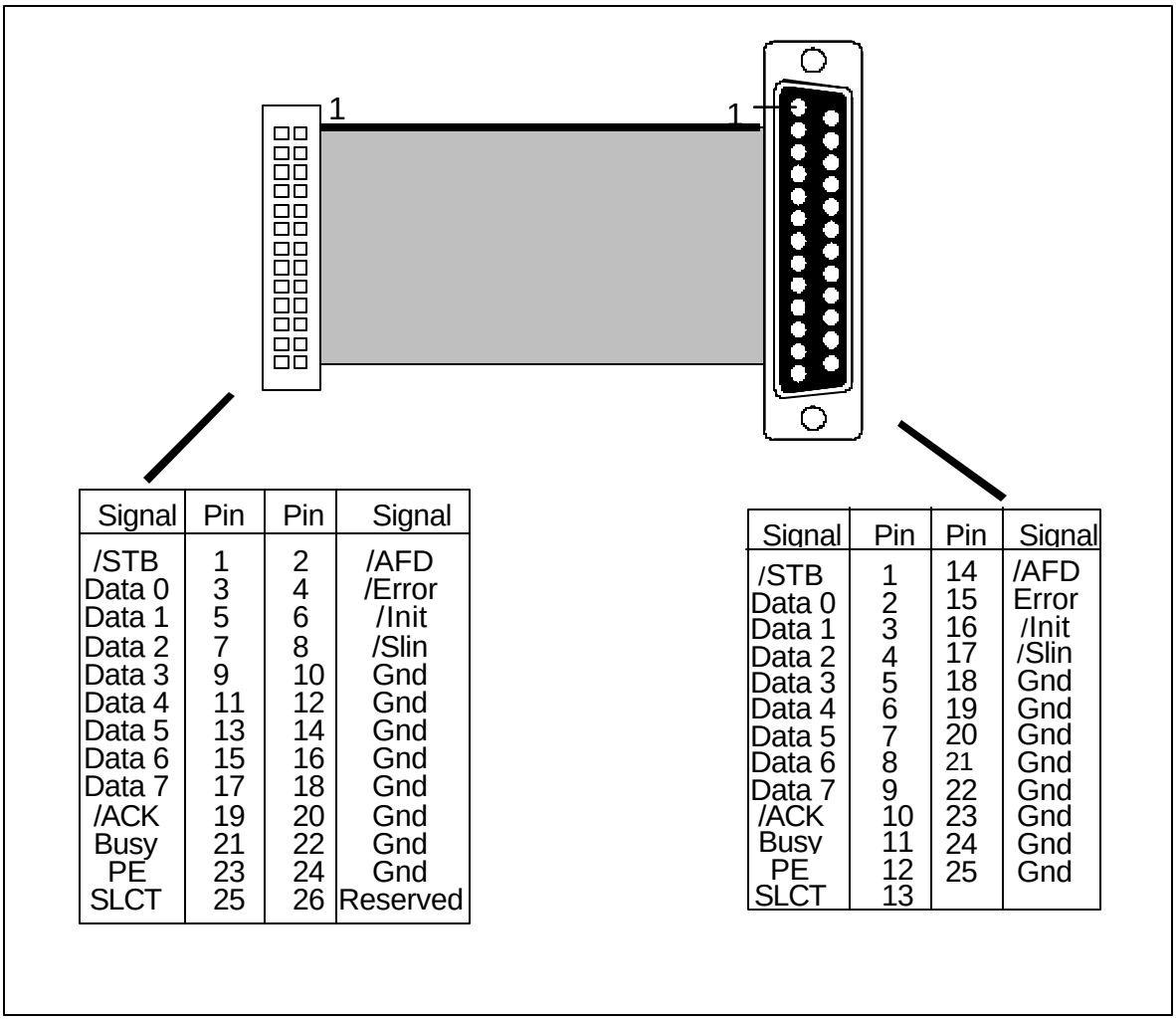
COM3 and COM4 can be configured as RS-422/RS-485 as discussed in Section 2.1. The pin definitions for COM3 and COM4 change as shown in the following figure.

Pin	RS-232	RS-422/RS-485 (COM3 and COM4 only)
1	RLSD	
2	DSR	
3	RX DATA	RD-
4	RTS	TD+
5	TX DATA	TD-
6	CTS	RD+
7	DTR	
8	RI	
9	GND	

Figure 2-26. RS-422/RS485 Connections

2.16 Printer Interface (J5 or J8)

The printer port on the SBC-MaX is flat-cable-compatible with the standard PC 25-pin parallel connector as shown in the following figure for J5.



Signal	Pin	Pin	Signal
/STB	1	2	/AFD
Data 0	3	4	/Error
Data 1	5	6	/Init
Data 2	7	8	/Slin
Data 3	9	10	Gnd
Data 4	11	12	Gnd
Data 5	13	14	Gnd
Data 6	15	16	Gnd
Data 7	17	18	Gnd
/ACK	19	20	Gnd
Busy	21	22	Gnd
PE	23	24	Gnd
SLCT	25	26	Reserved

Signal	Pin	Pin	Signal
/STB	1	14	/AFD
Data 0	2	15	Error
Data 1	3	16	/Init
Data 2	4	17	/Slin
Data 3	5	18	Gnd
Data 4	6	19	Gnd
Data 5	7	20	Gnd
Data 6	8	21	Gnd
Data 7	9	22	Gnd
/ACK	10	23	Gnd
Busy	11	24	Gnd
PE	12	25	Gnd
SLCT	13		

Figure 2-27. Printer Connections

SBC-MaX can be ordered with an optional on board DB-25 connector (J8), contact your Computer Dynamics Applications Engineer. The 25-pin connector for the printer port is a female connector. SBC-MaX supports one printer port.

2.17 USB Port (J12)

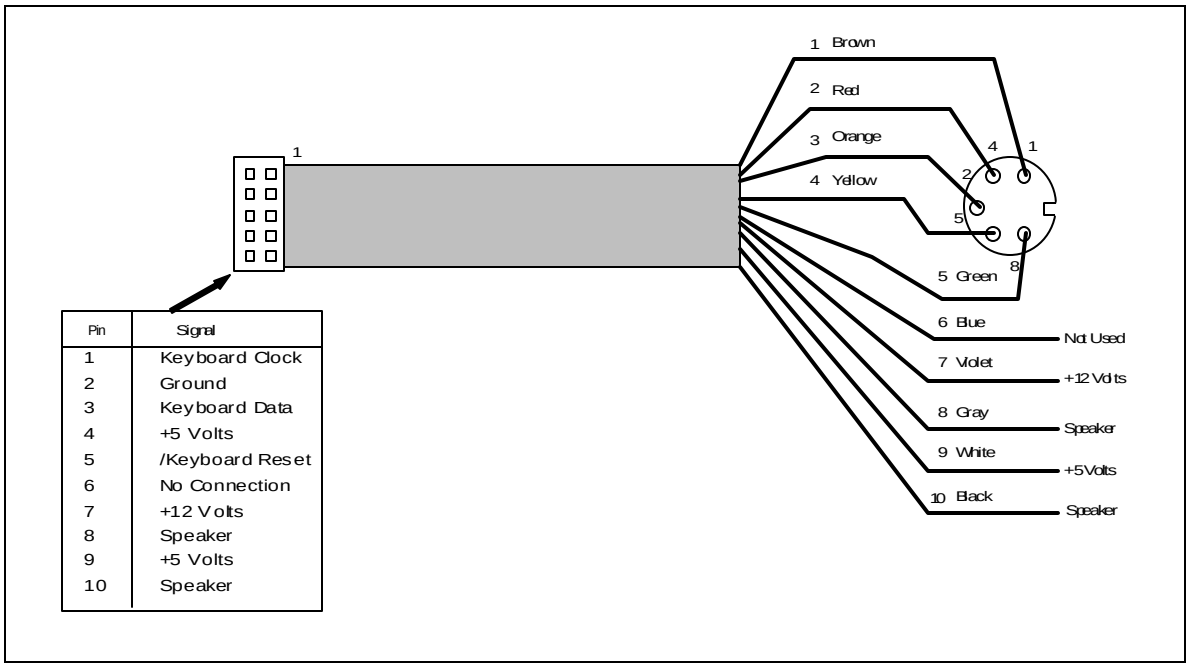
SBC-MaX provides an interface for two USB ports. J12 is compatible with the USB Host Cable from Computer Dynamics.

Function	Pin	Pin	Function
+5V fused	1	2	+5V fused
Port 1-	3	4	Port 2-
Port 1+	5	6	Port 2+
Ground	7	8	Ground
Shield	9	10	Shield

Figure 2-28. USB Connections

2.18 Keyboard/Speaker Interface (J13 or J26 and J27)

The keyboard/speaker connector, J13, provides an interface to PC/AT-compatible keyboards and a speaker or annunciator.



Pin	Signal
1	Keyboard Clock
2	Ground
3	Keyboard Data
4	+5 Volts
5	/Keyboard Reset
6	No Connection
7	+12 Volts
8	Speaker
9	+5 Volts
10	Speaker

Figure 2-29. Keyboard Connections (J13)

WARNING

Inserting the keyboard/speaker cable in the serial port connector or a serial port cable in the keyboard/speaker connector may damage either your keyboard or your SBC.

2.18.1 PC/AT Keyboard

The DIN connector on the end of the cable is compatible with PC/AT type keyboards.

Pin	Signal
1	Keyboard Clock
2	Keyboard Data
3	/Keyboard Reset
4	Ground
5	+5 Volts

Figure 2-30. PC Keyboard Pin Assignments

2.18.2 Speaker/Annunciator Interface

A transistor is provided to drive a speaker or annunciator. Attach an 8Ω speaker (2" to 2.5" are typically used) to the keyboard cable as shown.

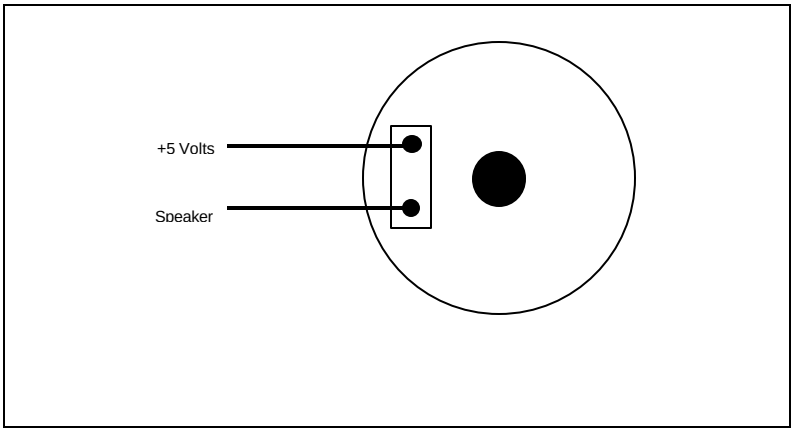


Figure 2-31. Speaker Interface

Annunciators may be connected to either the 5V supply or the 12V supply depending on the requirements of the particular device.

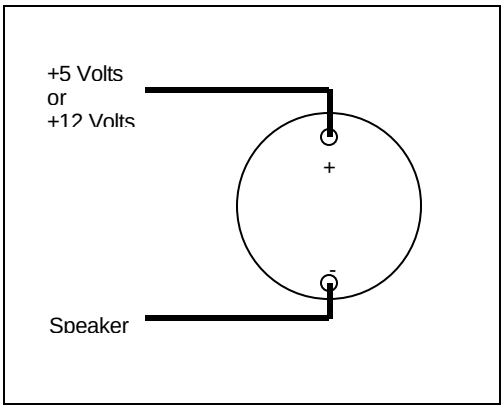


Figure 2-32. Typical Annunciator Connection

2.18.3 PS/2 Keyboard

A PS/2 keyboard can be connected to SBC-MaX at J26 instead of a PC/AT keyboard as shown in the following figure. The DIN connector on the end of the cable is compatible with PS/2 type keyboards. This is only an alternate connection for the keyboard, SBC-MaX does not support two keyboards.

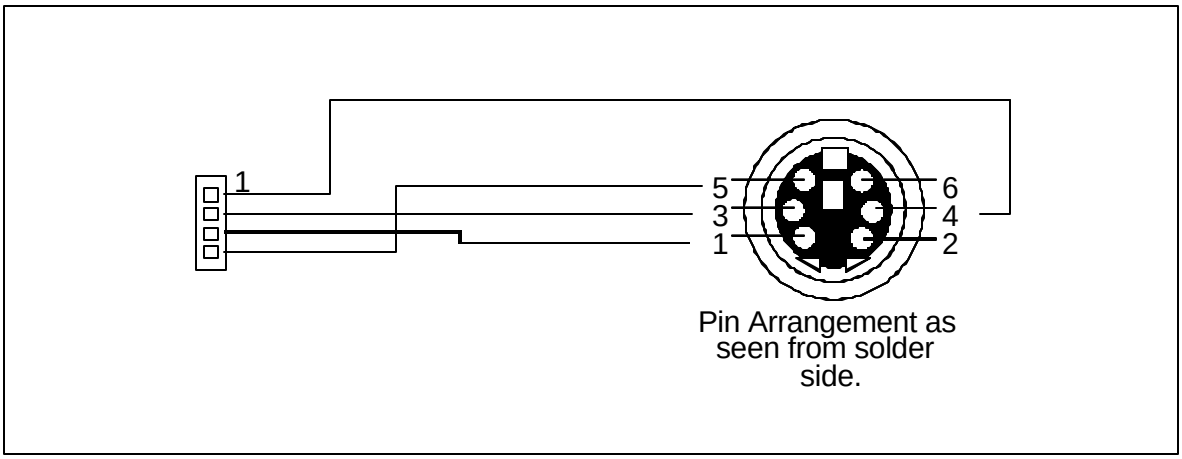


Figure 2-33. PS/2 Keyboard Adapter Cable

Pin	Function
1	+5 Volts
2	Ground
3	Data
4	Clock

Figure 2-34. Keyboard Connections (J26)

Optionally the speaker can be connected to J27. However, J27 does not support the 12 Volt option for driving the speaker.

Pin	Function
1	+5 Volts
2	Speaker

Figure 2-35. Speaker Connections (J27)

2.19 SBC-MaX Power (J14 or J16 and J28)

Power is applied to the SBC-MaX through J14. This connector was selected to support the current requirements for SBC-MaX. It includes a power return lead for each power connection which can help eliminate power lead related EMI.

Pin	Function
1	+5 Volts
2	Ground
3	Ground
4	+5 Volts
5	Ground
6	+12 Volts
7	Ground
8	-12 Volts

Figure 2-36. Power Connections (J14)

Optionally, SBC-MaX can be ordered with a more traditional “Hard Drive” type power connector (J16). When using this connector, -12 Volts must be applied through J28.

Pin	Function
1	+12 Volts
2	Ground
3	Ground
4	+5 Volts

Figure 2-37. Alternate Power Connections (J16)

Pin	Function
1	Ground
2	-12 Volts

Figure 2-38. Alternate Power Connections (J28)

2.20 Front Panel Connector (J15)

The Front Panel Connector provides a IDE Activity LED connection, a Soft On/Off Switch connection and a Reset Connection.

Pin	Function
1	Ground
2	Reset Switch
3	Soft On/Off Switch
4	IDE Activity LED
5	+5 Volts

Figure 2-39. Front Panel Connections (J15)

Connect the Reset Switch to a normally open momentary switch. Grounding the input will hold the SBC-MaX in reset.

Connect the Soft On/Off Switch to a normally open momentary switch. Momentarily grounding this input will put the processor in suspend mode. This will reduce the current requirements of the SBC-MaX. Momentarily grounding this input while the SBC-MaX is in suspend mode will resume normal operation.

Connect the cathode of an LED to the IDE Activity LED pin and the anode to +5 Volts. The LED will flash when any IDE device is used.

2.21 PS/2 Mouse (J17)

A PS/2 mouse can be connected to SBC-MaX at J17 as shown in the following figure.

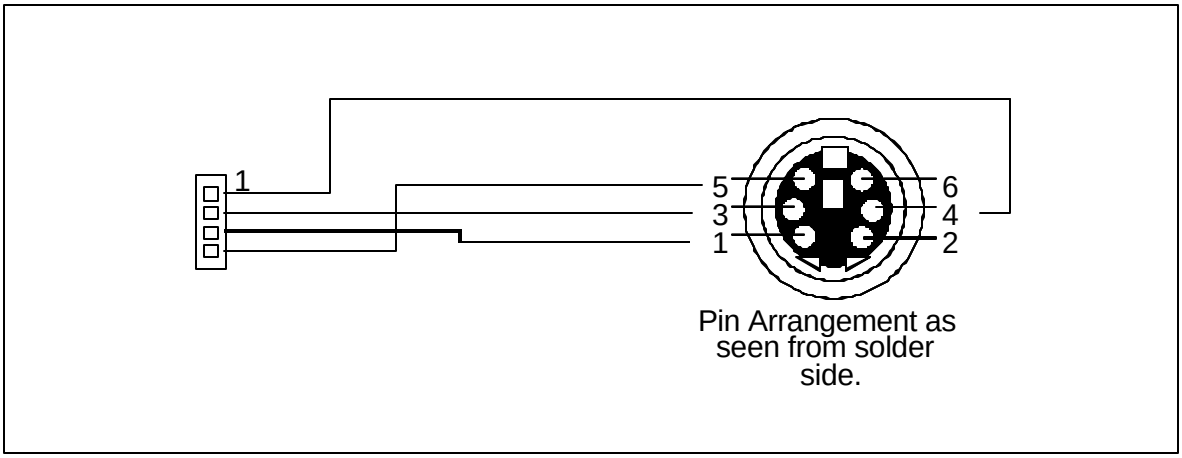


Figure 2-40. PS/2 Mouse Adapter Cable

Pin	Function
1	+5 Volts
2	Ground
3	Data
4	Clock

Figure 2-41. PS/2 Mouse (J17)

2.22 Fan Connector (J18)

The fan connector provides power to the processor heat sink fan.

Pin	Signal
1	+12 Volts
2	Ground

Figure 2-42. Fan Connections

2.23 IRDA Port (J19)

The IRDA port interfaces with an optical module for wireless communication with other IRDA devices. This connector is not currently supported on SBC-MaX. Contact your Computer Dynamics Applications Engineer for availability.

Pin	Signal
1	IRRXL
2	Ground
3	IRTX
4	+5 Volts
5	IRRXH
6	+5 Volts
7	Ground

Figure 2-43. IRDA Connections

2.24 ISA - PC/104 Expansion (J20, J21 and J37)

PC Bus-compatible boards can be attached to SBC-MaX using the ISA Riser available from Computer Dynamics. Contact your Computer Dynamics Applications Engineer to order the ISA Riser. This board plugs into J20 and J21.

PC/104 expansion boards can be used with the PC/104 build option SBC-MaX using J21 and J37. Contact your Computer Dynamics Applications Engineer to order the PC/104 option.

J21 is PC/XT compatible and is common to both options. J20 adds the additional lines for PC/AT compatibility for ISA. J37 adds the additional lines for PC/AT compatibility for PC/104.

Signal	XT Bus Pin	J21 Pin	J21 Pin	XT Bus Pin	Signal
/IO Channel Check	A1	1	2	B1	Ground
SDATA 07	A2	3	4	B2	Reset Driver
SDATA 06	A3	5	6	B3	+5 Volts
SDATA 05	A4	7	8	B4	IRQ 9 (2)
SDATA 04	A5	9	10	B5	-5 Volts
SDATA 03	A6	11	12	B6	DRQ 2
SDATA 02	A7	13	14	B7	-12 Volts
SDATA 01	A8	15	16	B8	/0WS
SDATA 00	A9	17	18	B9	+12V
IO Channel Ready	A10	19	20	B10	Ground
AEN	A11	21	22	B11	/SMEMW
SADDRESS 19	A12	23	24	B12	/SMEMR
SADDRESS 18	A13	25	26	B13	/IOW
SADDRESS 17	A14	27	28	B14	/IOR
SADDRESS 16	A15	29	30	B15	/DACK 3
SADDRESS 15	A16	31	32	B16	DRQ 3
SADDRESS 14	A17	33	34	B17	/DACK 1
SADDRESS 13	A18	35	36	B18	DRQ 1
SADDRESS 12	A19	37	38	B19	/DACK 0
SADDRESS 11	A20	39	40	B20	CLOCK
SADDRESS 10	A21	41	42	B21	IRQ 7
SADDRESS 09	A22	43	44	B22	IRQ 6
SADDRESS 08	A23	45	46	B23	IRQ 5
SADDRESS 07	A24	47	48	B24	IRQ 4
SADDRESS 06	A25	49	50	B25	IRQ 3
SADDRESS 05	A26	51	52	B26	/DACK 2
SADDRESS 04	A27	53	54	B27	T/C
SADDRESS 03	A28	55	56	B28	ALE
SADDRESS 02	A29	57	58	B29	+5 Volts
SADDRESS 01	A30	59	60	B30	14.3818 MHz
SADDRESS 00	A31	61	62	B31	Ground
Ground	No Pin	63	64	No Pin	Ground

Figure 2-44. PC/XT Expansion Connections (J21)

Signal	AT Bus Pin	J20 Pin	J20 Pin	AT Bus Pin	Signal
/SBHE	C1	1	2	D1	/MEMCS16
LA 23	C2	3	4	D2	/IOCS16
LA 22	C3	5	6	D3	IRQ 10
LA 21	C4	7	8	D4	IRQ 11
LA 20	C5	9	10	D5	IRQ 12
LA 19	C6	11	12	D6	IRQ 15
LA 18	C7	13	14	D7	IRQ 14
LA 17	C8	15	16	D8	/DACK 0
/MEMR	C9	17	18	D9	DRQ 0
/MEMW	C10	19	20	D10	/DACK 5
SDATA 08	C11	21	22	D11	DRQ 5
SDATA 09	C12	23	24	D12	/DACK 6
SDATA 10	C13	25	26	D13	DRQ 6
SDATA 11	C14	27	28	D14	/DACK 7
SDATA 12	C15	29	30	D15	DRQ 7
SDATA 13	C16	31	32	D16	+5 Volts
SDATA 14	C17	33	34	D17	/MASTER
SDATA 15	C18	35	36	D18	Ground

Figure 2-45. PC/AT Expansion Connections (J20)

Signal	PC/104 Pin	J37 Pin	J37 Pin	PC/104 Pin	Signal
Ground	C0	1	2	D0	Ground
/SBHE	C1	3	4	D1	/MEMCS16
LA 23	C2	5	6	D2	/IOCS16
LA 22	C3	7	8	D3	IRQ 10
LA 21	C4	9	10	D4	IRQ 11
LA 20	C5	11	12	D5	IRQ 12
LA 19	C6	13	14	D6	IRQ 15
LA 18	C7	15	16	D7	IRQ 14
LA 17	C8	17	18	D8	/DACK 0
/MEMR	C9	19	20	D9	DRQ 0
/MEMW	C10	21	22	D10	/DACK 5
SDATA 08	C11	23	24	D11	DRQ 5
SDATA 09	C12	25	26	D12	/DACK 6
SDATA 10	C13	27	28	D13	DRQ 6
SDATA 11	C14	29	30	D14	/DACK 7
SDATA 12	C15	31	32	D15	DRQ 7
SDATA 13	C16	33	34	D16	+5 Volts
SDATA 14	C17	35	36	D17	/MASTER
SDATA 15	C18	37	38	D18	Ground
No Connection	C19	39	40	D19	Ground

Figure 2-46. PC/104 AT Connections (J37)

2.25 Panel Connector (J22, J29 and J35)

Flat-panel displays (liquid crystal displays, electroluminescent, plasma, etc.) may be connected to SBC-MaX through J22 (2 x 22, 2mm connector) and J29 (2 x 10, 2 mm connector). J35 contains a subset of the signals used for flat panels but is only available on special order and is not documented here. CDI offers cable interfaces for common LCD or EL displays. Contact your Computer Dynamics Applications Engineer for availability on specific panel interfaces.

Signal	Pin	Pin	Signal
Backlight Power (switched)	1	2	Backlight Power (switched)
Ground	3	4	Ground
Panel Power (switched)	5	6	Panel Power (switched)
Enable V_{EE}	7	8	Ground
P00	9	10	P01
P02	11	12	P03
P04	13	14	P05
P06	15	16	P07
P08	17	18	P09
P10	19	20	P11
P12	21	22	P13
P14	23	24	P15
P16	25	26	P17
P18	27	28	P19
P20	29	30	P21
P22	31	32	P23
Ground	33	34	Ground
Shift Clock	35	36	FLM
M	37	38	LP
Ground	39	40	Enable Backlight
Ground	41	42	/Shift Clock
Panel Power (unswitched)	43	44	Panel Power (unswitched)

Figure 2-49. Panel Connections (J22)

Signal	Pin	Pin	Signal
Ground	1	2	Ground
P24	3	4	P25
P26	5	6	P27
P28	7	8	P29
P30	9	10	P31
P32	11	12	P33
P34	13	14	P35
Ground	15	16	Ground
+5 Volts	17	18	+5 Volts
Reserved (Ground)	19	20	Reserved (Ground)

Figure 2-50. Extended Flat Panel Connections (J29)

2.26 Ethernet (J23 or J31)

SBC-MaX provides an industry standard RJ-45 (J23) for 10/100baseT Ethernet. Unshielded twisted pair (UTP) cables from this connector connect SBC-MaX to other computers, hubs and bulkhead connectors. SBC-MaX supports most popular networks.

As an option, the 10/100baseT signals are available on a 2 x 5, 0.1" center header connector (J31) for remote mounting a RJ-45 connector.

Pin	Signal
1	+5 Volts
2	TX/RX LED
3	RX+
4	RX-
5	Not Connected
6	Ground
7	Not Connected
8	Ground
9	TX+
10	TX-

Figure 2-51. 10/100baseT Connections (J31)

2.27 IDE Hard Disk (J24 and J25)

The SBC-MaX supports two IDE interfaces. Each of these interfaces supports up to two IDE devices, such as hard drives, CD ROMs and ATA FLASH drives. A single 2.5-inch drive may be shock mounted to the SBC-MaX. Both of the SBC-MaX IDE connectors are 2 x 44, 2mm connectors with power embedded in the connector. Computer Dynamics builds a conversion board to connect 3.5 inch (2 x 20, 0.1 center connectors) devices to SBC-MaX. J24 is the primary IDE port and J25 is the secondary IDE port.

Signal	Pin	Pin	Signal
Reset	1	2	Ground
Data07	3	4	Data08
Data06	5	6	Data09
Data05	7	8	Data10
Data04	9	10	Data11
Data03	11	12	Data12
Data02	13	14	Data13
Data01	15	16	Data14
Data00	17	18	Data15
Ground	19	20	No Connection (key)
DMA REQ	21	22	Ground
/IDE WR	23	24	Ground
/IDE RD	25	26	Ground
IO Channel Ready	27	28	Not Connected
/DMA ACK	29	30	Ground
INTRQ	31	32	/IOCS16
ADDRESS01	33	34	Not Connected
ADDRESS00	35	36	ADDRESS02
/CS0	37	38	/CS1
/ACTIVE	39	40	Ground
+5 Volts	41	42	+5 Volts
Ground	43	44	Not Connected

Figure 2-52. IDE Connections (J24 and J25)

Signal	Pin	Pin	Signal
Reset	1	2	Ground
Data07	3	4	Data08
Data06	5	6	Data09
Data05	7	8	Data10
Data04	9	10	Data11
Data03	11	12	Data12
Data02	13	14	Data13
Data01	15	16	Data14
Data00	17	18	Data15
Ground	19	20	No Connection (key)
DMA REQ	21	22	Ground
/IDE WR	23	24	Ground
/IDE RD	25	26	Ground
IO Channel Ready	27	28	Not Connected
/DMA ACK	29	30	Ground
INTRQ	31	32	/IOCS16
ADDRESS01	33	34	Not Connected
ADDRESS00	35	36	ADDRESS02
/CS0	37	38	/CS1
/ACTIVE	39	40	Ground

Figure 2-53. 3.5” IDE Connections for Reference

INTRQ (pin 31) is IRQ 14 on J24 and IRQ 15 on J25.

To install two IDE hard disk drives on a single IDE connector, follow the instructions in the drive manufacturer's manual. Configure the first drive as the Master and the second drive as the Slave.

Some drives have shown intolerance to software reset (Ctrl-Alt-Del) and get "disk I/O error" on restart of win95. The fix for this is to disable multisector transfers in CMOS Setup.

2.27.1 Select IDE hard disk Type

Before SBC-MaX can use the IDE hard disk drive, the BIOS must know the drive type. The BIOS on the SBC contains a setup utility. **See section 4.**

2.27.2 Setting up a Hard Disk for use with MS-DOS

Before the IDE hard disk drive can be used by DOS, several setup steps must be completed. The first is low-level formatting. For all IDE hard disk drives purchased directly from CDI, low-level formatting will have been done prior to shipment.

Before the IDE hard disk drive can be used, it must be partitioned and formatted. The first of these steps is accomplished by booting the system from floppy and running the partition program FDISK.EXE (FDISK.COM on older versions on MS-DOS). FDISK is discussed in detail in Appendix D of the Microsoft MS-DOS User's Guide and User's Reference. We will not attempt to duplicate that discussion here but will guide you through the basics required to initialize your drive.

WARNING

Partitioning a hard-disk will destroy any files that are on it.

With a diskette containing FDISK in your floppy drive, type

FDISK

and press the "Enter" key. FDISK will provide an option menu. Select the "Create DOS Partition or Logical DOS drive" option. On the next menu, select the "Create Primary DOS Partition" option. When the system asks if you want to use the maximum size DOS partition, answer "Y". The system will reboot afterwards, be sure to have a bootable floppy diskette in the floppy disk drive.

Once the drive has been partitioned, each partition must be formatted. For the primary partition, use the command:

FORMAT C: /S

to both format the partition and install a bootable copy of MS-DOS on the partition.

For any remaining partitions or drives, enter the command without the "/S" option (since they don't need MS-DOS). For example, the D: partition would be formatted with:

FORMAT D:

WARNING

Always specify a drive when formatting to avoid accidentally losing valuable files by formatting the wrong drive.

Refer to the Microsoft MS-DOS User's Guide and User's Reference for details on the format process.

Once formatted with the "/S" option, you can complete the MS-DOS installation procedure provided with your copy of MS-DOS.

2.27.3 Setting up a Hard Disk for use with Windows 95/98

Insert the Windows 95 or 98 boot disk into the floppy disk drive and reboot your system.

When the first screen appears press enter to continue the Windows installation. Select the “configure unallocated disk space” option, and press enter. The system will reboot automatically, and then format the hard disk for use with Windows 95 or 98. When formatting is complete the Windows installation program will continue to install Windows.

2.28 Audio (J30)

SBC-MaX provides Sound Blaster Pro compatible connections for stereo line input, stereo line output, stereo speaker output and monaural microphone input on J30.

Stereo speaker outputs drive un-amplified speakers with 1.1 watts in bridged drive mode. SBC-MaX revisions B and earlier provide only bridged drive speaker outputs. SBC-MaX revisions C and later provide both bridged drive speaker outputs and single ended speaker outputs.

Amplified speakers should be connected to Line Out. However, Amplified speakers can be connected to the Un-amplified speaker outputs in single ended mode.

Computer Dynamics manufactures an audio cable. Contact your Computer Dynamics Applications Engineer for details.

Signal	Pin	Pin	Signal
Right Un-amplified Speaker+	1	2	Right Un-amplified Speaker-
Left Un-amplified Speaker+	3	4	Left Un-amplified Speaker-
Right Line Out	5	6	Left Line Out
Ground	7	8	Ground
Right Line In	9	10	Left Line In
Ground	11	12	Ground
Output Select (note)	13	14	Not Connected
Microphone In	15	16	Ground

Figure 2-54. Audio Connections

Note: Pin 13 - Output Select is valid on revision C and later. On earlier revisions pin 13 is Not Connected. Output Select is open for single ended mode and grounded for bridged drive mode.

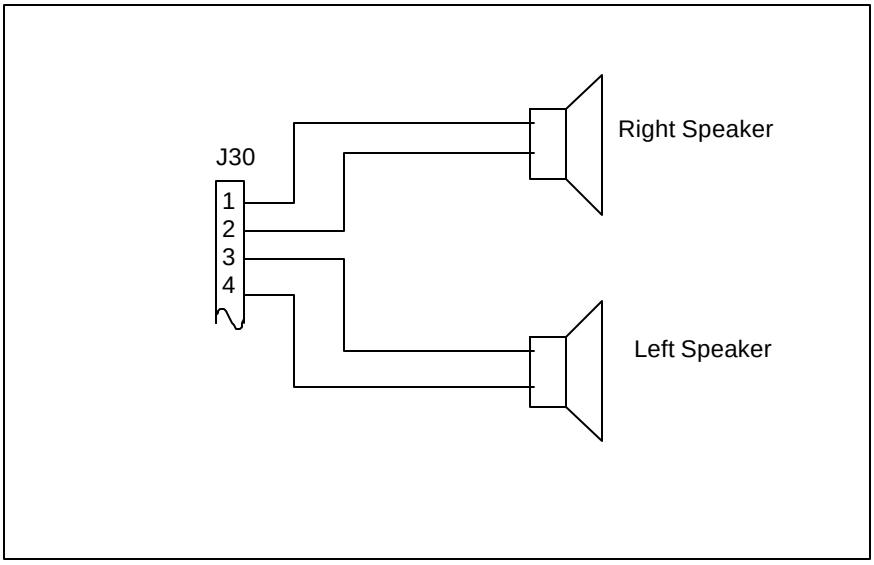


Figure 2-55. Un-amplified Speaker Connections

2.29 NTSC Video Adapter (J32)

The MaX-NTSC board (available separately) gives SBC-MaX the ability to display NTSC video.

Signal	Pin	Pin	Signal
+5 Volts	1	2	+5 Volts
Ground	3	4	Ground
VP00	5	6	VP01
VP02	7	8	VP03
VP04	9	10	VP05
VP06	11	12	VP07
VP08	13	14	VP09
VP10	15	16	VP11
VP12	17	18	VP13
VP14	19	20	VP15
VRDY	21	22	Ground
HREF	23	24	VREF
VCLK	25	26	I^2C Data
I^2C Clock	27	28	Ground
14.318 MHz	29	30	Buffered HSYNC
Buffered VSYNC	31	32	Red
Green	33	34	Blue
Midi In or FSR	35	36	Midi Out or FSX
DX	37	38	DR
SE	39	40	DCLK
Analog Ground	41	42	Ground
Right Audio In	43	44	Left Audio In

Figure 2-56. NTSC Connections

2.30 Backlight Control (J34)

Backlight Control allows SBC-MaX to adjust backlight intensity and control power when using Computer Dynamics High Bright Inverter. This function is connected when ordering a PAC-MaX. If you have purchased SBC-MaX and the High Bright Inverter separately contact your Computer Dynamics Applications Engineer for a cable.

2.31 CD ROM Audio In (J36)

CD ROM audio is connected to SBC-MaX using J36. This connector is compatible with the audio cable supplied with most CD ROM drives. This connector is usually referred to as a Sony connector. Some CD ROM audio cables are Mitsumi type and are not compatible. Contact your Computer Dynamics Applications Engineer.

Pin	Signal
1	Left CD ROM Audio
2	Ground
3	Right CD ROM Audio
4	Ground

Figure 2-57. CD ROM Audio Connector

2.32 System DRAM Installation (U17, U18)

The SBC can support up to two 168-pin EDO DIMM DRAM modules for a maximum of 128Mbytes of memory.

Refer to Section 2.0 for Bank 0 and Bank 1 locations.

Total System Memory	Bank 0	Bank 1
8MB	1M x 64 or 1M x 72	-
16MB	1M x 64 or 1M x 72	1M x 64 or 1M x 72
16MB	2M x 64 or 2M x 72	-
32MB	2M x 64 or 2M x 72	2M x 64 or 2M x 72
32MB	4M x 64 or 4M x 72	-
48MB	4M x 64 or 4M x 72	2M x 64 or 2M x 72
64MB	4M x 64 or 4M x 72	4M x 64 or 4M x 72
64MB	8M x 64 or 8M x 72	-
96MB	8M x 64 or 8M x 72	4M x 64 or 4M x 72
128MB	8M x 64 or 8M x 72	8M x 64 or 8M x 72

3 PRODUCT OVERVIEW

The Ethernet Controller and Audio Controller used on SBC-MaX are “Plug and Play” devices. Similarly COM3, COM4 and the temperature/backlight control resource allocation can be set by program control. The exact resource utilization varies with system configuration. The Ethernet and audio devices will “seek” available resources. COM3, COM4 and the temperature/backlight control resources are user selectable using BIOS Setup. This chapter will document fixed resource allocation and the options for the “Plug and Play” devices.

The audio configuration options are shown in the following table. The Windows 95 Control Panel/System/Device Manager allows the audio to be setup in 5 configurations. Most of the configurations allow multiple resource selections.

Configuration	DMA 0	DMA 1	INT 0	Audio 16 bytes	FM 4 bytes	MPU-401 2 bytes
0	DRQ 1	DRQ 0 DRQ 3	IRQ 5	220H	388H	330H
1	DRQ 1	DRQ 0 DRQ 3	IRQ 5 IRQ 7 IRQ 9 IRQ 10	220H 240H	388H	300H 330H
2	DRQ 0 DRQ 1 DRQ 3	DRQ 0 DRQ 1 DRQ 3	IRQ 5 IRQ 7 IRQ 9 IRQ 10 IRQ 11 IRQ 12	220H 240H 260H 280H	388H	300H 330H
3	DRQ 0 DRQ 1 DRQ 3	DRQ 0 DRQ 1 DRQ 3	IRQ 5 IRQ 7 IRQ 9 IRQ 10 IRQ 11 IRQ 12	220H 240H 260H 280H	388H	Any even address from 800 through FFE
4	DRQ 0 DRQ 1 DRQ 3	DRQ 0 DRQ 1 DRQ 3	IRQ 5 IRQ 7 IRQ 9 IRQ 10 IRQ 11 IRQ 12	220H 240H 260H 280H	Any 4th address from 800 through FFC	Any even address from 800 through FFE

Figure 3-1. Audio Resources.

COM3/4 can be set to respond to different I/O addresses and interrupts as shown in the following figure. These settings must be made in the BIOS Setup and in the Windows Control Panel/System/Device Manager.

Interrupts	I/O Ports 8 bytes
3	3F8H
4	2F8H
5	3E8H
7	2E8H
9	BF8H
10	AF8H
11	BE8H
12	AE8H
14	Disabled
Disabled	

Figure 3-2. COM3/4 Resources

The Temperature Sensors can be set to respond to different I/O addresses and interrupts as shown in the following figure. These settings must be made in the BIOS Setup. There is no option for Temperature Sensors in the Windows95 Control Panel/System/Device Manager.

Interrupt	Port 4 bytes
5	1210H
7	1310H
9	1410H
10	1510H
11	1610H
12	1710H
14	1810H
11	1910H
Disabled	Disabled

Figure 3-3. Temperature Sensor Resources.

3.1 SBC I/O Map

The following figure shows the SBC-MaX I/O map. The addresses used are PC/AT compatible. The PC/AT uses 16-bit I/O address decoding.

Address	Function
0000-000F	DMA Controller 1
0020-0021	Interrupt Controller 1
0040-0043	Counter Timer
0060	Keyboard Controller
0061	Port B register 8255 (Motherboard Speaker)
0064	Keyboard Controller
0070-0071	Real-Time Clock / NMI Mask
0078-007C	Motherboard Resources
007E-0080	Motherboard Resources
0081-008F	DMA Page Register
00A0-00A1	Interrupt Controller 2
00C0-00DF	DMA Controller 2
00F0-00FF	Math Co-processor
0100-016F	
0170-0177	Secondary IDE
0178-01EF	
01F0-01F7	Primary IDE
0220-0273	*0220-0230 Audio Base Option* *0240-0250 Audio Base Option* *0260-0270 Audio Base Option*
0274-0277	Plug and Play enumerator
0278-02E7	*280-290 Audio Base option*
02E8-02EF	COM4
02F0-02F7	
02F8-02FF	COM2
0300-0375	*0300-0301 Audio MPU401* *0330-0331 Audio MPU401*
0376	Secondary IDE
0377	
0378-037F	LPT1
0380-03AF	*0388-038B Audio FM Option*
03B0-03BB	VGA

Address	Function
03BC-03BF	
03C0-03DF	VGA
03E0-03E7	
03E8-03EF	COM3
03F0-03F5	Floppy
03F6	Primary IDE
03F7	Floppy
03F8-03FF	COM1
0400-04CF	
04D0-04D1	Motherboard Resources
04D2-0777	
0778-077A	LPT1
077B-0CF7	*0AE8-0AEF COM3/4 Option* *0AF8-0AFF COM3/4 Option* *0BE8-0BEF COM3/4 Option* *0BF8-0BFF COM3/4 Option*
0900-0907	*ES1868 Control Interface*
0CF8-0CFF	PCI Bus
0D00-190F	*1210-1213 Temperature Option* *1310-1313 Temperature Option* *1410-1413 Temperature Option* *1510-1513 Temperature Option* *1610-1613 Temperature Option* *1710-1713 Temperature Option* *1810-1813 Temperature Option*
1910-1912	COM/Temperature Select
1913-FBFF	
FC00-FC7F	Ethernet
FC80-FCEF	
FCF0-FCF7	Primary IDE
FCF8-FCFF	Secondary IDE
FDFF-FFFF	

SBC I/O Map

3.2 Interrupt Assignments

The following table lists the SBC-MaX interrupts.

Level	Function	COM 3/4	Temperature	Audio	Software Vector
NMI	Parity I/O Channel Check				2H
0	Timer 0				8H
1	Keyboard (buffer full)				9H
2	Controller 2 IRQ8-IRQ15				AH
3	Com Port 2 Com Port 4 (default)	✓			BH
4	Com Port 1 Com Port 3 (default)	✓			CH
5	ES1868 PnP AudioDrive (default)	✓	✓	✓	DH
6	Diskette Controller				EH
7	Printer Port LPT1 (default) (suggested for COM4)	✓	✓	✓	FH
8	Real-Time Clock				70H
9	Ethernet PCI Steering	✓	✓	✓	71H
10	(suggested for COM3)	✓	✓	✓	72H
11	USB PCI Steering	✓	✓	✓	73H
12	PS/2 Mouse	✓	✓	✓	74H
13	Math Co-processor				75H
14	Primary IDE Drive	✓	✓		76H
15	Secondary IDE Drive				77H

SBC Interrupt Assignments

The industry standard IRQ assignments for COM3 and COM4 are IRQ4 and IRQ3 respectively. CMOS setup on SBC-MaX follows this standard and defaults COM3 and COM4 as IRQ4 and IRQ3 when shipped from the factory. This causes a conflict in Windows95 and NT because COM1 and COM2 claim those IRQs as well. Each COM port 'likes' its own IRQ. Note that the PC industry has long felt a problem with too few interrupts and has developed USB as part of the plan to eliminate this problem. To change the IRQ settings for COM3 and COM4, first change the values stored in CMOS using the BIOS Setup Program (press F2 during POST before the operating system starts to load). Then change the IRQ settings in Windows95, Control Panel, System, Device Manager. In WindowsNT the setting can be changed in Control Panel, Ports.

SBC-MaX rev D and later have a PnP option that can be used for COM3 and COM4 eliminating need for hand configuration.

SBC-MaX systems that do not use USB (V1.1.0 and later BIOS ROM) can disable USB to free up its IRQ. USB defaults to disabled using this BIOS. When USB is enabled it claims IRQ11.

The Audio chip on SBC-MaX is Plug and Play, it will seek the first available IRQ based on your system configuration. On SBC-MaX this chip usually selects IRQ5. This setting can be changed in Windows95, Control Panel, System, Device Manager. In WindowsNT the setting can be changed in Control Panel, Ports.

Known problems exist when trying to use 2 master HD at same time. A fix is to change Transfer mode to 'Standard':
1. Main -> IDE Adapter 0 Master -> Transfer Mode
2. Use '+' key to change selection to 'Standard'

3.3 DMA Assignments

The SBC-MaX DMA assignments are listed in the following tables. DMA Channels 0 through 3 support 8-bit transfers between 8-bit I/O devices and 8-bit or 16-bit memory. Each channel can transfer 64-kbyte blocks throughout the 16 Mbyte address range of the system on 64-kbyte boundaries. DMA Channel 4 is used to cascade DMA Channels 0 through 3. DMA Channels 5 through 7 support 16-bit transfers between 16-bit I/O and 16-bit memory. Each channel can transfer 128-kbyte blocks throughout the 32-Mbyte-address range of the system on 64 kbyte boundaries.

DMA	Function
0	*Audio Option*
1	*Audio Option*
2	Floppy Diskette
3	*Audio Option*
4	Cascade for Controller 1 DMA0-DMA3
5	
6	
7	

SBC DMA Assignments

Function	I/O Address
DMA 0	087
DMA 1	083
DMA 2	081
DMA 3	082
DMA 5	08B
DMA 6	089
DMA 7	08A
Refresh	08F

DMA Page Register Address

3.4 Temperature Sensor Registers

SBC-MaX contains two Dallas Semiconductor DS1720 temperature sensors. Sensor 1 is located under the CPU. In its still air environment Sensor 1 closely approximates the processor temperature. Sensor 2 is located on a remote edge of SBC-MaX and indicates the ambient temperature. The following registers are used to drive the temperature sensors.

Offset	Function
0	Clock data in/out of temperature sensor on bit 0
1	Sensor enable

Bit	Function
0	Enable Temperature Sensor 1
1	Enable Temperature Sensor 2
2-7	Reserved

2 Backlight control

Bit	Function
0-5	Backlight control general purpose I/O
Bits 6-7	Reserved

3 Temperature Sensor Interrupt Enables

Bit	Function
0	Sensor 1 low
1	Sensor 1 high
2	Sensor 2 low
3	Sensor 2 high
4-7	Reserved

Figure 3-4. Temperature Register Definition

Register 2, bits 0-5 form a parallel port to control Backlight Inverters through J34.

4 Phoenix BIOS Setup Guide

Use the PhoenixBIOS Setup program for:

- Setting system time and date.
- Installing new drives for hard disks and floppy disks.
- Enhancing system performance by controlling advanced features such as shadow memory and cache memory.

Configuring system resources.

4.1 The Menu Bar Navigating the Setup Menus

The Menu Bar at the top of the window lists these selections:

Main	Use this menu for basic system configuration.
Advanced	Use this menu to set the Advanced Features of the system's chipset.
Power Savings	Use this menu to configure Power Management features.
Boot	Use this menu to select the boot device.
Exit	Exits the current menu.

Use the left/ right " ← → " arrow keys to make a selection.

4.1.1 The Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu. The following chart describes the legend keys and their alternates:

4.1.2 4.1.2 Key	Function
<F1> or <Alt- H>	General Help window.
<Esc>	Exit this menu.
← or → arrow keys	Select a different menu.
↑ or ↓ arrow keys	Move cursor up and down.
<Tab> or <Shift- Tab>	Cycle cursor through fields.
<Home> or <End>	Move cursor to top or bottom of window.
<PgUp> or <PgDn>	Move cursor to next or previous page.
<F5> or <->	Select the Previous Value for the field.
<F6> or <+> or <Space>	Select the Next Value for the field.
<F9>	Load the Default Configuration values for this menu.
<F10>	Load the Previous Configuration values for this menu.
<Enter>	Execute Command or Select Submenu.
<Alt- R>	Refresh screen.

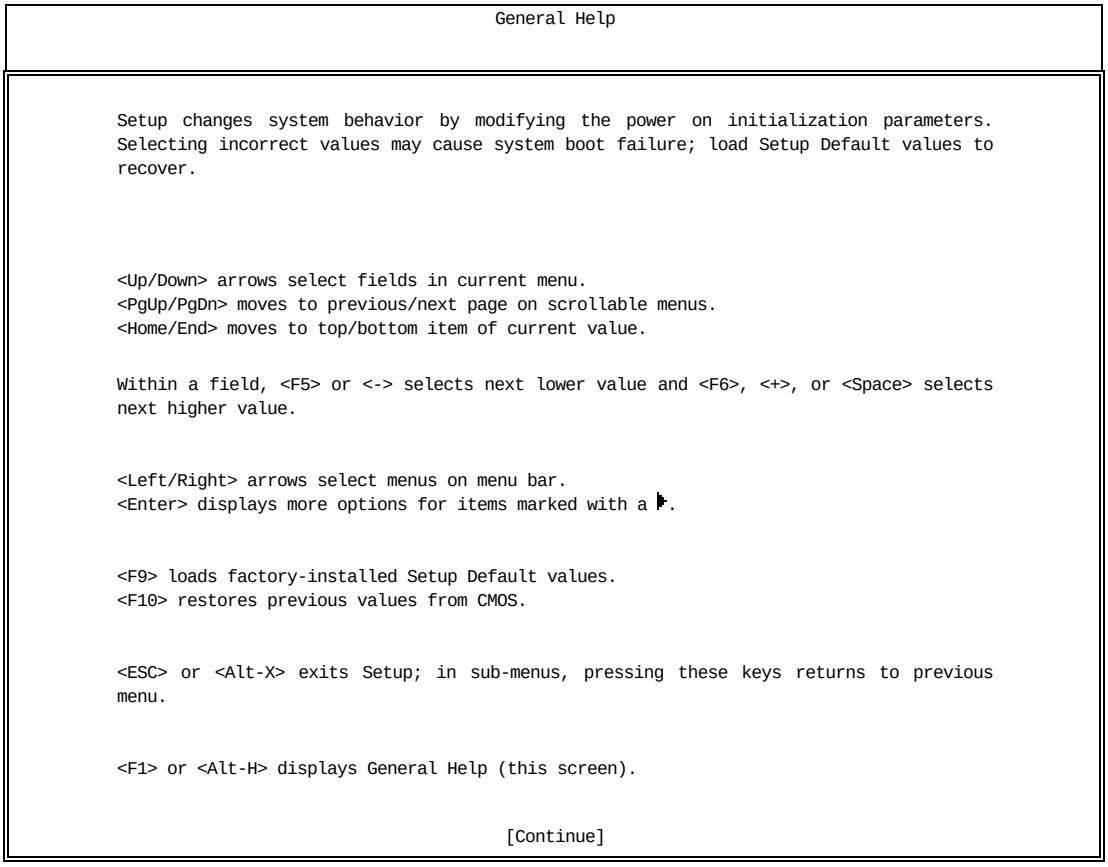
To select an item, use the arrow keys to highlight the field you want. Then use the plus and minus value keys to select a value for that field. The Save Changes commands in the Exit Menu save the values currently displayed in all the menus. To display a sub menu, use the arrow keys to highlight the sub menu you want, then press <Enter>. A pointer (▶) marks all sub menus.

4.1.3 The Field Help Window

The help window on the right side of each menu displays the help text for the currently selected field. It updates as you move the cursor to each field.

4.1.4 The General Help Window

Pressing <F1> or <Alt H> on any menu brings up the General Help window that describes the legend keys and their alternates:



The scroll bar on the right of any window indicates that there is more than one page of information in the window.

Use <PgUp> and <PgDn> to display all the pages.
Pressing <Home> and <End> displays the first and last page.
Press <Esc> to exit the current window.

4.2 The Main Menu

To start the PhoenixBIOS Setup utility:

1. Turn on or reboot your system. PhoenixBIOS displays this message:

```
Press <F2> to enter SETUP
```

2. Pressing <F2> displays the Main Menu, which looks like this:

```
Phoenix BIOS NoteBIOS 4.0 Setup – Copyright 1985-96 Phoenix Technologies Ltd.
  Main     Advanced       Power    Savings       Boot       Exit

                                                      Item Specific Help

                                                    <Tab>, <Shift-Tab> or <Enter>
    System Time:                  [16:19:21]        selects field

    System Date:                  [03/01/1998]
    Diskette A:                   [1.44MB, 3½"]
    Diskette B:                   [Not Installed]
  ▶ Primary Master:               (1350Mb)
  ▶ Primary Slave:                (None)
  ▶ Secondary Master:             (None)
  ▶ Secondary Slave:              (None)
    Video System:                 [EGA/VGA]
  ▶ Memory Cache
  ▶ System Shadow
  ▶ Boot Options
  ▶ Numlock                       [Auto]

    System Memory:                640 KB
    Extended Memory:              31 MB

F1 Help      ↑↓ Select Item     +/- Change Values        F9  Setup Defaults
ESC Exit     ←→ Select Menu     Enter Select ▶ Sub-Menu  F10 Previous Values
```

You can make the following selections on the Main Menu itself. Use the sub menus for other selections.

Feature	Options	Description
System Time	HH: MM: SS	Set the system time.
System Date	MM/ DD/ YYYY	Set the system date.
Diskette 1 Diskette 2	360 kB, 5 ¼" 1.2 MB, 5 ¼" 720 kB, 3 ½" 1.44MB, 3 ½" 2.88 MB, 3 ½" Not installed Disabled	Select the type of floppy disk drive installed in your system.
System Memory	N/ A	Displays amount of conventional memory detected during bootup.
Extended Memory	N/ A	Displays the amount of extended memory detected

		during bootup.

4.2.1 Boot Sequence

You can set the boot sequence of the bootable drives by opening the Boot Menu.

The Master and Slave settings on the Main Menu control these types of devices:

- Hard disk drives
- CD-ROM drives

PhoenixBIOS 4.04 supports up to two IDE disk adapters, called primary and secondary adapters. Each adapter supports one master drive and one optional slave drive in these possible combinations:

- 1 Master
- 1 Master, 1 Slave
- 2 Masters
- 2 Masters, 1 Slave
- 2 Masters, 2 Slaves

There is one IDE connector for each adapter, Primary IDE and Secondary IDE. There can be two connectors on each ribbon cable attached to each IDE connector. When you enter Setup, the Main Menu displays the results of Autotyping–information each drive provides about its own size and other characteristics– and how they are arranged as Masters or Slaves on your machine.

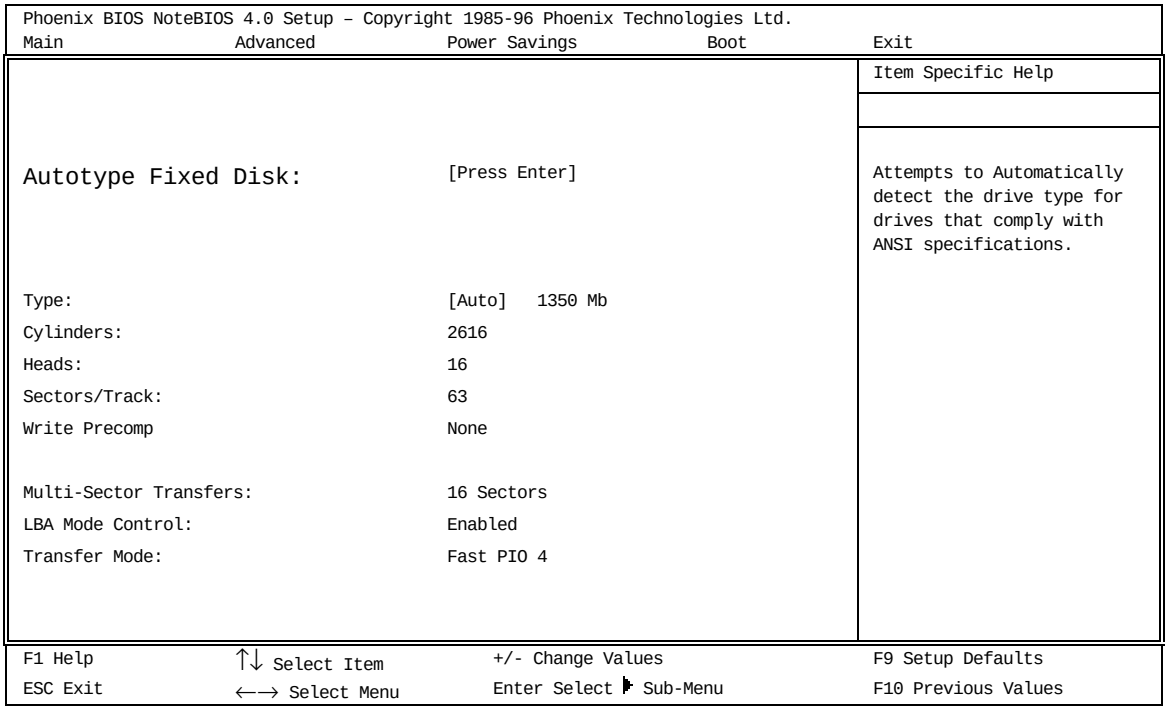
Note:

Do not attempt to change these settings unless you have an installed drive that does not autotype properly (such as an older hard disk drive that does not support autotyping).

If you need to change your drive settings, use the Master or Slave sub-menu as explained in the following.

4.2.2 Advanced Hard Disk Features

Selecting one of the Master or Slave sub menus on the Main Menu displays this menu:



Use the following chart to configure the hard disk drive with Advanced Hard Disk Features:

Feature	Options	Description
Type	None 1 to 39 User Auto CD	None = Autotyping is not able to supply the drive type or end user has selected None, disabling any drive that may be installed. 1 to 39 = Fills in all remaining fields with values for predefined hard disk type. User = You supply the hard disk drive information in the following fields. Auto = Autotyping, the drive Autotypes on each boot. CD-ROM = CD-ROM drive.
Cylinders	1 to 65,536	Number of cylinders.
Heads	1 to 16	Number of read/ write heads.
Sectors/ Track	1 to 63	Number of sectors per track.
Multi- Sector Transfers	Disabled Standard 2 sectors 4 sectors 8 sectors 16 sectors	Any selection except Disabled determines the number of sectors transferred per block. Standard is 1 sector per block.
LBA Mode Control	Enabled Disabled	Enabling LBA causes Logical Block Addressing to be used in place of Cylinders, Heads, & Sectors.
32- Bit I/ O	Enabled Disabled	Enables 32- bit communication between CPU and IDE card.
Transfer Mode	Standard Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4	Selects the method for transferring the data between the hard disk and system memory.

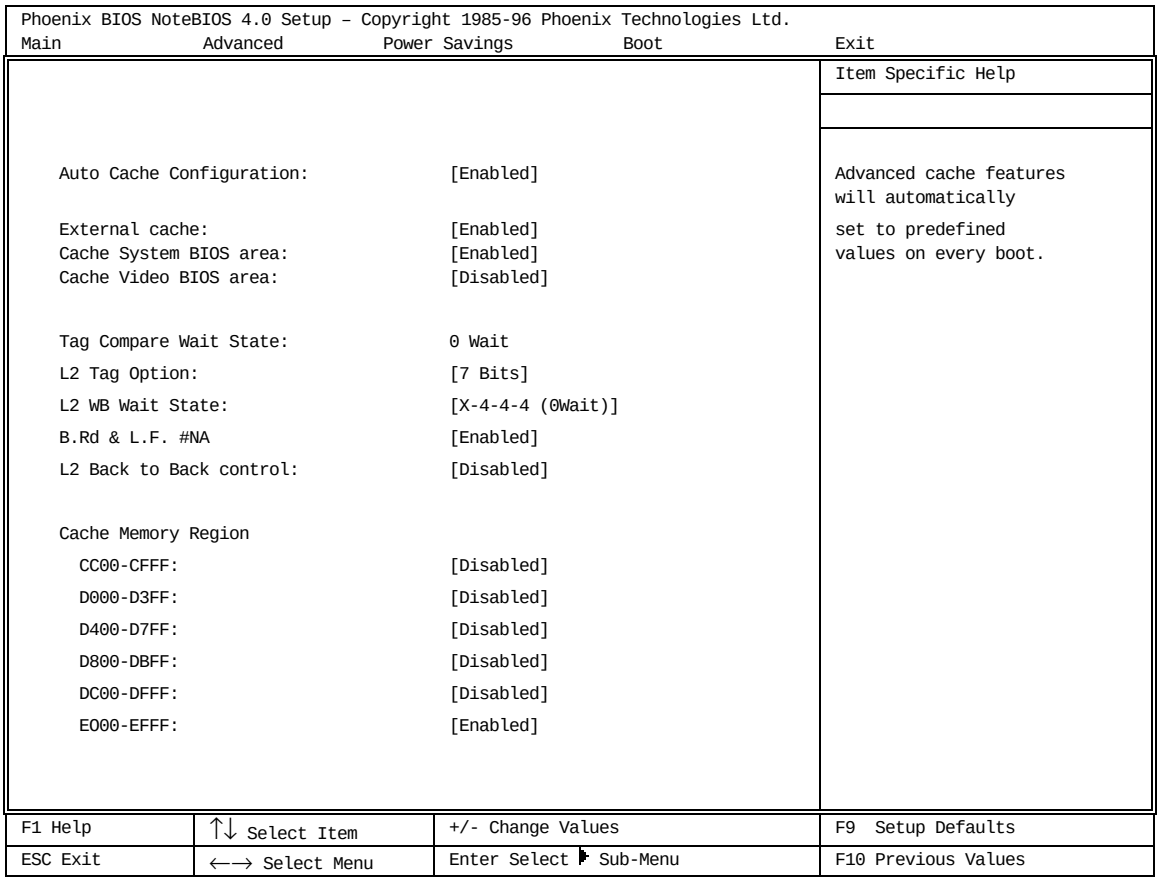
WARNING

Incorrect settings can cause your system to malfunction.

4.2.3 Memory Cache

Enabling cache enhances performance by holding data most recently accessed in regular memory (dynamic RAM or DRAM) in a special storage area of static RAM (SRAM), which is faster. Before accessing regular memory, the CPU first accesses the cache. If it does not find the data it is looking for there, it accesses system memory.

Selecting "Memory Cache" from the Main menu displays the menu shown here:



Use the following chart to configure the memory cache.

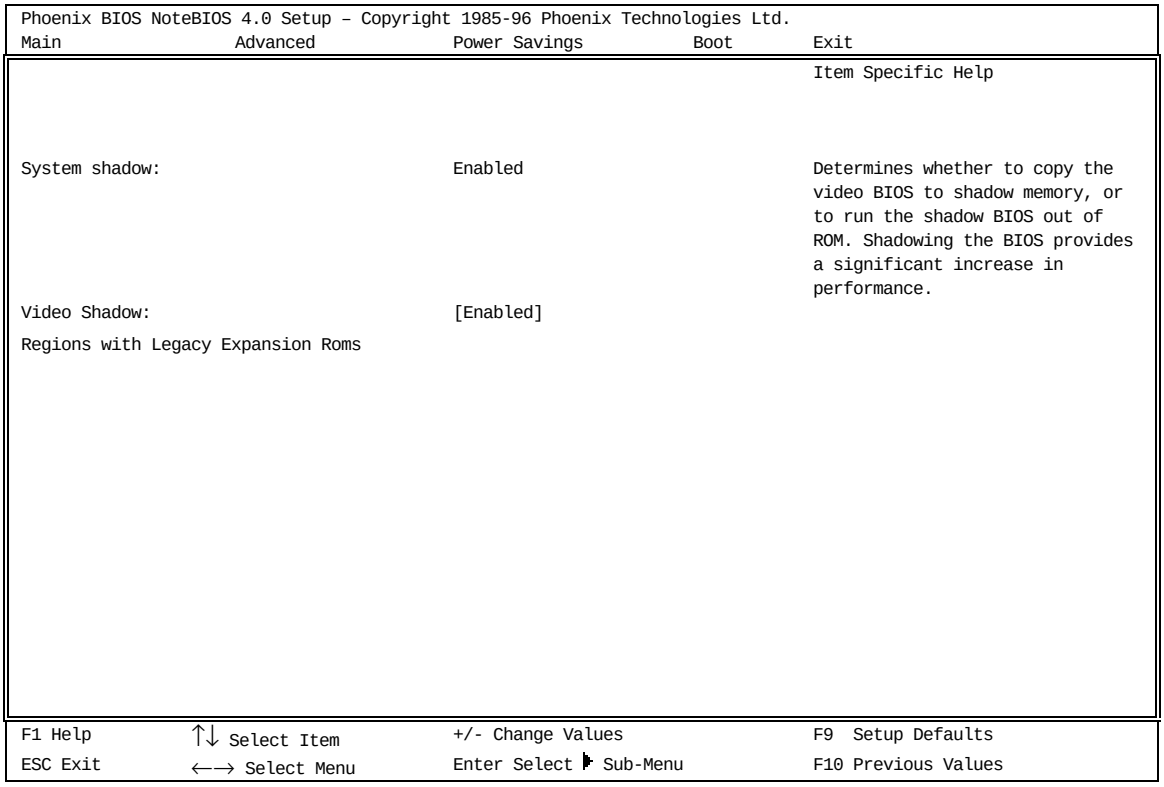
Feature	Options	Description
Auto Cache Configuration	Enabled Disabled	Advanced cache features will automatically set to predefined values on every boot.
External Cache	Enabled Disabled	Enables or Disables L2 Cache.
Cache System BIOS area	Enabled Disabled	Controls caching of the system BIOS area.
Cache Video BIOS area	Enabled Disabled	Controls caching of the video BIOS area.
L2 Tag Option	7 Bits 8 Bits	Selects the number of L2 Cache Tag Bits.
L2 WB Wait State	X-4-4-4 (0Wait) X-5-5-5	Sets the L2 WB wait state timing.
B.Rd & L.F. #NA	Enabled Disabled	Sets Pipeline Sync-SRAM control with burst read and line fill #NA functions.
L2 Back to Back Control	Enabled Disabled	L2 Back to Back read X-1-1-1… control with I/O concurrent.
Cache Memory Regions:		
CC00- CFFF	Enabled Disabled	Enable/ Disables Caching of option ROM in this area.
D000-D3FF	Enabled Disabled	Cache shadowed option ROM in this area.
D400-D7FF	Enabled Disabled	Cache shadowed option ROM in this area.
D800-DBFF	Enabled Disabled	Cache shadowed option ROM in this area.
DC00-DFFF	Enabled Disabled	Cache shadowed option ROM in this area.
E000-EFFF	Enabled Disabled	Cache shadowed option ROM in this area.

WARNING

Incorrect settings can cause your system to malfunction.

4.2.4 Memory Shadow

Selecting "Memory Shadow" from the Main Menu displays the menu shown here.



Use the following chart to configure memory shadowing.

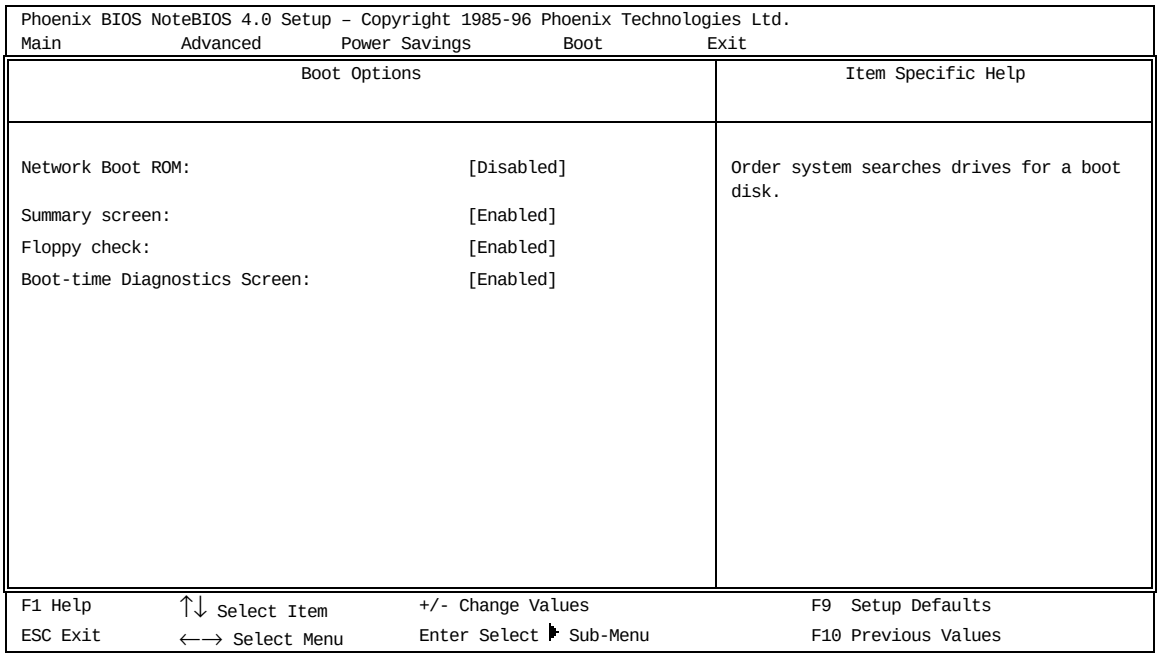
Feature	Options	Description
System shadow	N/ A	Permanently enabled.
Video shadow	Enabled Disabled	Determines whether to copy the video BIOS to shadow memory, or to run the shadow BIOS out of ROM. Shadowing the BIOS provides a significant improvement in performance.

WARNING

Incorrect settings can cause your system to malfunction.

4.2.5 Boot Options

Selecting "Boot Options" on the Main Menu displays the Boot Options menu.

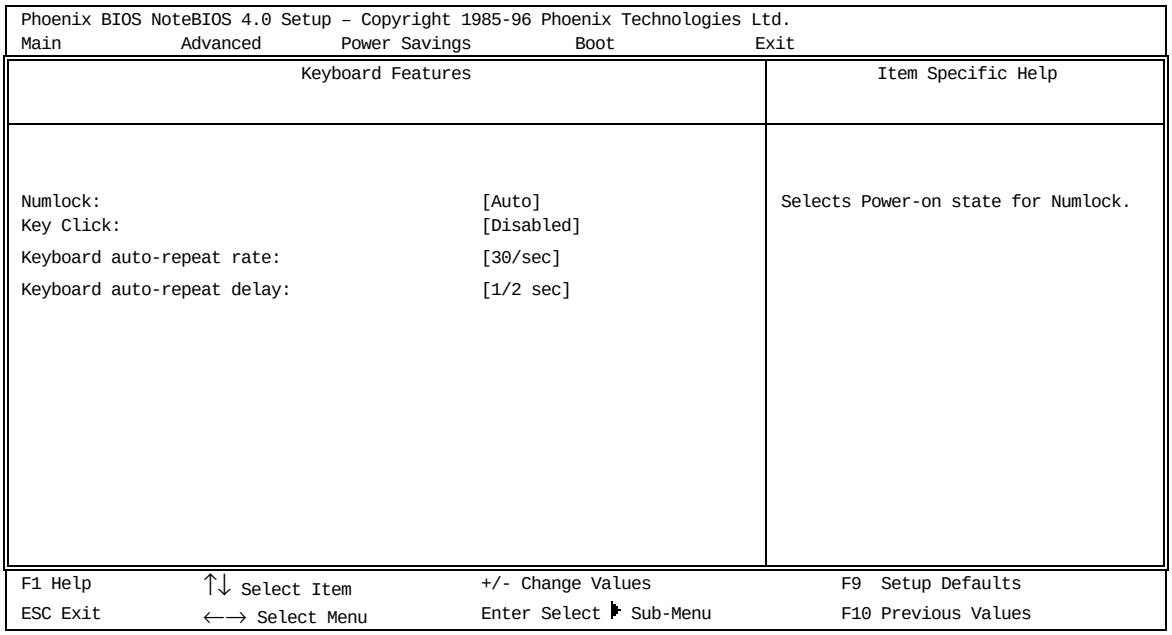


Use the following chart to select your boot options.

Feature	Options	Description
Network Boot ROM	Enabled Disabled	Enabled causes BIOS to attempt to boot from network, Disabled causes BIOS to boot from local floppy or hard disks.
Summary Screen	Enabled Disabled	Display system configuration on boot.
Floppy check	Enabled Disabled	Enabled verifies floppy type on boot, disabled speeds boot.
Boot Diagnostics screen	Enabled Disabled	Displays system diagnostic screen during boot.

4.2.6 Keyboard Features

Selecting "Numlock" on the Main Menu displays the Keyboard Features menu:

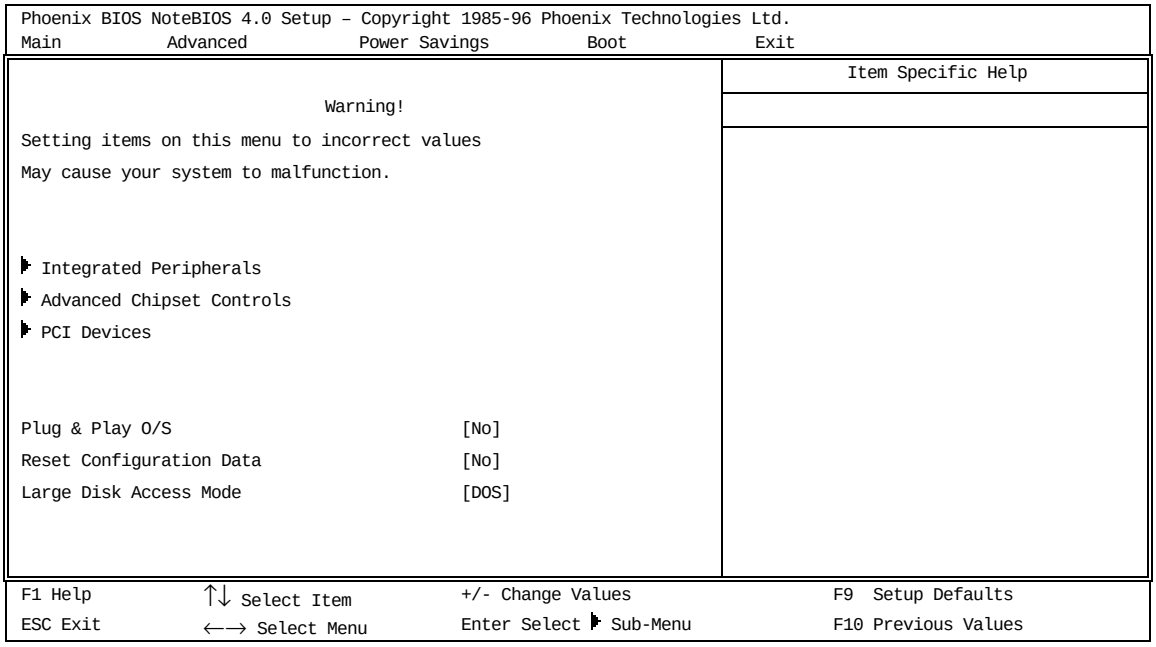


Use the following chart to configure the keyboard features:

Feature	Options	Description
Numlock	Auto On Off	Selects Power-on state for NumLock.
Key Click	Enabled Disabled	Turns audible key click on.
Keyboard auto- repeat rate	2/ sec 6/ sec 10/ sec 13.3/ sec 18.5/ sec 21.8/ sec 26.7/ sec 30/ sec	Selects key repeat rate.
Keyboard auto- lag delay	¼ sec ½ sec ¾ sec 1 sec	Selects delay before key repeat.

4.3 The Advanced Menu

Selecting "Advanced" from menu bar displays a menu like this:

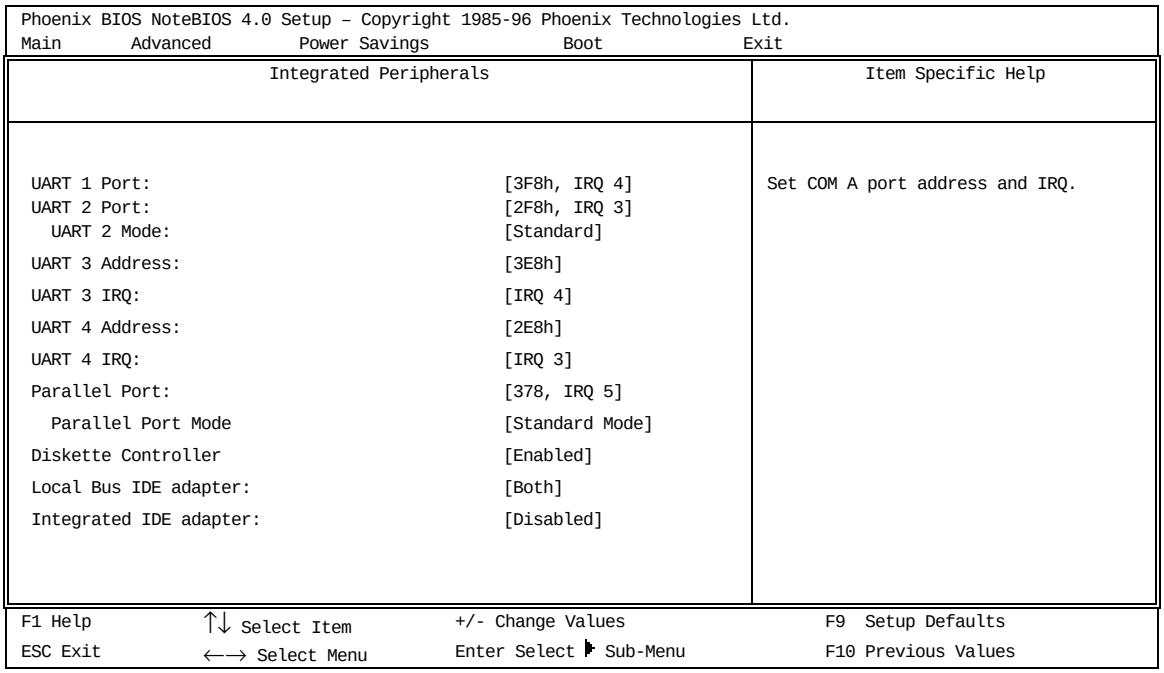


Use the following chart to make your selection:

Feature	Options	Description
Plug and Play OS	Yes No	If your system has a Plug and Play Operating System, Yes lets the Operating System configure Plug and Play devices not required for boot. No makes the BIOS configure them. Select “No” to use the Ethernet controller in Windows 95 or Windows NT.
Reset Configuration Data	Yes No	Yes erases all configuration data in ESCD, which stores the configuration settings for non- PnP plug- in devices. Select Yes when required to restore the Manufacturer's defaults.
Large Disk Access Mode	DOS Other	Select DOS if you have DOS or Windows. Select Other if you have another Operating system such as UNIX. A Large disk is one that has more Than 1024 cylinders, more than 16 Heads, or more than 63 tracks per Sector.

4.3.1 Integrated Peripherals

Selecting "Integrated Peripherals" from the Advanced menu displays this menu:



Use the following chart in configuring the Integrated Peripherals:

Feature	Options	Description
UART 1 Port	Disabled Auto 2E8h, IRQ3 3E8h, IRQ4 2F8h, IRQ3 3F8h, IRQ4	Set COM A port address and IRQ.
UART 2 Port	Disabled Auto 2E8h, IRQ3 3E8h, IRQ4 2F8h, IRQ3 3F8h, IRQ4	Set COM B port address and IRQ.
UART 2 Mode	Standard ASK IR IrDA (HPSIR)	Set the mode for UART 2: Standard, IrDA (HPSIR), Amplitude Shift Keyed @500Khz. If you select one of the IRDA's then another option line appears.
IR Duplex Mode	Full Duplex Half Duplex	Set the Duplex Mode for IR transmition: Full Duplex, Half Duplex.
UART 3 Address	Disabled AE8h BE8h AF8h BF8h 2E8h 3E8h 2F8h 3F8h	Set COM C port address.
UART 3 IRQ	Disabled IRQ 3 IRQ 4 IRQ 5 IRQ 7 IRQ 9 IRQ 10 IRQ 11 IRQ 12 IRQ 14	Set COM C port IRQ
UART 4 Address	Disabled AE8h BE8h AF8h BF8h 2E8h 3E8h 2F8h 3F8h	Set COM D port address.

UART 4 IRQ	Disabled IRQ 3 IRQ 4 IRQ 5 IRQ 7 IRQ 9 IRQ 10 IRQ 11 IRQ 12 IRQ 14	Set COM D port IRQ.
Parallel Port	Auto Disabled 278h, IRQ 7 378h, IRQ 7 3BCh, IRQ 7 278h, IRQ5 378h, IRQ 5 3BCh, IRQ 5 278h, NO IRQ 378h, NO IRQ 3BCh, NO IRQ	Set parallel port address and IRQ.
Parallel Port Mode	Standard Mode Bi-directional EPP Mode ECP Mode	Set parallel port mode
ECP DMA Channel	Disabled DMA 0 DMA 1 DMA 3	Selects the DNA channel ECP will use.
Diskette Controller	Enable Disable	Enables on-board floppy disk controller.
Local Bus IDE Adapter	Disabled Primary Both	Enable the integrated Local Bus IDE adapter.
Integrated IDE Adapter	Disabled Primary Secondary	Enables on-board IDE adapter. N/A for SBC-MaX

WARNING

Incorrect settings can cause your system to malfunction.

4.3.2 Advanced Chipset Control

Selecting "Advanced Chipset Control" from the Advanced menu displays this menu:

```
Phoenix BIOS NoteBIOS 4.0 Setup – Copyright 1985-96 Phoenix Technologies Ltd.
Main          Advanced       Power Savings          Boot                Exit

                Advanced Chipset Control                  Item Specific Help

Chipset Auto Configuration:                  [Enabled]    Advanced chipset features
                                                          will be automatically set to
                                                          predefine values every boot.

 DRAM Write Wait State:                      0
 RAS# precharge time:                        3 clocks
 RAS# low to CAS# low delay:                 3 clocks
 DRAM Write Buffer Concurrency:              [Enabled]
 FP DRAM W.S. with prefetch buffer:          [7-3-3-3]
 EDO DRAM timing:                            [7-2-2-2]
 SDRAM timing:                               [8T/7T]
 SDRAM CAS Latency:                          [3T]
 SDRAM cycle time:                           [9T]
 MW #Cas width/DRAM PostWt Buf:              [1T/X-3..]
 Resource lock for DRAM:                     [Disabled]
 PCI address/data stepping:                  [Disabled]
 CPU to PCI post-write:                      [3T]
 CPU to PCI though Write Buffer:             [Enabled]
 CPU to PCI #NA Function:                    [Enabled]
 CPU to PCI Write Buffer:                    [8]
 Reduce #RAS W.S. when Bank Miss:            [Disabled]
 Fast Back-To-Back function:                 [Disabled]
 VGA Burst Write Wait State:                 [0 Wait]
 Send #NA at T2 after each #MemWrt:          [Disabled]

F1 Help      ↑↓ Select Item      +/- Change Values      F9  Setup Defaults
ESC Exit     ←→ Select Menu      Enter Select ▸ Sub-Menu F10 Previous Values
```

The following chart describe each of the options on this menu:

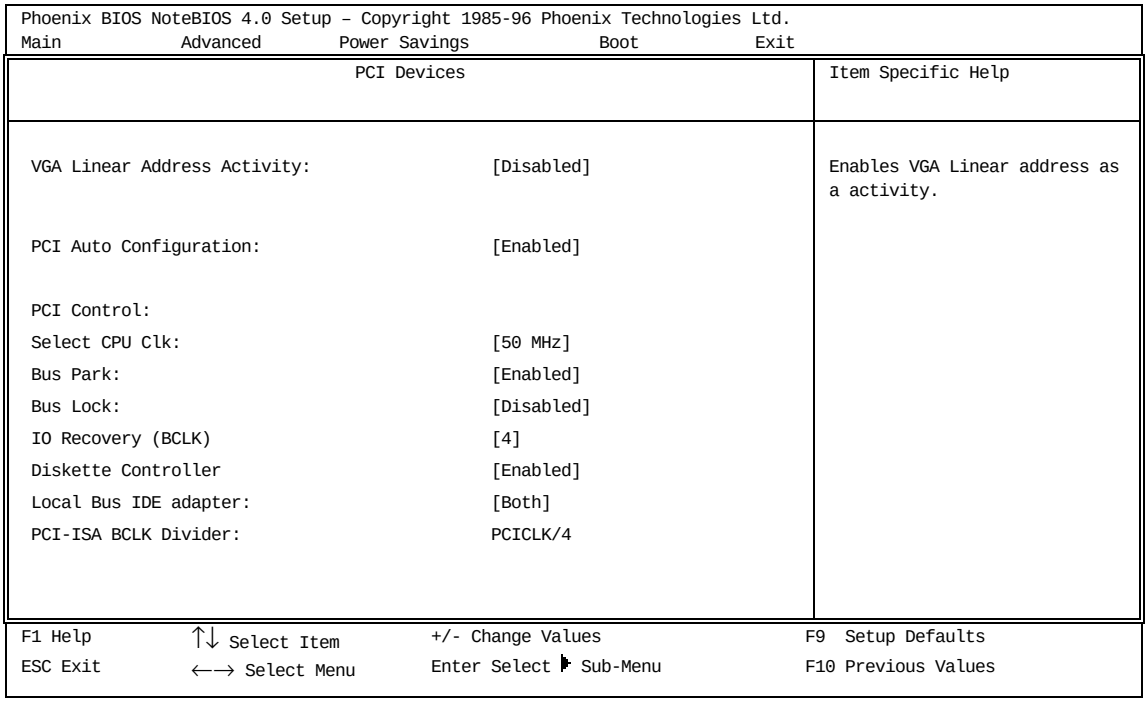
Feature	Options	Description
Chipset Auto Configuration	Enable Disable	Advanced chipset features will be automatically set to predefined values every boot.
DRAM Write Wait State	0 1 2 3	When Auto Configuration is disabled, sets DRAM Write wait state speed.
RAS# precharge time	2 3 4 5	When Auto Configuration is disabled, defines the number of CPU clocks for RAS# signal precharge.
RAS# low to CAS# low delay	2 3 4 5	When Auto Configuration is disabled, defines the number of clocks delay from RAS# asserted to CAS#
DRAM Write Buffer Concurrency	Enable Disable	Control Pipeline Function.
FP DRAM W.S. with prefetch buffer	6-2-2-2 6-3-3-3 7-2-2-2 7-3-3-3	Fast page mode DRAM access timing.
EDO DRAM timing	6-2-2-2 7-2-2-2	EDO DRAM timing control.
SDRAM cycle time	7T/6T 8T/7T	SDRAM 1st READ latency for page-hit cycle.
SDRAM CAS Latency	2T 3T	SDRAM CAS latency, RAS# to CAS# low delay.
SDRAM Cycle time	7T 9T	SDRAM RAS# active-to-charge and precharge.
MW #Cas width/DRAM PostWt Buf	1T/X-3.. 1T/X-2.. 2T/X-3..	Setting the timing of Memory write #CAS pulse width and Post Write Buffer to DRAM.
Resource lock for DRAM	Enable Disable	Resource lock for local DRAM.
PCI address/data stepping	Enable Disable	PCI stepping.
CPU to PCI post-write	3T 4T Disabled	CPU to PCI post-write control and wait state.
CPU to PCI though Write Buffer	Enable Disable	CPU to PCI control with Write Buffer.
CPU to PCI #NA Function	Enable Disable	CPU to PCI #NA function.
CPU to PCI Write Buffer	4 8	Setting the CPU to PCI Write buffer width.
Reduce #RAS W.S. when Bank Miss	Enable Disable	Reduce the #RAS precharge time when bank missed.
Fast Back-To-Back function	Enable Disable	
VGA Burst Write Wait State	0 Wait 1 Wait	
Send #NA at T2 after each #MemWrt	Enable Disable	

WARNING

Incorrect settings can cause your system to malfunction.

4.3.3 PCI Devices

Selecting "PCI Devices" from the Advanced menu displays this menu:



The following chart describe each of the options on this menu:

Feature	Options	Description
VGA Linear Address Activity	Enabled Disabled	Enables VGA Linear Address as an activity
PCI Auto Configuration	Enabled Disabled	Advanced PCI bridge features will be automatically set to predefined values on every boot.
PCI Control	N/A	
Select CPU Clk	50 MHz 60 MHz 66.6 MHz	Select Default CPU clock speed.
Bus Park	Enabled Disabled	
Bus Lock	Enabled Disabled	
IO Recovery (BCLK)	2 4 8 12	
PCI-ISA BCLK Divider	PCICLK/4 PCICLK/2	Adjustable if PCI auto config. is disabled.

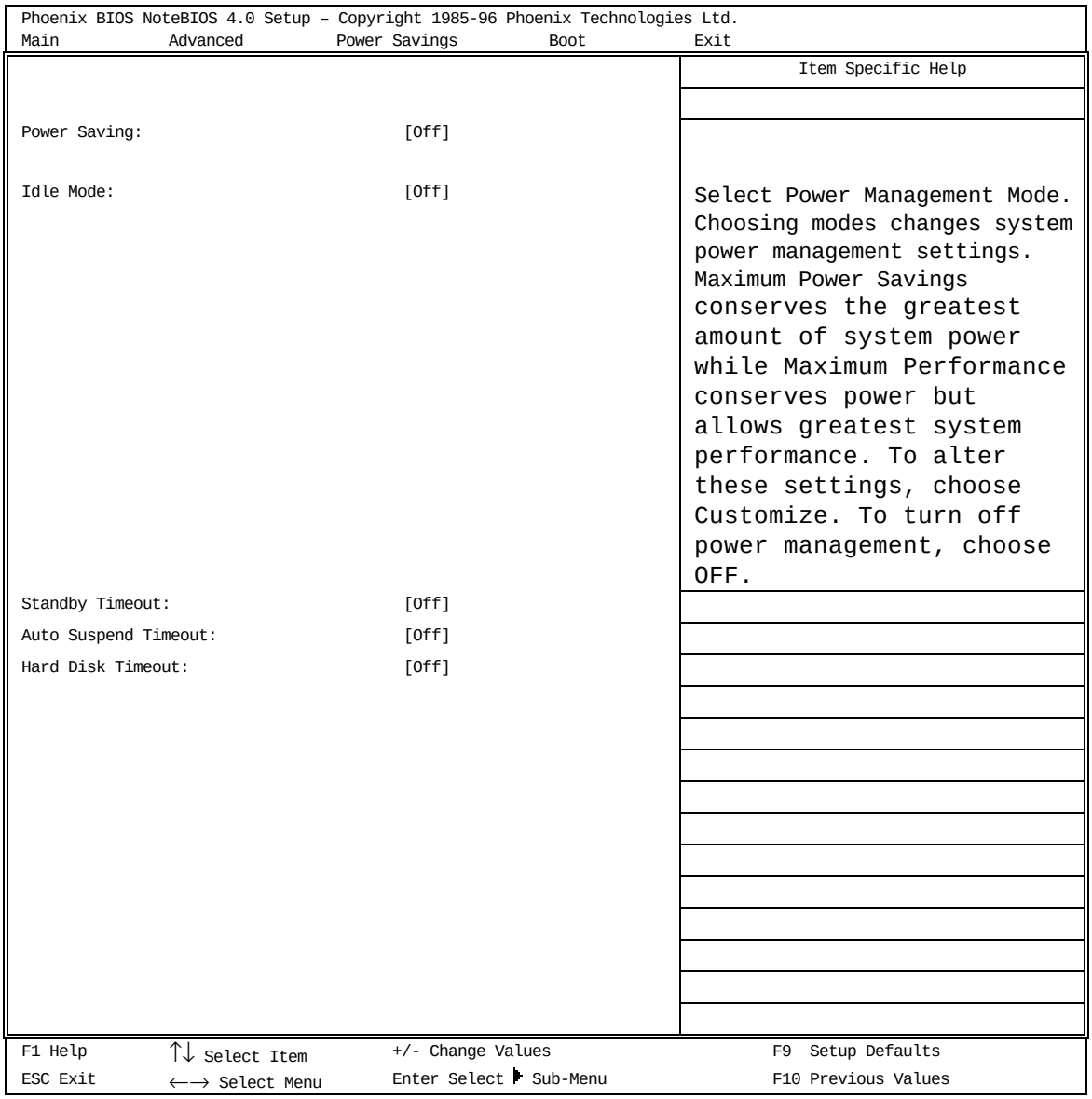
	PCICLK/3	

WARNING

Incorrect settings can cause your system to malfunction.

4.4 The Power Savings Menu

Selecting "Power Savings" from menu bar displays a menu like this:



The following chart describe each of the options on this menu:

Feature	Options	Description
Power Savings	Off Maximum Performance Maximum Power Savings Customize	Select Power Management Mode. Choosing modes changes system power management settings. Maximum Power Savings conserves the greatest amount of system power while Maximum Performance conserves power but allows greatest system performance. To alter these settings, choose Customize. To turn off power management, choose OFF.
Idle Mode	On Off	Turn on or off the Idle Mode power savings. Idle Mode slows down the CPU during brief periods when the system is not busy.
Standby Timeout	Off 1 Minute 2 Minutes 4 Minutes 6 Minutes 8 Minutes 12 Minutes 16 Minutes	Amount of time the system needs to be in Idle Mode before entering the Standby Mode. Standby Mode turns off various devices in the system, including the screen, until you start using the computer again.
Auto Suspend Timeout	Off 5 Minutes 10 Minutes 15 Minutes 20 Minutes 30 Minutes 40 Minutes 60 Minutes	Amount of time the system needs to be in Standby before entering Suspend Mode.
Hard Disk Drive Timeout	Off 10 Seconds 15 Seconds 30 Seconds 45 Seconds 1 Minute 2 Minutes 4 Minutes 6 Minutes 8 Minutes 10 Minutes 15 Minutes	Amount of time the hard disk needs to be inactive before it is turned off.

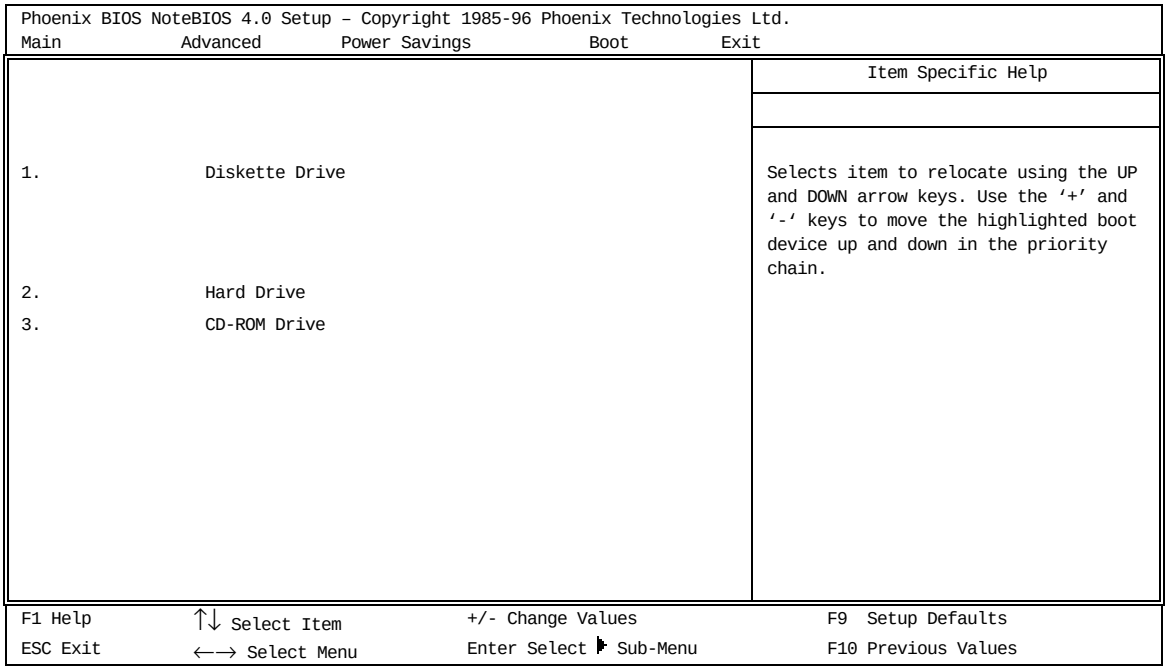
4.5 The Boot Menu

After you turn on your computer, it will attempt to load the operating system (such as Windows 95) from the drive of your choice. If it cannot find the operating system on that drive, it will attempt to load it from one or more other drives in the order specified in the Boot Menu.

Note:

Specifying any drive as a boot drive on the Boot Menu requires the installation of an operating system on that drive. To use another drive as a bootable drive may require your installing the operating system on it.

Selecting "Boot" from the Menu Bar displays the Boot menu, which looks like this:

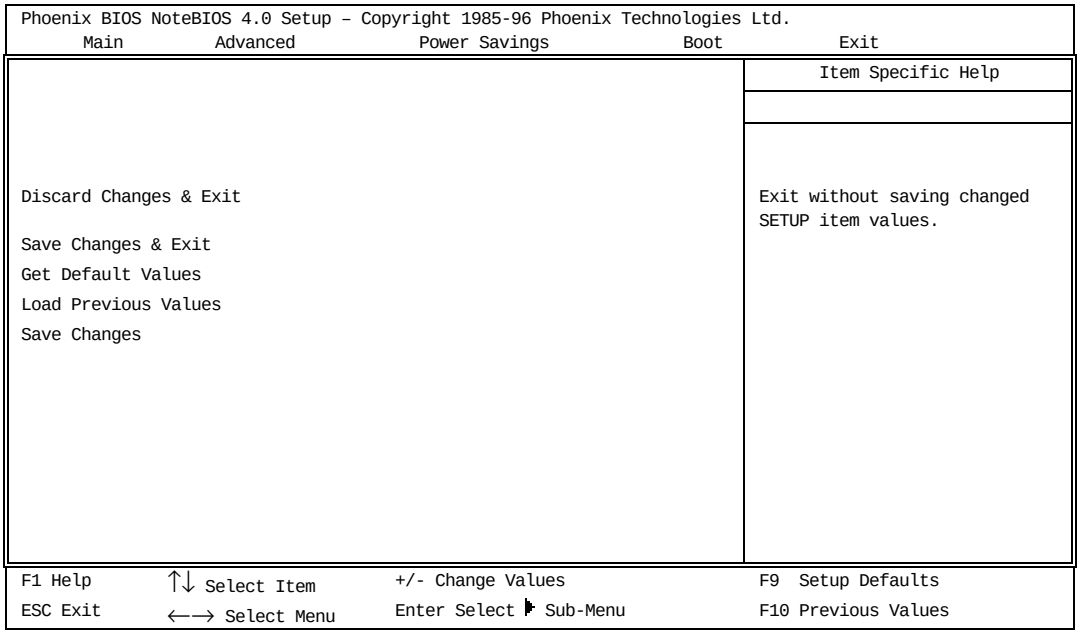


You can arrange the boot order list at the top of this menu to specify the order of the devices from which the BIOS will attempt to boot the Operating System.

To move a device, first select it with the up- or- down arrows, and move it up or down using the <+> and <-> keys.

4.6 The Exit Menu

Selecting "Exit" from the menu bar displays this menu:



The following describes each of the options on this menu:

4.6.1 Discarding Changes & Exit

Use this option to exit Setup without storing in CMOS any new selections you may have made. The selections previously in effect remain in effect. Pressing <Enter> will exit Setup and reboot the computer.

4.6.2 Save Changes & Exit

After making your selections on the Setup menus, always select "Save Changes & Exit" to store the selections in "battery- backed CMOS RAM". The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS.

After you save your selections, the program displays this message:

```
Notice
Changes have been saved.
[        ]
```

If you attempt to exit without saving, the program asks if you want to save before exiting and displays this message:

```
Warning!
Configuration has been not been saved!
Save before exiting?
[Yes]      [  ]
```

During bootup, PhoenixBIOS attempts to load the values saved in CMOS. If those values cause the system boot to fail, reboot and press <F2> to enter Setup. In Setup, you can get the Default Values (as described below) or try to change the selections that caused the boot to fail.

4.6.3 Get Default Values

To display the default values for all the Setup menus, select "Load Setup Defaults" from the Exit Menu. The program displays this message:

```
Notice
Default values have been loaded.
[        ]
```

If, during bootup, the BIOS program detects a problem in the integrity of values stored in CMOS.

The program displays this message:

```
System CMOS checksum bad - run SETUP
Press <F1> to resume, <F2> to Setup
```

The CMOS values have been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS.

Press <F1> to resume the boot or <F2> to run Setup with the ROM default values already loaded into the menus. You can make other changes before saving the values to CMOS.

4.6.4 Load Previous Values

To display the previous values for all the Setup menus, select "Previous Values Defaults" from the Exit Menu. The program displays this message:

```
Notice
Previous values have been loaded.
[        ]
```

4.6.5 Save Changes

Selecting “Save Changes” saves all the selections without exiting Setup. You can return to the other menus if you want to review and change your selections.

The program displays this message:

```
Notice
Changes have been saved.
[        ]
```

APPENDICES

A. ADDITIONAL READING

IBM PC Technical Reference, IBM Corp., 1983. - Complete reference to the PC. There are versions for both the PC/XT and PC/AT.

Microprocessor and Peripheral Handbook Volume 1 - Microprocessor, Intel, 1989. This volume contains register definitions for the parts duplicated in the ACC2168DT.

The Programmer's PC Sourcebook, Thom Hogan, Microsoft Press, 1988. This volume contains many tables of useful information on the PC family. It is very handy for the assembly language programmer.

The Peter Norton Programmer's Guide to the IBM PC, Peter Norton, Microsoft Press, 1985. This book is an excellent introduction to the logical organization of the PC family. It highlights differences between different versions.

Microsoft MS-DOS User's Guide and User's Reference, Microsoft, 1988. This volume is included with each purchase of MS-DOS. It will explain DOS commands and some important operations such as formatting.

Programmer's Guide to the EGA and VGA Cards, Richard F. Ferraro, Addison-Wesley Publishing Company, 1988. This volume explains in good detail the function and use of the VGA registers and BIOS calls.

Super VGA BIOS Extension VBE Version 1.2, Video Electronics Standards Association (VESA), 1991. This document provides the standardized software interface for VESA VBE compliant Super VGA hardware.

Chips and Technologies F82C735 I/O Peripheral Controller with Printgine (Dual Buffered UART, Floppy Disk Controller and Parallel Port with EPP capability), Chips and Technologies 1993. This data sheet provides information on bit assignments and register assignments for the COM ports, configuration of standard/bidirectional parallel ports as well as detailed information on Enhanced Printer Port configuration.

C Programmers Guide to Serial Communications, Joe Campbell, Howard W. Sams & Company, 1987. A complete reference to programming asynchronous serial communications.

B. SBC I/O OPTIONS

The SBC has a 100% compatible parallel printer port. That means that all output pins can be read back at the pin. Additionally, four pins have open collector outputs allowing them to be used as inputs or outputs. Compatibility also means IBM defined connectors, pinouts, port mapping, and logic conventions.

If not used for a parallel printer, the parallel printer port can be used as general purpose parallel I/O. The outputs can drive LEDs, intelligent LCD displays, motor controllers or higher voltage devices through solid state relays. The input lines can be used to read switches, multiplexed keypads, encoders, or interface to higher voltages through solid state relay racks. The parallel printer port can be used as follows:

8 bits output only with read back

4 bits open collector outputs which are programmable as input or output with read back

4 bits input only

1 bit programmable interrupt and readable input

All outputs have read back. Read back keeps you from having to store the output value in memory when changing individual bits. An input buffer actually senses the level at the output and lets you read it. Unfortunately, if the outputs are heavily loaded, the output voltage may not be within TTL voltage limits causing the read back value to be incorrect. LEDs are current devices and will light up even though the pin is greater than 0.8V. However, the read back buffer may see that pin as a high. In these cases, store a copy of what you output in memory.

The bits are accessed by reading or writing to I/O port locations. The following tables show the I/O port locations and list the connector pins affected. The board has a 26-pin header connector which is normally cabled to a DB-25 connector. The tables and connector diagrams list both the header and DB-25 connector pin numbers.

	D7	D6	D5	D4	D3	D2	D1	D0
Header Pin Number	17	15	13	11	9	7	5	3
DB-25 Pin Number	9	8	7	6	5	4	3	2

Write Address 378H (Use as outputs only.) Reset Condition: Undetermined

These pins are connected to driver outputs with direct read back via port 378H. Each output can source 2.6 mA and sink 24 mA while maintaining TTL voltage levels. This port is not reset on power-up. External devices must not drive these lines or damage may occur.

	D7	D6	D5	D4	/D3	D2	/D1	/D0	
Header Pin Number				IRQ7 Enable	8	6	2	1	
DB-25 Pin Number				IRQ7 Enable	17	16	14	1	
Reset Condition				0	0	0	0	0	
Write for Input	0	0	0	0	0	1	0	0	= 04H

Write Address 37AH (These pins may be outputs or inputs.)

These four pins are connected to open collector outputs with 4.7k pull-up resistors. Each line can sink about 7 mA while maintaining TTL levels. Each pin is also connected to an input buffer for read back. With the open collector output off, the pin can be used as an input. The drawing at the end of this section illustrates how to use these outputs. Notice that D2 is not inverted.

When D4 is set, an interrupt request #7 (IRQ7) will be generated when pin 10 makes a high-to-low transition. Do not enable the interrupt unless pin 10 is properly driven (pin 10 has no pull-up resistor). The status of pin 10 may be read.

	D7	D6	D5	D4	D3	D2	D1	D0
Header Pin Number	17	15	13	11	9	7	5	3
DB-25 Pin Number	9	8	7	6	5	4	3	2

Read Address 378H

The 8-bit output port 378H may also be read back at the same address. This allows you to read the data you have written. External devices must not drive these lines or damage may occur. To simplify your code, OR this byte with the bits you wish to set.

	D7	D6	D5	D4	/D3	D2	/D1	/D0
Header Pin Number				IRQ7 Enable	8	6	2	1
DB-25 Pin Number				IRQ7 Enable	17	16	14	1

Read Address 37AH (These pins may be outputs or inputs.)

These four pins are connected to open collector outputs with 4.7k pull-up resistors. If the appropriate value is written to the open collector outputs (see the following figure), then the pins may be used as inputs. Switches to ground may be connected directly to these pins since 4.7k pull-up resistors are provided on the board. Notice that some inputs are inverted while D2 is not.

	/D7	D6	D5	D4	D3	D2	/D1	/D0
Header Pin Number	21	19	23	25	4			
DB-25 Pin Number	11	10	12	13	15			

Read Address 379H

These five pins are inputs only and have no internal pull-up resistors. Any device connected to these pins must ensure that the logic level goes to a true low (<0.8V) as well as high (>2.0V). An external pull-up resistor must be connected from the input to +5V when open collector devices or switches are used to ground the input.

	DB-25	Header	Header	DB-25	
*Write 37AH bit /D0	1	1	2	14	*Write 37AH bit /D1
Write 378H bit D0	2	3	4	15	
Write 378H bit D1	3	5	6	16	*Write 37AH bit D2
Write 378H bit D2	4	7	8	17	*Write 37AH bit /D3
Write 378H bit D3	5	9	10	18	Ground
Write 378H bit D4	6	11	12	19	Ground
Write 378H bit D5	7	13	14	20	Ground
Write 378H bit D6	8	15	16	21	Ground
Write 378H bit D7	9	17	18	22	Ground
	10	19	20	23	Ground
	11	21	22	24	Ground
	12	23	24	25	Ground
	13	25	26		

Outputs

* Indicates an open collector output which can also be used as an input.

	DB-25	Header	Header	DB-25	
*Read 37A bit /D0	1	1	2	14	*Read 37AH bit /D1
Read back 378H bit D0	2	3	4	15	Read 379H bit D3
Read back 378H bit D1	3	5	6	16	*Read 37AH bit D2
Read back 378H bit D2	4	7	8	17	*Read 37AH bit /D3
Read back 378H bit D3	5	9	10	18	Ground
Read back 378H bit D4	6	11	12	19	Ground
Read back 378H bit D5	7	13	14	20	Ground
Read back 378H bit D6	8	15	16	21	Ground
Read back 378H bit D7	9	17	18	22	Ground
Read 379H bit D6 /INT	10	19	20	23	Ground
Read 379H bit D7	11	21	22	24	Ground
Read 379H bit D5	12	23	24	25	Ground
Read 379H bit D4	13	25	26		

Inputs

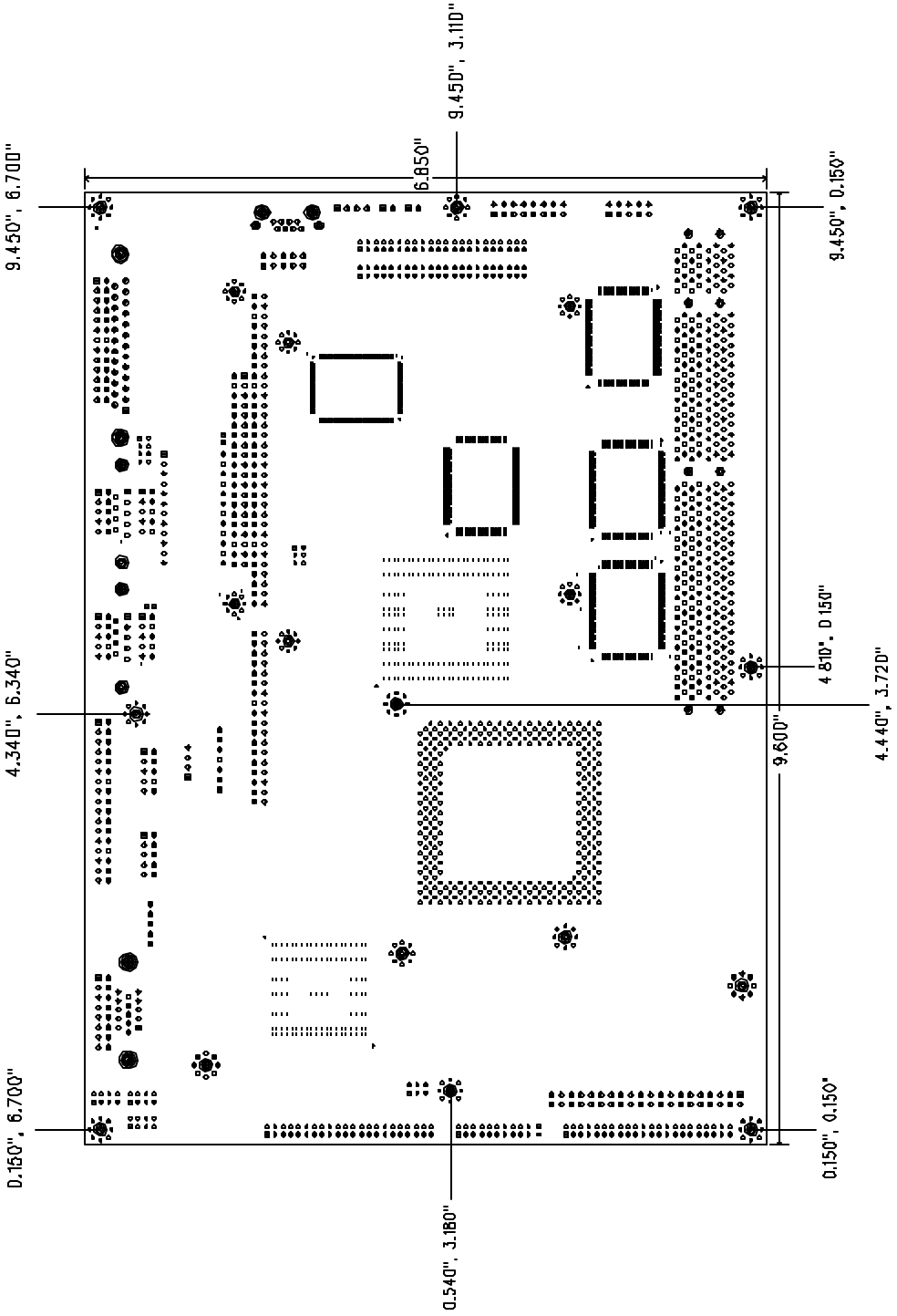
* Indicates an open collector output which can also be used as an input.

C. MATING CONNECORS

Reference Designator	Function	CDI Part Number	Manufacturer's Part Number
J1	PC Bus Expansion	7CRF0-0020-6400	AMP 1-499997-2
J2	AT Bus Expansion	7CRF0-0020-4000	AMP 499997-9
J3	Power	7CRF0-0004-2000	Molex 15-24-2008
J4	Keyboard/Speaker	7CRF0-0020-1000	AMP 499997-1
J5	SBX	7CBM0-0036-0100	Viking 000292-0003
J6	Reset Switch	7CRF0-2100-0200 (shell) * 7CRF0-2100-0000 (pin)	AMP 640440-2
J7	IDE Hard Disk Drive	7CRF0-0020-4000	AMP 499997-9
J8	Printer	7CRF0-0020-2600	AMP 499997-6
J9	VGA Monitor	7CRF0-0020-1600	AMP 499997-3
J10	Floppy Drive	7CRF0-0020-3400	AMP 499997-8
J11	COM2	7CRF0-0020-1000	AMP 499997-1
J12	COM1	7CRF0-0020-1000	AMP 499997-1
J13	Panels	7CRF0-0020-4000	AMP 499997-9
J14	External Power	7CRF0-2100-0600 (shell) * 7CRF0-2100-0000 (pin)	AMP 640440-6
J16	Fanned Heat Sink	7CRF0-2100-0200 (shell) * 7CRF0-2100-0000 (pin)	AMP-640440-2
J17	External Battery	7CRF0-2100-0300 (shell) * 7CRF0-2100-0000 (pin)	AMP 640440-3

* Note these connectors have separate pins which must be crimped to the signal wire and then inserted into the shell.

D. MECHANICAL OUTLINE



E. WARRANTY STATEMENT

COMPUTER DYNAMICS INCORPORATED
7640 Pelham Rd., Greeville, SC 29615
Phone: (864) 627-8800

WARRANTY

CDI products are warranted for a period of one year from the date of purchase against all defects in materials and workmanship provided they are properly used and not modified by non-CDI personnel. Subassemblies and items not manufactured by CDI (power supplies, disk drives, etc.) are warranted for the period established by their original manufacturer. CDI will repair or replace the product, provided that it is returned promptly to CDI at the owner's expense. Prior to returning a component or subsystem, the purchaser must obtain a Return Material Authorization number (RMA#) from CDI. All board level products are shipped in an antistatic bag to prevent damage to the electronic components due to electrostatic discharge. Failure to use the bag in shipment will VOID the warranty. No other warranty is expressed or implied.

DISCLAIMER

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To Our Customers:

It is our intention to provide you with accurate and useful information about our product. Although the information is correct to the best of our knowledge, we cannot assume responsibility for inaccuracies within the manual.

We request that you inform us of any errors found, areas difficult to understand or suggestions to improve this manual. Please fill out the bottom portion (using additional sheets if necessary) with your comments and return it to CDI.

Thank you.

Name: _____

Company: _____

Address: _____

_____

Phone: _____

Product Type: _____

Computer Dynamics, Inc.
7640 Pelham Rd.
Greenville, S.C. 29615
Phone: (864) 627-8800

Card Serial No. _____

COMMENTS: