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# Reference Manual

DOC. REV. 12/18/2007

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## VSBC-8

Pentium® III/Celeron® based  
SBC with Ethernet, Video, Audio  
and Industrial I/O



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# VSBC-8

Pentium® III/Celeron® based  
SBC with Ethernet, Video, Audio  
and Industrial I/O



**MVSBC-8**



## Product Release Notes

This page includes recent changes or improvements that have been made to this product. These changes may affect its operation or physical installation in your application. Please read the following information.

### ***Rev 4 Release***

- Rev 4 release.

### ***Rev 3 Release***

- Initial public release.

### ***Rev 2 Release***

- Beta release only.

### ***Rev 1 Release***

- Pre-production only. No customer releases.

## Support Page

The **VSBC-8 Support Page**, at <http://www.VersaLogic.com/private/vsbc8support.asp>, contains additional information and resources for this product including:

- Reference Manual (PDF format)
- Operating system information and software drivers
- Data sheets and manufacturers' links for chips used in this product
- BIOS information and upgrades
- Utility routines and benchmark software

**Note:** This is a private page for VSBC-8 users only. It cannot be reached through our web site. You must enter this address directly to find the support page.

**Model VSBC-8**  
Pentium® III/Celeron® based SBC with Ethernet,  
Video, Audio and Industrial I/O

**REFERENCE MANUAL**



**VERSALOGIC**  
C O R P O R A T I O N

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## Description

The VSBC-8 is a feature-packed single board computer designed for OEM control projects requiring fast processing, industrial I/O, flexible memory options, and designed-in reliability and longevity (product lifespan). Its features include:

- Socket 370 processors
  - Intel Celeron 350 MHz (equivalent)
  - Intel Celeron 566 MHz
  - Intel Pentium III 850 MHz
- Up to 256 MB system RAM
- Intel 440BX chipset
- 32-pin DiskOnChip site
- 10/100 Ethernet interface
- AGP based video
- Flat Panel Display support
- PC/104-Plus expansion site
- Dual PCI based IDE controllers
- Dual USB 1.1 interfaces
- PCI based audio
- 4 COM + 1 LPT port
- CPU temperature sensor
- Keyboard and PS/2 mouse port
- Industrial I/O
  - Analog input option
  - 16 channel Opto 22 compatible
  - Three spare 16-bit counter/timers
- Two RS232/422/485 selectable ports
- Watchdog timer
- Vcc sensing reset circuit
- EBX Compliant. 5.75" x 8.00" footprint
- UL and CE compliant
- Flash BIOS with OEM enhancements
- Latching I/O connectors
- Customizing available
- Low power fanless version
- 3 extra 8254-style timer/counters
- TVS devices

This Socket 370 compliant single board computer will accept Intel Flip-Chip Pentium and Intel Flip-Chip Celeron chips. Processing speeds up to 850 MHz are available. The board is compatible with popular operating systems such as Windows, QNX, VxWorks, and Linux.

A full complement of standard I/O ports is included on the board. Additional I/O expansion is available through the high speed PCI-based PC/104-Plus expansion site (which supports both PC/104 and PC/104-Plus expansion modules).

System memory expansion is supported with a high-reliability latching 168-pin DIMM socket. Low power 3.3V 168-pin DIMM modules up to 256 MB are available. SDRAM PC-100 modules are accepted (see specifications on page 3).

The VSBC-8 features high reliability design and construction including latching I/O connectors. It also features a watchdog timer, voltage sensing reset circuits, and self-resetting fuse on the 5V supply to the keyboard, mouse, USB 1.1 and Opto 22 I/O ports.

VSBC-8 boards are subjected to 100% functional testing and are backed by a limited two-year warranty.

US-based manufacturing, careful parts sourcing, and US-based technical support ensure the highest possible quality, reliability, service, and product longevity for this exceptional SBC.

## Technical Specifications

*Specifications are typical at 25°C with 5.0V supply unless otherwise noted.*

**Board Size:** 5.75" x 8.00" x 1.75"; EBX Compliant

**Storage Temperature:** -40° C to 85° C

**Free Air Operating Temperature:**

0° C to +50° C free air, no airflow

0° C to +60° C 100 FPM airflow

-40° C to +85° C, no airflow (Extended temp. version)

**Power Requirements:** (with 32 MB SDRAM, keyboard, and mouse)

VSBC-8g 350 MHz (equivalent) Celeron® CPU LPF 5V ± 5% @ 3.2 A (15.9 W) typ.

VSBC-8h 566 MHz Celeron® CPU 5V ± 5% @ 4.0 A (20.1 W) typ.

VSBC-8k 850 MHz Pentium® CPU 5V ± 5% @ 5.5 A (27.4 W) typ.

VSBC-8m 350 MHz (equivalent) Celeron® CPU extended temperature 5V ± 5% @ 3.3 A (16.5 W) typ.

+3.3V or ±12V may be required by some expansion modules

**System Reset:**

V<sub>CC</sub> sensing, resets below 4.70V typ.

Watchdog timeout

**DRAM Interface:**

One 168-pin DIMM socket.

8 to 256 MB, 3.3 volt, parity or non-parity PC-100 or faster SDRAM.

**Video Interface:**

Based on ATi Rage™ XL / Mobility chip. 4 MB VRAM standard. Resolutions to 1280 x 1024.

Flat panel display interface, 3.3V and 5V support, TTL and LVDS

**IDE Interface:**

Two channels, 40-pin .1" connectors. Supports high speed IDE Type 4 and Ultra DMA drives.

Supports up to four IDE devices (hard drives, CD-ROM, etc.)

**Floppy Disk Interface:** One 34-pin connector, supports two floppy drives

**Ethernet Interface:** 10/100 Ethernet based on Intel 82551ER chip. On-board RJ-45 Ethernet cable connector.

**Audio Interface:**

16-bit Sound Blaster Pro compatible. PCI-based.

Non-amplified Line Out and Line In supported

**Analog Input:**

8-channel, 12-bit, single-ended, 6 microsecond, channel independent input ranges:

±5, ±10, 0 to +5V, 0 to +10V. Option available HDW-301 and HDW-302 (Extended temp. version)

**COM1–2 Interface:**

RS-232, 16C550 compatible, 115k baud max.

**COM3–4 Interface:**

RS-232/422/485, 16C550 compatible, 460k baud max.

**LPT Interface:**

Bi-directional/EPP/ECP compatible

**Opto 22 / Digital Interface:**

16 channel, full compliance, ±24 ma outputs

**BIOS:** General Software Embedded BIOS© 2000 with OEM enhancements

Field upgradeable with Flash BIOS Upgrade Utility

**Bus Speed:**

CPU Bus: 100MHz/66MHz

PC/104-Plus (PCI): 33MHz

PC/104: 8MHz

**Compatibility:**

PC/104 – Full compliance

Embedded-PCI (PC/104-Plus) – Full PCI 2.2 compliance, 3.3V signaling.

EBX – Full compliance

**Weight:**

VSBC-8g – 0.35 kg (0.76 lbs)  
VSBC-8gu – 0.36 kg (0.80 lbs)  
VSBC-8h – 0.34 kg (0.74 lbs)  
VSBC-8hu – 0.35 kg (0.78 lbs)  
VSBC-8k – 0.34 kg (0.75 lbs)  
VSBC-8ku – 0.36 kg (0.79 lbs)  
VSBC-8m – 0.34 kg (0.74 lbs)  
VSBC-8mu – 0.35 kg (0.80 lbs)

Specifications are subject to change without notice.

# VSBC-8 Block Diagram

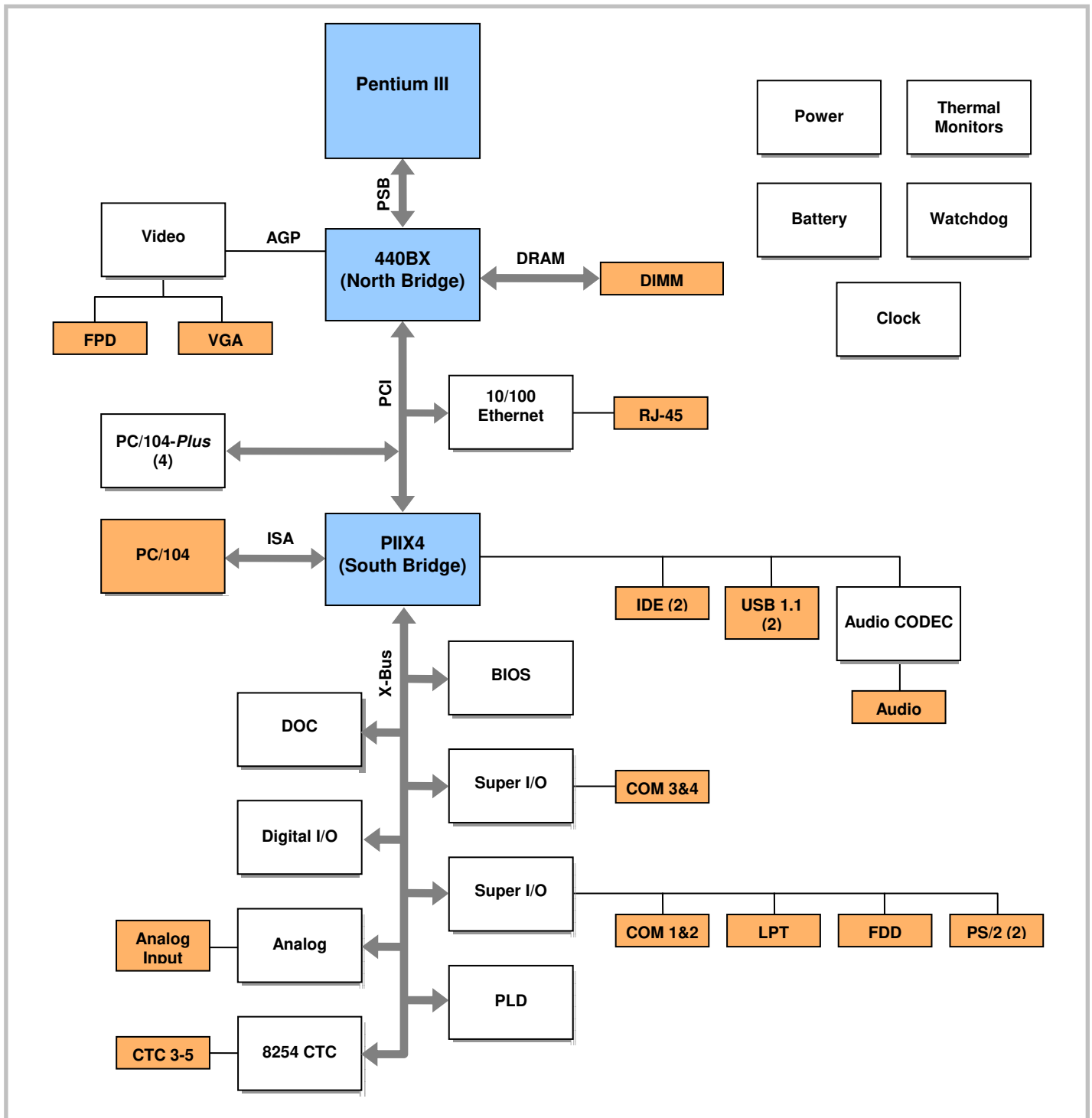


Figure 1. VSBC-8 Block Diagram

## Technical Support

If you have problems that this manual can't help you solve, first visit the VSBC-8 Product Support web page at <http://www.VersaLogic.com/private/vsbc8support.asp>. If you have further questions, contact VersaLogic for technical support at (541) 485-8575. You can also reach our technical support engineers via e-mail at [Support@VersaLogic.com](mailto:Support@VersaLogic.com).

### VSBC-8 Support Website

<http://www.VersaLogic.com/private/vsbc8support.asp>

#### REPAIR SERVICE

If your product requires service, you must obtain a Returned Material Authorization (RMA) number by calling (541) 485-8575.

Please provide the following information:

- Your name, the name of your company, and your phone number
- The name of a technician or engineer who we can contact if we have questions
- Quantity of items being returned
- The model and serial number (bar code) of each item
- A description of the problem
- Steps you have taken to resolve or repeat the problem
- The return shipping address

**Warranty Repair** All parts and labor charges are covered, including return shipping charges for UPS Ground delivery to United States addresses.

**Non-warranty Repair** All non-warranty repairs are subject to diagnosis and labor charges, parts charges, and return shipping fees. We will need to know what shipping method you prefer for return back to your facility, and we will need to secure a purchase order number for invoicing the repair.

**Note:** Please mark the RMA number clearly on the outside of the box before returning. Failure to do so can delay the processing of your return.

## Overview

### ELECTROSTATIC DISCHARGE

**Warning!** Electrostatic discharge (ESD) can damage boards, disk drives, and other components. The circuit board must only be handled at an ESD workstation. If an approved station is not available, some measure of protection can be provided by wearing a grounded antistatic wrist strap. Keep all plastic away from the board, and do not slide the board over any surface.

After removing the board from its protective wrapper, place the board on a grounded, static-free surface, component side up. Use an anti-static foam pad if available.

The board should also be protected during shipment or storage by keeping inside a closed metallic anti-static envelope.

**Note:** The exterior coating on some metallic anti-static bags is sufficiently conductive to cause excessive battery drain if the bag comes in contact with the bottom side of the VSBC-8.

### LITHIUM BATTERY

**Warning!** To prevent shorting, premature failure, or damage to the lithium battery, do not place the board on a conductive surface such as metal, black conductive foam, or the outside surface of a metalized ESD protective pouch. The lithium battery may explode if mistreated. Do not recharge, disassemble, or dispose of in fire. Dispose of used batteries promptly.

### MOUNTING SUPPORT

**Warning!** The single board computer must be supported at all eight mounting points to prevent excessive flexing when expansion modules are mated and demated. Flex damage caused by excessive force on an improperly mounted circuit board is not covered under the product warranty. See page 11 for more details.



## Initial Configuration and Setup

The following list describes the recommended components and gives an abbreviated outline for setting up a typical development system.

### RECOMMENDED COMPONENTS

- VSBC-8 Single Board Computer
- 168-pin DIMM SDRAM Memory Module PC-100 or PC-133
- ATX Power Supply
- SVGA Video Monitor
- Keyboard with PS2 connector
- 3.5" Floppy Disk Drive (optional)
- IDE Hard Drive (optional)
- IDE CD ROM Drive (optional)

### DRAM MODULE

- Insert DRAM module into the DIMM socket. Latch into place.

### CABLES / PERIPHERAL DEVICES

- Plug video adapter cable (p/n VL-CBL-1007) into socket J1 and attach video monitor.
- Plug keyboard adapter cable (p/n VL-CBL-1602) into socket J13 and attach keyboard.
- Plug floppy data cable (p/n VL-CBL-3403) into socket J17 and attach floppy drive.  
**Note:** Floppy drive should be connected after the twist in the cable.
- Plug hard drive data cable (p/n VL-CBL-4001) into socket J18. Attach hard drive and CD ROM drive to the connectors at the opposite end of the cable.
- Plug power supply into J9.
- Attach power supply cables to external drives.
- Jumper hard drive to operate as a master device.
- 

### MEMORY MODULE REQUIREMENTS

- 256MB maximum
- 168-pin DIMM, 3.3V, unbuffered SDRAM
- PC133 or PC100
- 64-bits wide, no parity
- CL = 2 CL = 3
- A0 to A13 Row address lines maximum.
- A0 A9 Column address lines maximum.
- 128Mbyte per bank maximum, 1 or 2 banks

## CMOS Setup / Boot Procedure Preliminary

- Turn power on.
- Press the DEL key the instant that video is displayed (during the memory test).
- Verify correct CMOS Setup information (see table below)
- Insert bootable floppy disk into floppy drive or allow the system to boot from the hard drive.
- See KnowledgeBase article [VT1424 VSBC-8 CMOS Setup Reference](#) for more information on these options.

### Basic CMOS Configuration

System Bios Setup - Basic CMOS Configuration (C) 2002 General Software, Inc. All rights reserved			
DRIVE ASSIGNMENT ORDER: Drive A: Floppy 0 Drive B: (None) Drive C: (None) Drive D: (None) Drive E: (None) Drive F: (None) Drive G: (None) Drive H: (None) Drive I: (None) Drive J: (None) Drive K: (None) Boot Method: Boot Sector	Date:>Jan 01, 1980 Time: 00 : 00 : 00 NumLock: Disabled	Typematic Delay : 250 ms Typematic Rate : 30 cps Seek at Boot : Floppy Show "Hit Del" : Enabled	
	BOOT ORDER: Boot 1st: Drive A: Boot 2nd: (None) Boot 3rd: (None) Boot 4th: (None) Boot 5th: (None) Boot 6th: (None)	Config Box : Enabled F1 Error Wait : Enabled Parity Checking : (Unused) Memory Test Tick : Enabled Debug Breakpoint : (Unused) Debug Hex Case : Upper Memory Test :StdLo FastHi	
FLOPPY DRIVE TYPES: Floppy 0: 1.44 MB, 3.5" Floppy 1: Not installed	IDE DRV ASSIGNMENT: Sect Hds Cyls Ide 0: Not installed Ide 1: Not installed Ide 2: Not installed Ide 3: Not installed	Memory Base: 633KB Ext: 127MB	

### Custom Configuration

System BIOS Setup - Custom Configuration (C) 2002 General Software, Inc. All rights reserved			
BIOS Extension : Disabled DiskOnChip/BBSRAM : Disabled CPU Temperature Threshold : 70C Display Type : CRT Splash Screen : Disabled Parallel Port Mode : SPP I/O Register Base Address : 0E0h Processor Throttling : Disable Throttling Percentage : 0% Reserved : (Unused)	COM1 (03F8) Enabled/IRQ : IRQ4 COM2 (02F8) Enabled/IRQ : IRQ3 COM3 (03E8) Enabled/IRQ : NO IRQ COM4 (02E8) Enabled/IRQ : NO IRQ LPT1 (0378) Enabled/IRQ : IRQ7 PS/2 Mouse Enabled/IRQ : IRQ12 PCI Int A : IRQ11 PCI Int B : IRQ11 PCI Int C : IRQ11 PCI Int D : IRQ11		

### Shadow Configuration

System BIOS Setup - Shadow/Cache Configuration (C) 2002 General Software, Inc. All rights reserved			
Shadowing : Chipset Shadow 16KB ROM at C400 : Enabled Shadow 16KB ROM at CC00 : Disabled Shadow 16KB ROM at D400 : Disabled Shadow 16KB ROM at DC00 : Disabled Shadow 16KB ROM at E400 : Disabled Shadow 16KB ROM at EC00 : Disabled	Shadow 16KB ROM at C000 : Enabled Shadow 16KB ROM at C800 : Disabled Shadow 16KB ROM at D000 : Disabled Shadow 16KB ROM at D800 : Disabled Shadow 16KB ROM at E000 : Disabled Shadow 16KB ROM at E800 : Disabled Shadow 64KB ROM at F000 : Enabled		

**Note:** Due to changes and improvements in the system BIOS, the information on your monitor may differ from that shown above.

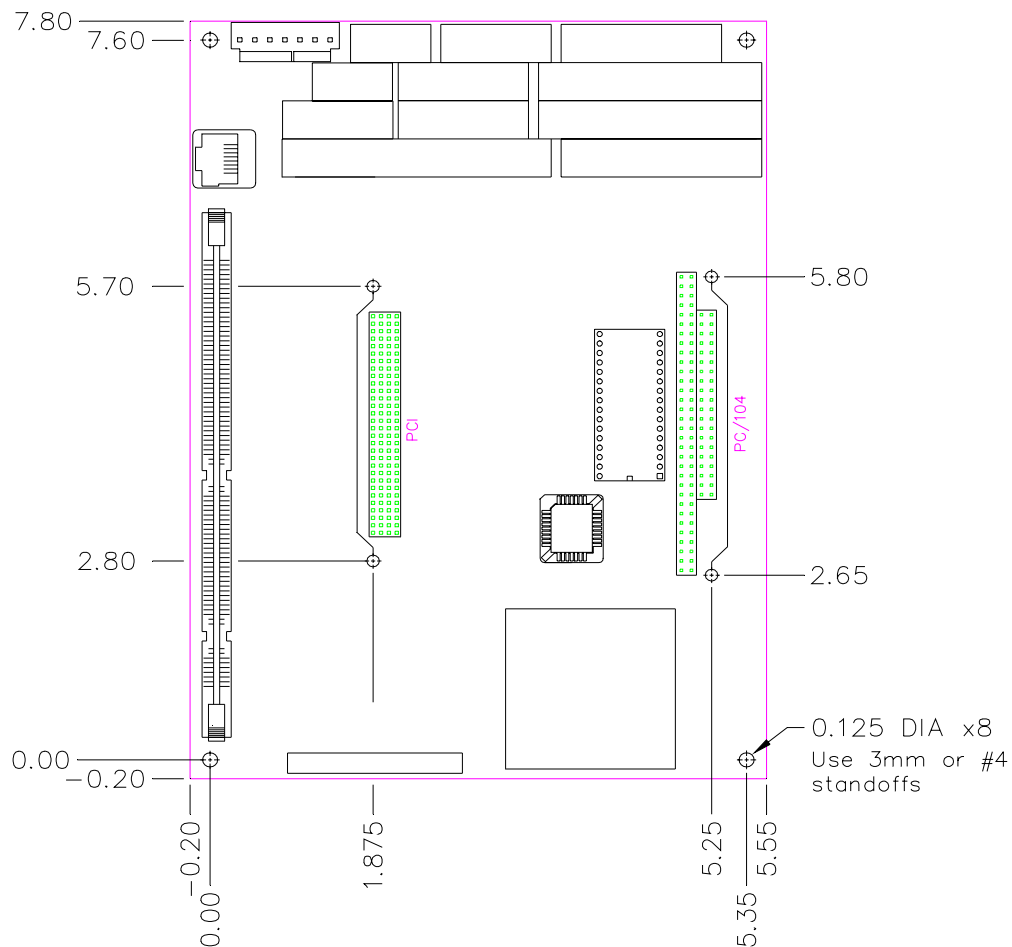
## Operating System Installation

The standard “PC” architecture used on the VSBC-8 makes the installation and use of most of the standard x86 processor based operating systems very straight forward. The operating systems listed on the [VersaLogic OS Compatibility Chart](#) ([www.VersaLogic.com/kb/KB.asp?KBID=1487](http://www.VersaLogic.com/kb/KB.asp?KBID=1487)) use the standard installation procedures as provided by the maker of the OS. If special optimized hardware drivers are available for a particular operating system, you can find these drivers, or a link to the drivers, at the VSBC-8 Product Support web page at <http://www.VersaLogic.com/private/vsbc8support.asp>.

## Dimensions and Mounting

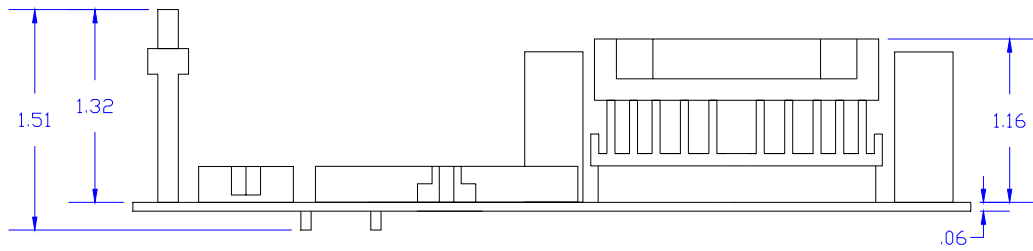
The VSBC-8 complies with all EBX standards which provide for specific mounting hole and PC/104-*Plus* stack locations as shown in the diagram below.

**Caution** The single board computer must be supported at all eight mounting points to prevent excessive flexing when expansion modules are mated and demated. Flex damage caused by excessive force on an improperly mounted circuit board is not covered under the product warranty.

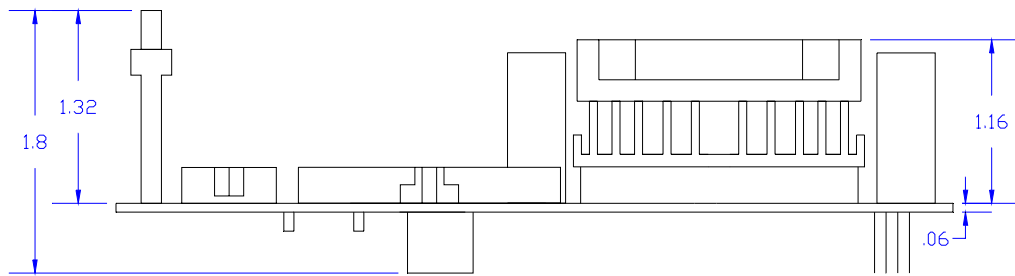


**Figure 2. Dimensions and Mounting Holes**

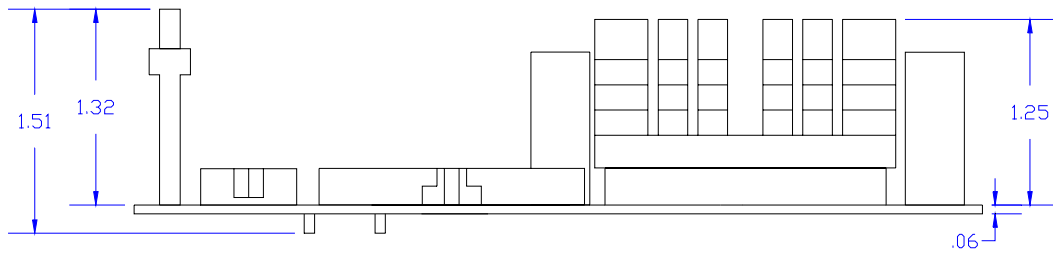
*(Not to scale. All dimensions in inches.)*



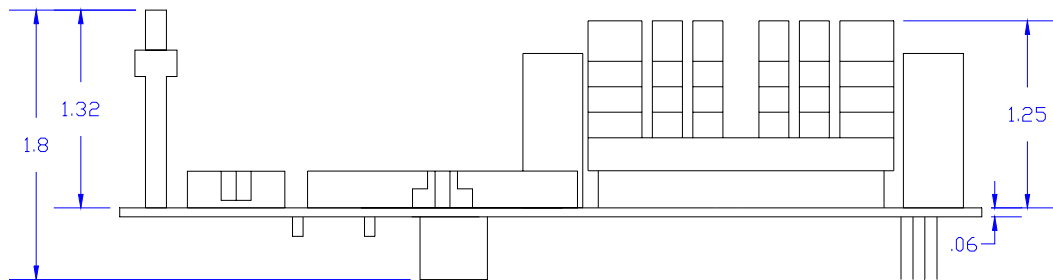
**Figure 3. Height Dimensions (Non-pass-through)**



**Figure 4. Height Dimensions (Pass-through)**



**Figure 5. Height Dimensions (Fanless Non-pass-through)**



**Figure 6. Height Dimensions (Fanless Pass-through)**

*(Above figures not to scale. All dimensions in inches.)*

## HARDWARE ASSEMBLY

The VSBC mounts on four hardware standoffs using the corner mounting holes (A). These standoffs are secured to the underside of the circuit board using pan head screws.

Four additional standoffs (B) must be used under the circuit board to prevent excessive flexing when expansion modules are mated and demated. These are secured with four male-female standoffs (C) threaded from the topside which also serve as mounting struts for the PC/104 stack.

The entire assembly can sit on a table top or it can be secured to a base plate. When bolting the unit down, make sure to secure all eight standoffs (A and B) to the mounting surface to prevent circuit board flexing. Refer to the drawing on page 11 for dimensional details.

An extractor tool is available (part number VL-HDW-201) to separate the PC/104 modules from the stack.

**Note:** Standoffs and screws are available as part number VL-HDW-101.

## STANDOFF LOCATIONS

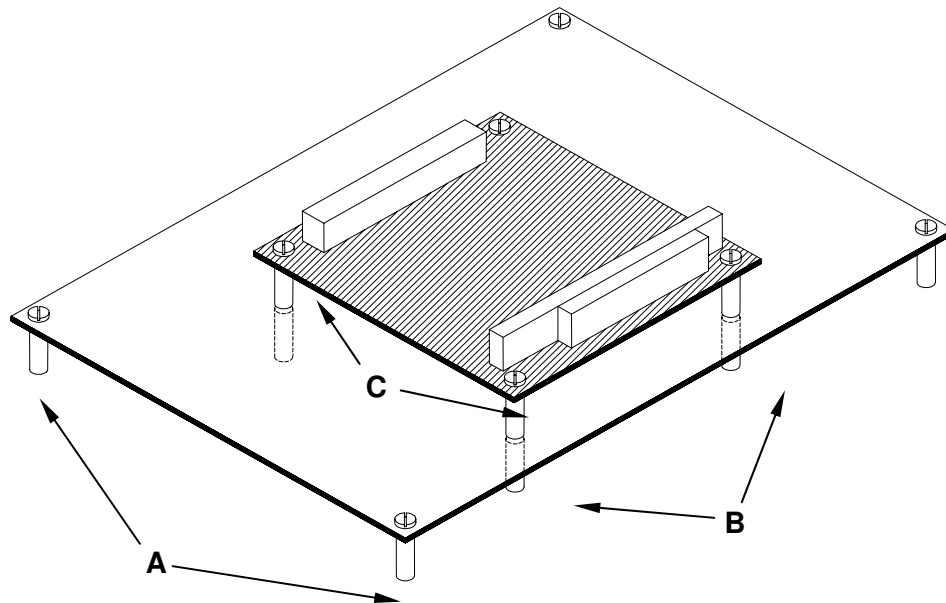


Figure 7. Standoff Locations

# External Connectors

## CONNECTOR LOCATION DIAGRAM

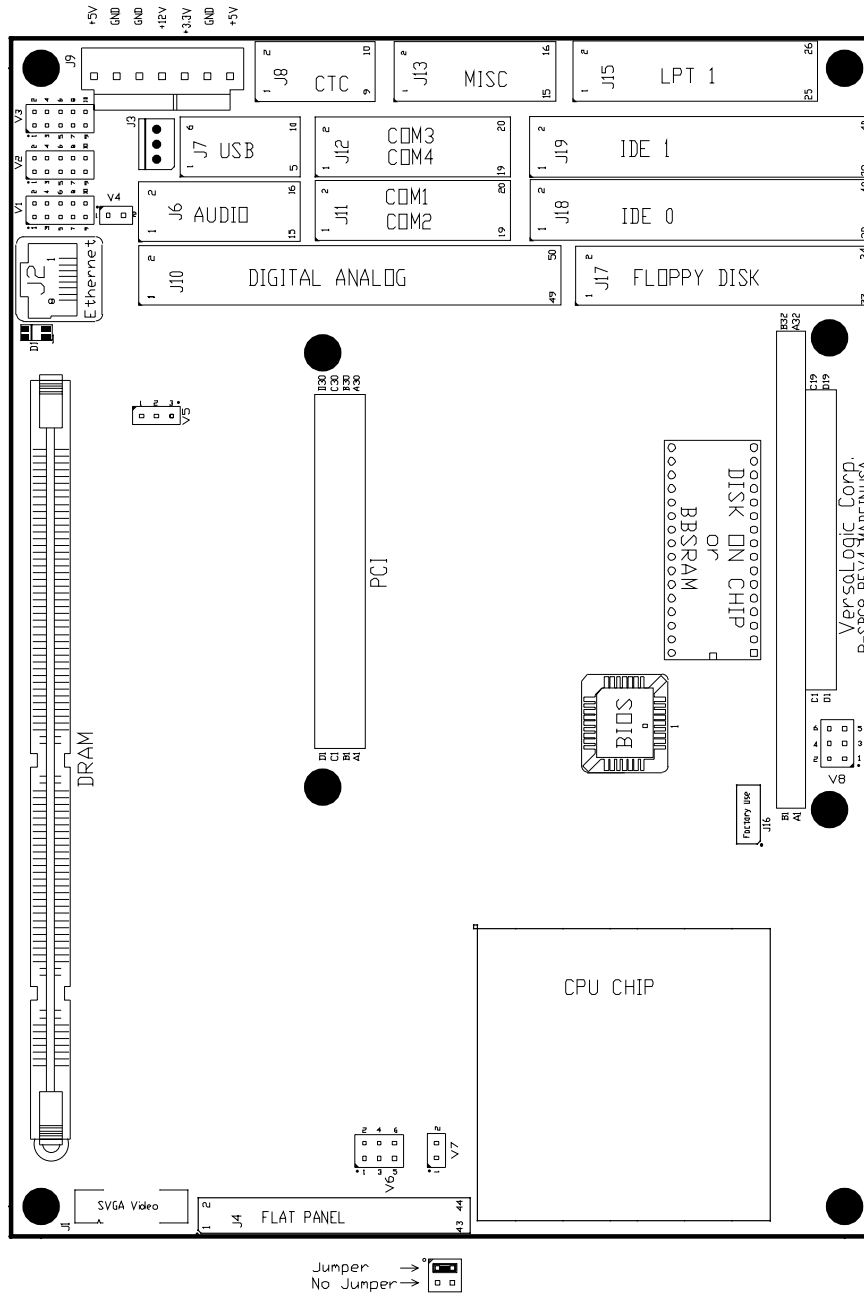


Figure 8. Connector Location Diagram

## CONNECTOR FUNCTIONS AND INTERFACE CABLES

The table below notes the function of each connector, as well as mating connectors and cables, and the page where a detailed pinout or further information is available.

**Table 1: Connector Functions and Interface Cables**

Connector	Function	Mating Connector	Transition Cable	Cable Description	Page	Pin 1 Location X Coord. Y Coord.	
J1	SVGA Video Output	SAMTEC TCSD-05-S-12.00-01-F-N	VersaLogic VL-CBL-1007	1 foot 10-pin socket to 15-pin D-sub SVGA connector	36	.445	-.100
J2	Ethernet	RJ-45 Crimp-on Plug	—	—	39	N/A	N/A
J3	PC/104-Plus Auxiliary Power (-5V & -12V)	Molex 10-11-2033 + Molex 08-50-0005 (3ea.)	See connector J9	See connector J9	19	.745	6.980
J4	Flat Panel Interface	FCI 90311-044(Housing) + FCI 77138(Crimp Pins)§	Custom	Contact Factory	37	1.125	-.100
J6	Audio	3M 3452-7600			40	.825	6.600
J7*	Dual USB 1.1 Connector	Molex 14-56-2051	VersaLogic VL-CBL-0501 (two required)	6 inch transition cable. 5 pin connector to USB receptacle connector.	49	1.125	7.025
J8	Counter / Timer Signals	3M 3473-7600	User supplied		52	1.625	7.525
J9	Main Power Input (EBX Compliant)	Molex 09-50-8073 + Molex 08-52-0072 (7 ea.)	VersaLogic VL-CBL-2021	Interface from industry standard ATX power supply (to J3 and J9)	19	.375	7.550
J10*	Opto-22 Interface and Analog Input (-r version)	3M 3425-7600	VersaLogic VL-CBL-5007	1.5 foot, 50-pin socket to 34-pin socket and 16-pin socket	50, 42	.825	6.175
J11*	COM1 and COM2 Ports	3M 3421-7600	VersaLogic VL-CBL-2001	1 foot, 20-pin socket to two DB9M serial port connectors	26	2.025	6.600
J12*	COM3 and COM4 Ports	3M 3421-7600	VersaLogic VL-CBL-2001	1 foot, 20-pin socket to two DB9M serial port connectors	26	2.025	7.025
J13*	Speaker, IDE LED, Programmable LED, Fused Vcc, Keyboard, PS/2 mouse, Push-Button Reset	3M 3452-7600	VersaLogic VL-CBL-1602	1 foot breakout cable. 16-pin socket to two 6-PIN mini DIN panel mount, programmable LED and HD activity LED, speaker, and reset switch.	33	2.525	7.525
J14	Fan Power Output (+5V)	Molex 22-01-3027 or Molex 22-01-2025	Provided with fan assembly	—		5.095	.380
J15*	LPT1 Port	3M 3399-7600	VersaLogic VL-CBL-2601	1 foot 26-pin socket to DB-25F connector	31	3.725	7.525
J16	PLD Reprogramming Port (Factory use Only)	—	—	—	—	4.750	2.490
J17*	Floppy Drive Interface	3M 3414-7600	VersaLogic VL-CBL-3403	1.5 foot 34-pin dual floppy drive interface cable	35	3.725	6.175
J18*	IDE Hard Drive Channel 0	3M 3417-7600	VersaLogic VL-CBL-4001	1.5 foot 40-pin dual IDE drive interface cable	32	3.425	6.600
J19*	IDE Hard Drive Channel 1	3M 3417-7600	VersaLogic VL-CBL-4001	1.5 foot 40-pin dual IDE drive interface cable	32	3.425	7.025

\* **Note:** These standard .100" dual-row low profile headers are 3M 2500 series compatible. They are compatible with 3M snap-in latches, socket retaining clips, polarizing posts, and keys.

§ **Note:** This connector is a 2.00mm housing and crimp terminal style. Number of crimp terminals depends upon flat panel display model being used.

‡ **Note:** Relative to lower left hand mounting hole. See page 11, Figure 1.



# Jumper Block Locations

**Note:** Jumpers shown in as-shipped configuration.

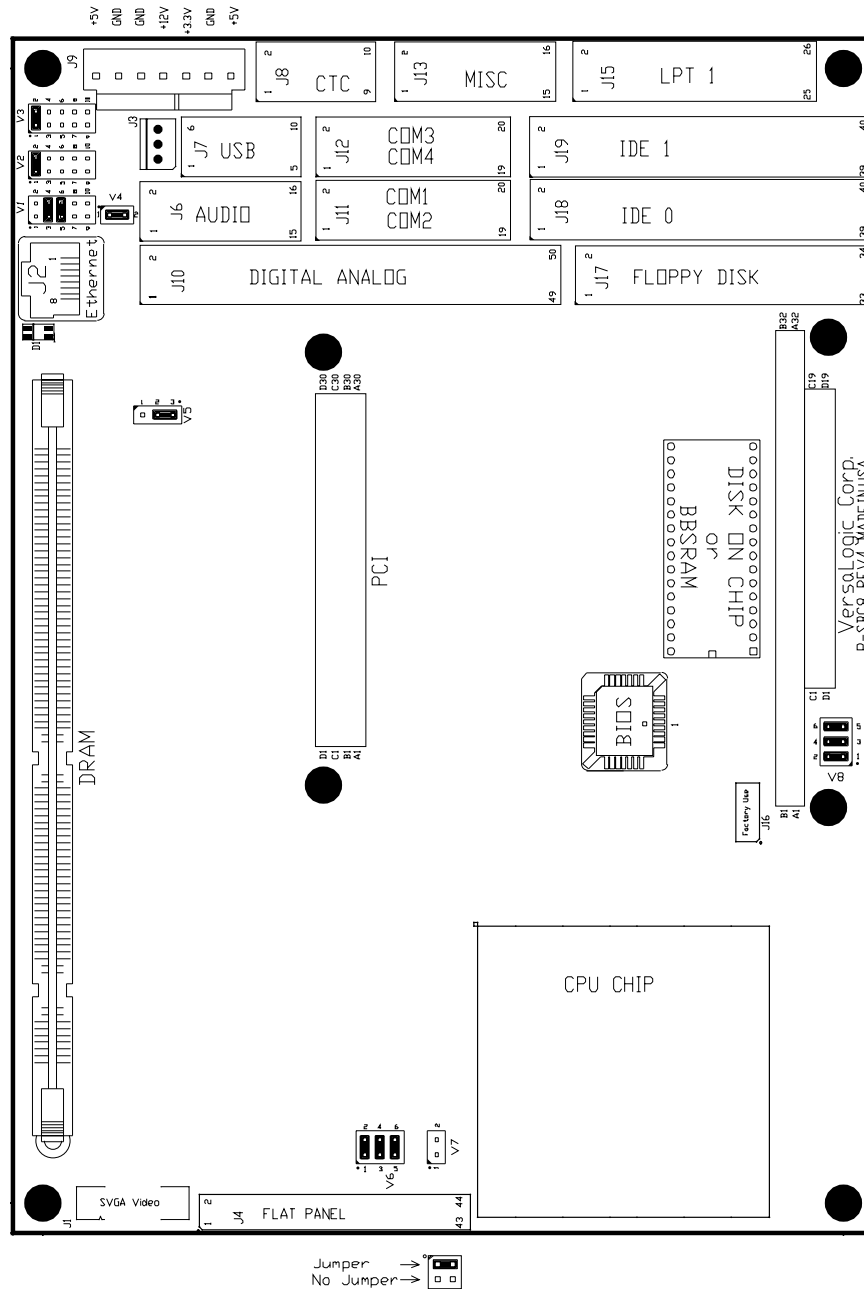
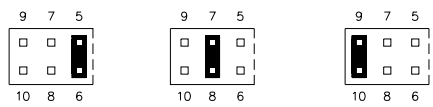

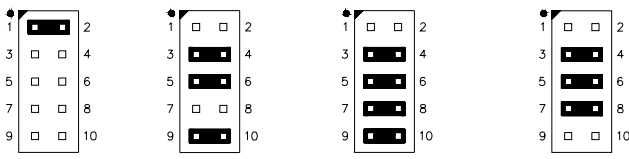
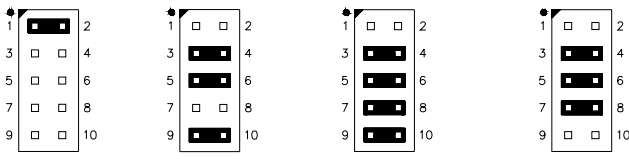



Figure 9. Jumper Block Location

**JUMPER SUMMARY**

**Table 2: Jumper Summary**

Jumper Block	Description	As Shipped	Page
V1	<p><b>Counter/Timer 5 Clock Source</b></p> <p>6 MHz      CTC#4      External Input</p>  <p><i>Note: Only ½ of jumper block V1 is shown in this picture.</i></p>	6 MHz	52
V1	<p><b>Counter/Timer 4 Clock Source</b></p> <p>External Input      6 MHz</p>  <p><i>Note: Only ½ of jumper block V1 is shown in this picture.</i></p>	6 MHz	52
V2	<p><b>COM4 Configuration</b></p> <p>RS-232      RS-422      RS-485 Endpoint Station      RS-485 Intermediate Station</p> 	RS-232	25
V3	<p><b>COM3 Configuration</b></p> <p>RS-232      RS-422      RS-485 Endpoint Station      RS-485 Intermediate Station</p> 	RS-232	25
V4	<p><b>Opto 22 I/O Rack Power</b></p> <p>In — I/O rack power provided by VSBC Out — I/O rack power provided externally</p>	In	50
V5	<p><b>CMOS RAM and Real Time Clock Erase</b></p> <p>Erase      Normal Operation</p>  <p><i>Note: Do not operate the board with the jumper in the erase position. Leave the jumper in position V5[1-2] for at least one full minute to fully erase CMOS RAM.</i></p>	Normal	22