Pentium EBX Computer with Data Acquisition/GPS/CAN SBC2596

Features

- ✓ LP Pentium, 166 or 266MHz
- ✓ 32 channels of 16-bit analog input
- ✓ 14-bit, 4-channel DAC
- ✓ 10/100BASE-T Ethernet
- ✓ CAN option
- ✓ GPS for location identification/ synchronized data acquisition
- ✓ Extended temperature range available

The SBC2596 offers high performance A/D and D/A on a Pentium platform. The board can be configured for use in many environments including vehicles, remote data logging, or factory floor applications. The onboard GPS (Global Positioning System) makes synchronized data acquisition possible, even in remote locations. An onboard DC/DC power supply allows direct connection to battery power supplies in remote locations and vehicles.

With 1MB of onboard flash, accessible as a read/ write disk, and up to 128MB of DRAM, many large programs can be run from system memory. An onboard CompactFlash connector provides hundreds of megabytes of removable program and data storage. External IDE drives and floppy drives can also be connected.

The SBC2596 has multiple communication options which include four serial ports, 10/ 100BASE-T Ethernet, USB, infrared (IrDA), GPS, and CAN. Coupled with a DC/DC power supply, this board can communicate from remote locations with host computers in a multitude of ways.

Software Support

DOS emulation
MSDOS 5.0
Linux, CE, NT, VxWorks®
RTOS
Comm Library, CommBLOK™
PID loop library, PidBLOK™
C, compilers
[Items above in Section 6]

Compatible Hardware

PC/104 expansion cards
[Items above in Section 4]
RS232/RS485 devices
Custom

Mounting/Packaging

Standoffs, STDOFF01
[Items above in Section 5]
Custom

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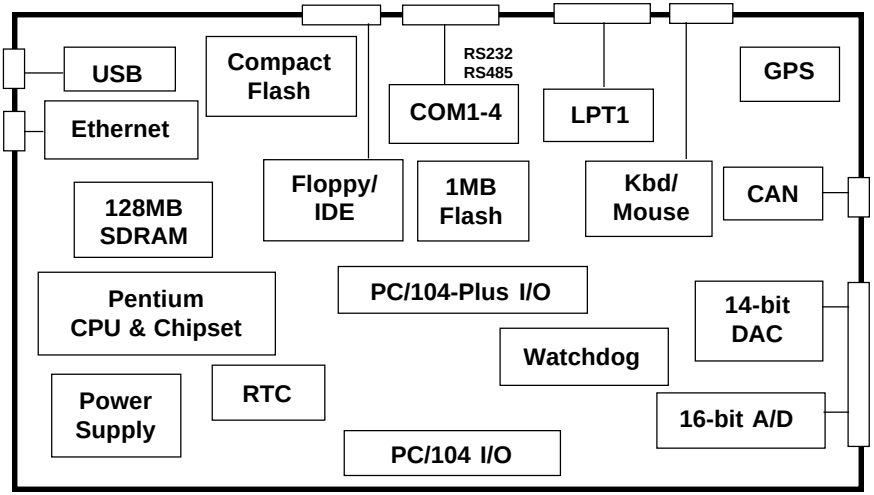

Technical Details:

At the core of the SBC2596 is an Intel Pentium "Tillamook" processor running at 166 or 266 MHz. The Pentium allows compatibility with both real mode and 32-bit protected mode programs and also integrates a hardware floating point coprocessor.

The Pentium processor is paired with an Intel 430TX chipset. The chipset contains many PC devices, such as a PCI and ISA (PC/104) bus controller, DRAM controller, and USB controller.

The data acquisition on the SBC2596 provides up to 32 single-ended 16-bit analog inputs that are fault protected to ±40V. The analog input section offers individual channel selection of single-ended or differential modes in any combination. The analog inputs also feature basic and auto-scan modes. Basic mode directly controls all modes, gains, channel selection, and filters. In auto-scan mode, a user can preset individual channel attributes - channel on/off, mode, gain, and low-pass filter in onboard RAM.

The 14-bit analog outputs have full-scale output of ±10.1V. The digital-to-analog converter is noise-protected. Each output has a 1-pole low-pass filter.

The onboard GPS has two features. It can determine the location of the system for mobile applications. Additionally, it has a pulse-per-second clock that is accurate to ±95ns. This can be used to synchronize data acquisition in geographically distant systems.

The memory subsystem on the SBC2596 allows many programs to be run without any external storage. Up to 128 Mbytes of synchronous DRAM (SDRAM) is more than sufficient for many complex, protected-mode programs and operating systems.

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The 1-Mbyte Flash memory chip contains both the BIOS and a user application code space. The user space can be configured as a 768k read/ write flash disk.

If a larger program or data storage space is required, or if removability is needed, the CompactFlash interface can provide hundreds of megabytes of storage.

Four serial ports allow communication with many different devices. COM1 through COM4 are 16C550-compatible UARTs (with transmit and receive FIFOs). All four serial ports are capable of speeds up to 115200 baud, have RS-232 transceivers, and have RTS and CTS modem control lines. Additionally, COM4 can be configurable for full-duplex RS-485 communication with jumperable termination resistors.

The PC/104 connector provides support for both 8-bit and 16-bit expansion boards and operates with standard PC/104 bus protocol and timing. The default configuration is non-stackthrough connectors, allowing the SBC2596 to be the bottom card in a stack. The stackthrough option (SBCOPT16ST) allows the SBC2596 to be plugged into a custom-designed OEM I/O board as an automation component.

The SBC2596 can support application development under numerous strategies. If 16-bit DOS or DOS-extended software is sufficient, Micro/sys offers a free DOS-compatible operating system preinstalled on the SBC2596. For a small royalty fee, true MSDOS 5.0 can be preinstalled. Powerful, cost-effective remote debug capabilities are provided through Borland's Turbo Debugger.

For true 32-bit application development, the SBC2596 supports a number of alternatives. Due to its PC compatibility, 32-bit real time operating systems (RTOS) such as, PharLap® ETS, and VxWorks® can be booted on the SBC2596. All support 32-bit linear protected mode operation, and have full tool suites available, including compilers and debuggers.

For pre-configured sets of options, Micro/sys can provide OEMs with a single part number for ordering. In addition, custom versions of the SBC2596 are available. Please call Micro/sys Technical Sales for details.

Specifications:

Mechanical:

- ❑ EBX standard (8" x 5.75" x .6") except it uses a removable terminal block as a power connector.

Power Requirements:

- ❑ SBC2596: +5v 5% at 4.5A max
- ❑ SBC2596-ET: +5v 5% at 3.5A max

Environmental:

Part Number	*Board Airflow**	*Operating Temp.*
SBC2596	0 cfm	0° to +70°C
SBC2595-ET	0 cfm	-40° to +65°C
SBC2596-ET	6.5 cfm	-40° to +85°C

* Using 80mm fan

- ❑ SBC2596 includes a factory-installed CPU heatsink/fan
- ❑ SBC2596-ET includes a factory-installed CPU passive heatsink
- ❑ -40° to +85°C storage
- ❑ 5%-95% relative humidity, non-condensing

Processor Core Section:

- ❑ Intel Low-Power Embedded Pentium
- ❑ 166 or 266 MHz clock rate

On-board Memory:
- ❑ 64M SDRAM based at 0, expandable to 128M
- ❑ 1M of Flash at top of memory map with BIOS and operating system installed; 768k available for user application
- ❑ BIOS setup stored in 2Kbyte EEPROM

Watchdog Timer:
- ❑ Program must refresh watchdog timer every 1.6 seconds, or board reset will be reissued
- ❑ Enabled through software

COM1-COM4 Serial Ports:
- ❑ Four async serial ports, PC compatible
- ❑ COM1-COM4 16550-compatible
- ❑ RTS and CTS modem controls
- ❑ RS232 on all four channels
- ❑ COM4 RS485 full duplex

COM1/COM2 Serial Port and COM3/COM4 Serial Port Connector/Cable		
Pin	Signal	Pin
1	COM1 RX	1.2
2	COM1 RTS	1.7
3	COM1 TX	1.3
4	COM1 CTS	1.8
5		
6		
7	GND	1.5
8	COM2 RX	2.2
9	COM2 RTS	2.7
10	COM2 TX	2.3
11	COM2 CTS	2.8
12		
13		
14	GND	2.5

Parallel Printer Port:
- ❑ Bi-directional LPT standard

COM4 RS485 and LPT Connector			
Pin	Signal	Signal	Pin
1	TX+ COM4 RS485	TX- COM4 RS485	2
3	RX+ COM4 RS485	RX- COM4 RS485	4
5	-	-	6
7	VCC	-STROBE	8
9	-ALF	D0	10
11	-ERR	D1	12
13	-INIT	D2	14
15	-SLCTRIN	D3	16
17	GND	D4	18
19	D5	D6	20
21	D7	-ACK	22
23	GND	-BUSY	24
25	PE	SLCT	26

Keyboard, Mouse and Speaker:
- ❑ PS/2-compatible keyboard port
- ❑ PS/2-style mouse port
- ❑ AT-compatible TTL speaker port

Keyboard, Mouse, Speaker Connector			
J4 Pin	Signal	Signal	J4 Pin
1	GND	GND	2
3	MCLK	MDATA	4
5	VCC	VCC	6
7	KDATA	KCLK	8
9	SPKR	-	10

USB:
- ❑ USB 1.0 port
- ❑ Transfers at 12 or 1.5 Mbit/sec

Floppy Disk Interface:
- ❑ Two drives on single cable
- ❑ Standard connector pinout

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IDE:
- ❑ Two drives on single cable (CompactFlash counts as one drive)
- ❑ Standard 40-pin connector pinout
- ❑ Hard drive, CD-ROM support
- ❑ Flexible BIOS drive setup

Real Time Clock:
- ❑ RTC with on-board battery
- ❑ Driver code in BIOS

PC/104 Interface:
- ❑ 8-bit and 16-bit PC/104 module support
- ❑ Full IRQ and DRQ support
- ❑ Standard mounting holes
- ❑ Stackthrough option available

CompactFlash Interface:
- ❑ Supports Type I CompactFlash
- ❑ Operates in True IDE mode
- ❑ CF+ cards not supported
- ❑ Not hot-swappable

Digital I/O:
- ❑ 8 bits of TTL-level, byte selectable I/O from 82C55 chip
- ❑ 12 Multi-function TTL-level bit selectable I/O at 8mA sink/source
- ❑ Ext-trigger, Ext-pacer clock, User I/O
- ❑ Any/all multi-function inputs can generate an IRQ
- ❑ Read-back function on outputs
- ❑ Additional 16 bits of digital I/O if CAN Bus option is installed

User LEDs/Switches:
- ❑ 8 user-readable DIP switches
- ❑ 9 user-writeable LEDs

Analog Inputs:
- ❑ 16-bit, 32-channels individually selected for single/differential
- ❑ ADC conversion time of 5usec
- ❑ -3dB typical full-power response of input circuitry: $20V_{p-p}$ @35kHz, $5V_{p-p}$ @ 100kHz
- ❑ Each channel can be set by software for the following attributes: on/off, single/differential, input range of ±5.0V or ±10.0V, low-pass filter (1kHz or 100kHz)
- ❑ Default Basic Mode from reset allows readings of individual channels from software directly with EOC being Polled/IRQ
- ❑ Auto-scan Mode waits for an ext-trigger or software to start the pacer-clock to systematically run through each channel with its preset values and store the data into CPU DRAM with DMA

Digital I/O Connector		
Pin	**Signal**	**Dual Function Signal**
1	55DIO0	
2	55DIO1	
3	55DIO2	
4	55DIO3	
5	DIO 1	
6	DIO 2	
7	DIO 3	
8	DIO 4	
9	DIO 5	
10	DIO 6	
11	DIO 7	
12	DIO 8	
13	GND	
14	DIO 9	
15	GND	
16	DIO 10	
17	GND	
18	DIO 11	EXT PACER CLK
19	GND	
20	DIO 12	EXT TRIGGER

Analog Outputs:
- ❑ 14-bit, 4-channels
- ❑ 10usec DAC settling time

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- ❑ Each channel has a 1-pole reconstruction filter and output buffer
- ❑ ±10.0V output

Counter/Timers:
- ❑ 1MHz 16-bit timer for pacer clock
- ❑ 82C54-compatible timer for general-purpose timing

GPS:
- ❑ Supports three popular protocols: TSIP (Trimble Standard Interface Protocol), TAIP (Trimble ASCII Interface Protocol), and NMEA 0183.
- ❑ Horizontal Accuracy: <6m (50%), <9m (90%)
- ❑ Altitude Accuracy: <11m (50%), <18m (90%)
- ❑ Pulse-per-second Accuracy: ±95ns

CAN Bus:
- ❑ Uses Intel 82527 CAN controller
- ❑ Supports CAN specification 2.0, Parts A and B
- ❑ Adds 16 bits of general-purpose digital I/O

CAN Bus Terminals	
Pin	Signal
1	CANH
2	CANL
3	CAN +5V
4	CAN GND

Power Supply:
- ❑ Accepts input voltages from 5V to 28V

Power Connector	
Pin	Signal
1	PWR IN
2	GND
3	PWR OUT
4	+12V

DK2596 Development Kit:
- ❑ Free with first SBC2596 purchase
- ❑ Breakout cables to COM1, COM2
- ❑ Download cable and utilities
- ❑ Documentation, schematics, sample software
- ❑ Supports COM port, non-disk based development
- ❑ Cables for disk, additional COM ports can be ordered separately

External Connections:
- ❑ 14-pin header for COM1-COM2
- ❑ 14-pin header for COM3-COM4
- ❑ 10-pin header for keyboard, mouse, speaker
- ❑ 34-pin header for floppy
- ❑ 40-pin header for IDE
- ❑ 20-pin header for general-purpose digital I/O
- ❑ 20-pin header for data acquisition digital I/O
- ❑ 50-pin header for analog input
- ❑ 10-pin header for analog output
- ❑ 10-pin header for GPS, timer I/O
- ❑ 26-pin header for LPT, RS485
- ❑ 4-pin removable terminal block for power input
- ❑ 2-pin locking header for pushbutton reset

Ordering Information:

SBC2596	Pentium CPU, 266MHz, 16-ch A/D, 64MB RAM, 1M Flash
SBC2596-1	Pentium CPU, 266MHz, 16-ch A/D, 64MB RAM, 1M Flash, Ethernet
SBC2596-ET	Pentium CPU, 166MHz, 16-ch A/D, 64MB RAM, 1M Flash, extended temp operation
SBC2596-1-ET	Pentium CPU, 166MHz, 16-ch A/D, 64MB RAM, 1M Flash, Ethernet, extended temp operation

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DK2596	No charge development kit, available with first order only
SDK-Linux	Linux kit (requires Ethernet and 2596OPT50)
2596OPT3	128MB RAM total
2596OPT11	16 additional A/D channels
2596OPT12	4-chan, 14-bit D/A
2596OPT14	COM3/COM4, temperature sensor
2596OPT19	GPS module
2596OPT22	CAN Bus interface
2596OPT25	MSDOS 5.0 in bootable A: flash disk
2596OPT40	DC/DC Converter
2596OPT50	Linux startup kernel installed in flash

Related Products:

CA4089	Breakout cable for COM1-COM2 DB9
CA4048	Breakout cable for keyboard, mouse
CA4105	Breakout cable for RS485, LPT
CA4012	Cable, 20-pin header to 20-pin header
CA4031-3	Cable, dual 3-1/2” floppy disk
CA4025	Cable, IDE disk, single drive
CA5049	Cable, 50-pin header to 50-pin header
CA5052	Cable, 10-pin header to 10-pin header
TB5001	50-pin terminal block
SBCOPT16ST	Stackthrough PC/104
SBCOPT120ST	Stackthrough PC/104-plus
CF-FL128	128MB CompactFlash Card
CF-FL256	256MB CompactFlash Card
CF-FL512	512MB CompactFlash Card

Cables nominally 15”, other lengths available.

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