PC/104-Plus Pentium Computer with Industrial I/O and Ethernet
SBC2590

Features

✓ True Intel Pentium, 100 to 266MHz

✓ Up to 128MB RAM, 1GB flash

✓ SVGA with CRT, flat panel, touchscreen

✓ 4 COM ports, LPT1, KBD, mouse, USB, FDC, IDE, RTC, watchdog

✓ 24 TTL I/O, 8 A/D, 4 D/A

✓ 100BASE-TX/10BASE-T Ethernet

✓ PC/104 & PC/104-Plus expansion

✓ DOS, LINUX, CE, NT, RTOS

The highly intergrated Micro/sys SBC2590 Pentium computer provides a high performance, easy to integrate platform for advanced embedded applications. Fully compatible with current PC standards, the SBC2590 will run all popular operating systems. On-board display, touchscreen, digital I/O, analog I/O, and network features can eliminate other cards, reducing system cost.

The SBC2590 can be used in diskless, unattended embedded controller applications where the strong Pentium performance and industrial BIOS offer quick startup and the integrated I/O needed by these applications.

For applications that need full Pentium computer features such as graphical user interfaces and large disk drives, the SBC2590 again provides an ideal choice, and the on-board analog and digital I/O may satisfy additional system requirements.

A unique mix of pre-installed firmware is available on the SBC2590, including a robust industrial BIOS, a board Flash Setup utility, and load capabilites for applications and system images.
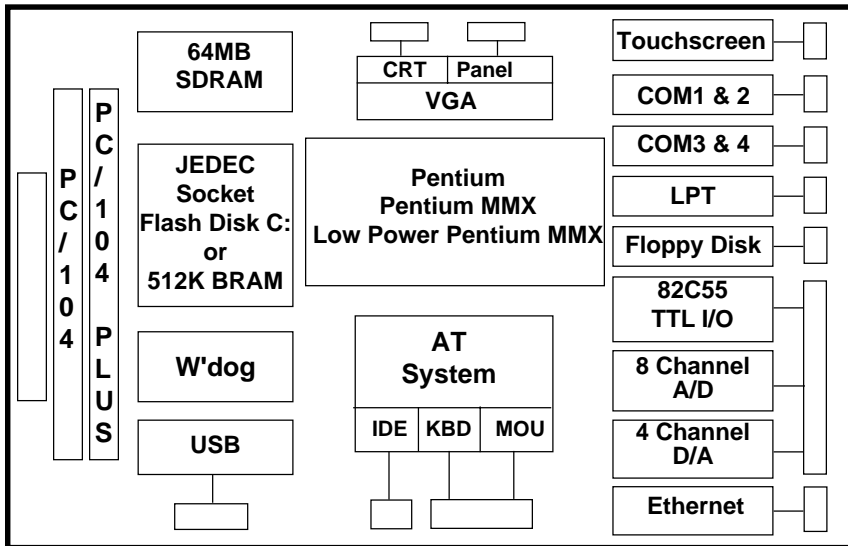
Software Support

DOS emulation
Turbo Debugger™
Comm library, CommBLOK™
PID loop library, PidBLOK™
C, BASIC, compilers
  [Items above in Section 6]
Linux, CE, NT, VxWorks®

Compatible Hardware

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

Mounting/Packaging

Standoffs, STDOFF01
  [Items above in Section 5]
Custom

Micro/sys 3730 Park Place, Montrose, CA 91020 (818)244-4600 Fax (818)244-4246
email: info@embeddedsys.com

Technical Details:

The SBC2590 core is implemented with a genuine Intel Pentium CPU and the Intel 430TX chipset. The Pentium processor core is clocked at rates from 100MHz to 266MHz, and includes hardware floating point math. RAM is accessed through a 64-bit wide data bus. The 430TX chipset integrates the full mix of PC system devices, PCI bus(PC/104-Plus), ISA bus (PC/104), DRAM, and USB bus controllers.

The memory subsystem on the SBC2590 includes a DIMM socket that supports 8MB, 16MB, 32MB, 64MB or 128MB of DRAM. 1MB of flash is included that is preloaded with an industrial BIOS and a suite of firmware utilities. A DOS compatible operating system is also loaded into the flash.

A 32-pin JEDEC socket on the SBC2590 can be used to implement non-volatile storage in two ways. For large capacity solid state read/write disk requirements, a DiskOnChip® flash device can provide a solid state disk from 8MB to 1GB in size. This solid state disk is bootable, and is supported with drivers for a number of advanced operating systems. It can be mapped as the C: drive, and can be treated by software as if it were a hard disk. Because of a limit on the number of erase/write cycles, flash disks are best as "read mostly" disks. Loading of operating systems and applications, and updating configuration files is best done with flash disks.

The JEDEC socket can also support battery-backed RAM, from 128KB to 512KB. The RAM is mapped as 16 pages of 32KB in the option ROM space in the first megabyte of memory. An application can directly manage the battery-backed RAM, or a RAM disk driver can be used. Battery-backed RAM has an infinite number of write cycles, so continual data logging to an array or file is best done with battery-backed RAM.

The SVGA controller supports resolutions to 1,280 x 1,024. It includes hardware acceleration for

fast graphic updates. The output can drive a standard RGB CRT monitor, and any LCD, EL, or VF flat panel display. Active matrix (TFT) LCD panels are supported, in up to 36-bit color. A set of 8 digital outputs and 8 digital inputs can be used to interface to a resistive matrix touchscreen, a keypad, sets of row-column connected switches, or for general purpose digital I/O.

PC-compatible COM1, COM2, COM3, and COM4 serial ports are provided, with RS232 levels and RTS and CTS control signals. RS422/RS485 operation is also supported on three serial ports. COM1 and COM3 are 4-wire full duplex RS422/RS485. COM4 is 2-wire RS485. COM2 or COM4 can be used for board configuration, and to download operating systems and application programs onto the SBC2590.

An 82C55 digital I/O device provides 24 lines of TTL I/O. Direction is programmable in two 8-bit groups and two 4-bit groups. The TTL I/O lines can source and sink 2.5 mA. Also included on the SBC2590 are a real-time clock and a watchdog timer.

Optional on-board features include 8 channels of 12-bit analog input, 4 channels of 12-bit analog output, and a 10BASE-T/100BASE-TX Ethernet adapter.

Both PC/104 and PC/104-Plus expansion connectors are provided. The PC/104 connector supports both 8-bit and 16-bit expansion cards, and operates with standard PC/104 bus protocol and timing. The PC/104-Plus connector supports expansion cards with standard PC/104-Plus (PCI) bus protocol and timing. The default configuration is non-stackthrough connectors, allowing the SBC2590 to be the bottom card in a stack. Stackthrough options are available for both expansion connectors, allowing the SBC2590 to be plugged into a custom-designed OEM I/O board as an automation component.
The SBC2590 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 SBC2590. 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 SBC2590 supports a number of alternatives. Due to its extensive PC compatibility, most 32-bit Real Time Operating Systems (RTOS) such as PharLap® ETS, QNX®, and VxWorks® can easily be booted on the SBC2590. All support 32-bit linear protected mode operation, and have full tool suites available, including compilers and debuggers.

In addition, Micro/sys is constantly qualifying 32-bit operating systems such as Linux, Windows® CE, and Embedded NT on the SBC2590. Linux is available preinstalled on the SBC2590. Please call for availability of other 32-bit operating systems through Micro/sys.

The unique Micro/sys firmware suite that is preinstalled in flash on the SBC2590 includes a fully PC-compatible industrial BIOS that supports many operating systems and application programs. The BIOS setup allows users to configure the SBC2590 for different operating modes, which can include setting disk parameters, console redirection, and interrupts.

For pre-configured sets of options, Micro/sys can provide OEMs with a single part number for ordering. In addition, custom versions of the SBC2590 are available. Please call Micro/sys Technical Sales for details concerning these.

Specifications:

Mechanical:
- ❑ EBX standard format, except underside components .23" high, max
- ❑ 8" x 5.75" x 1.25"
- ❑ Four mounting holes in corners
- ❑ Each PC/104 module adds 1.2" max to height

Power Requirements:
- ❑ SBC2590: +5v ±5% at 3.9A max
- ❑ SBC2590-166: +5v ±5% at 3.0A max
- ❑ SBC2590-266: +5v ±5% at 3.7A max
- ❑ +12v ±5% at 55mA max

Environmental:
- ❑ 0° - +70°C operating
- ❑ -40° - +85°C storage
- ❑ 5%-95% relative humidity, non-condensing
- ❑ CPU heatsink/fan assembly included

J7 Power Connection	
J7 Pin	**Signal**
1	VCCMAIN
2	GND
3	GND
4	+12V
5	PC13.3V
6	GND
7	VCCMAIN

Processor Core Section:
- ❑ Genuine Intel Pentium family CPU, socketed
- ❑ On-board DC-DC system provides voltage support for multiple CPU versions
- ❑ CPU clock rates from 100MHz to 266MHz

Memory Mapping:
- ❑ 8MB, 32MB, 64MB or 128MB of 64-bit wide DIMM-socketed SDRAM based at 0000_0000
- ❑ 1MB system flash with BIOS, and utilities based at FFF0_0000
- ❑ JEDEC 32-pin socket mapped 32K window at 000D_0000
- ❑ JEDEC socket supports up to 512K BRAM, (16 pages of 32K), or up to 144MB flash disk

J10 COM1 and COM2 Serial Port Connector/Cable		
J10 Pin	**Signal**	**DB9 Pin**
1	COM1 RX	2
2	COM1 RTS	7
3	COM1 TX	3
4	COM1 CTS	8
5	-	4
6	-	9
7	GND	5
J10 Pin	**Signal**	**DB9 Pin**
8	COM2 RX	2
9	COM2 RTS	7
10	COM2 TX	3
11	COM2 CTS	8
12	-	4
13	-	9
14	GND	5

Serial Ports:
- ❑ AT-compatible COM1, COM2, COM3, COM4
- ❑ 16C550 UARTS with 16-byte FIFOS
- ❑ CTS and RTS modem controls supported
- ❑ Rates to 115,200 baud
- ❑ COM1 RS232/RS422/RS485
- ❑ COM2 RS232
- ❑ COM3 RS232/RS422/RS485
- ❑ COM4 RS232/RS485

Parallel Printer Port:
- ❑ Bidirectional LPT standard

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

J19 Keyboard, Speaker, Mouse	
J19 Pin	Signal
1	GND
2	GND
3	MCLK
4	MDATA
5	V5_0
6	V5_0
7	KDATA
8	KCLK
9	SPKR
10	--

J8 COM1, COM3 and COM4 RS485 Serial Port Connector	
J8 Pin	Signal
1	GND
2	COM3 TX+
3	COM3 TX-
4	COM3 RX+
5	COM3 RX-
6	COM4+
7	COM4-
8	
9	COM3 TXEN
10	COM4 TXEN
11	GND
12	COM1 TX+
13	COM1 TX-
14	COM1 RX+
15	COM1 RX-
16	COM1 TXEN

USB:
- ❑ Dual stacked USB connectors

Floppy Disk Interface:
- ❑ Two drives on single cable
- ❑ Standard connector pinout
- ❑ 720K, 1.44MB disks

J23 Cooling Fan Connector	
J23 Pin	Signal
1	5V
2	GND
3	-12V

IDE:
- ❑ Two drives on single cable
- ❑ Standard 40-pin connector pinout
- ❑ Hard drive, CD ROM support
- ❑ Flexible BIOS drive setup

SVGA Video Output:
- ❑ Advanced C & T 69000 controller
- ❑ Hardware graphics acceleration
- ❑ 2MB video RAM
- ❑ High Speed bus connection
- ❑ CRT and flat panel drive
- ❑ Extensive video BIOS support on-board
- ❑ Drivers available for Windows 95/98/NT

SVGA Flat Panel Support:
- ❑ Monochrome LCD
- ❑ Single drive LCD
- ❑ Dual drive passive STN color LCD
- ❑ Active matrix TFT/MIM color LCD
- ❑ EL and plasma panels
- ❑ 640 x 480, 24-bit color

- 600 x 600, 24-bit color
- 1,024 x 768, 16-bit color
- 1,280 x 1,024, 8-bit color
- 36-bit direct interface to mono, STN, and TFT
- Supports panels with 16:9 aspect ratio
- Panel power sequencing
- Centering and stretching of image
- On-board monchrome Vee generator

Real Time Clock:
- AT-compatible RTC with on-board battery
- Driver software in BIOS

Watchdog Timer:
- Program must refresh watchdog timer every 1.6 seconds, or board reset will be issued

J3 Pin	Signal
	J3 **Touch Screen**
J3 Pin	Signal
1	TOUT0
2	TOUT1
3	TOUT2
4	TOUT3
5	TOUT4
6	TOUT5
7	TOUT6
8	TOUT7
9	TIN0
10	TIN1
11	TIN2
12	TIN3
13	TIN4
14	TIN5
15	TIN6
16	TIN7
17	
18	
19	GND
20	GND

	J13 Digital and Analog I/O		
Pin	Signal	Pin	Signal
1	PA0	26	AGND
2	PA1	27	AOUT0
3	PA2	28	AGND
4	PA3	29	AOUT1
5	PA4	30	AGND
6	PA5	31	AOUT2
7	PA6	32	AGND
8	PA7	33	AOUT3
9	PB0	34	AGND
10	PB1	35	AIN7
11	PB2	36	AGND
12	PB3	37	AIN6
13	PB4	38	AGND
14	PB5	39	AIN5
15	PB6	40	AGND
16	PB7	41	AIN4
17	PC0	42	AGND
18	PC1	43	AIN3
19	PC2	44	AGND
20	PC3	45	AIN2
21	PC4	46	AGND
22	PC5	47	AIN1
23	PC6	48	AGND
24	PC7	49	AIN0
25	GND	50	AGND

Touchscreen/keypad Interface:
- Row-column matrix format
- 8 rows of 8 columns
- Resistive matrix touchscreens, row-column keypads, or arrays of row-column switches
- Can alternatively be used as 8 digital inputs and 8 digital outputs

Digital I/O:
- Provides 24 lines of TTL-level digital I/O, 2.5mA source/sink

A/D Converter Option:
- ❑ Eight 12-bit channels
- ❑ ±1-bit linearity
- ❑ 6usec conversion time
- ❑ 0 to +5V, 0 to +10V, ±5V, ±10V input ranges
- ❑ Software-programmable input range

D/A Converter Option:
- ❑ Four 12-bit channels
- ❑ ±1 LSB linearity
- ❑ 3usec settling time
- ❑ 0 to +5V output range

PC/104 Expansion:
- ❑ Non-stackthrough PC/104 connectors
- ❑ Standard mounting holes
- ❑ 8 and 16-bit cards supported
- ❑ Full IRQ and DRQ support
- ❑ Stackthrough option available

PC/104-Plus Expansion:
- ❑ Non-stackthrough PC/104-Plus connectors
- ❑ Full 32-bit PCI-type transfers supported
- ❑ Stackthrough option available

DK2590 Development Kit:
- ❑ Free with first SBC2590 purchase
- ❑ Breakout cables to CRT, COM1, COM2, KBD, mouse
- ❑ Download cable and utilities
- ❑ CPU heatsink/fan assembly installed
- ❑ Documentation, schematics, sample software
- ❑ Supports COM port, non-disk based development with attached PC host
- ❑ Cables for disk, LCD panel, additional COM ports can be ordered separately

J1 TFT Extended Color	
J1 Pin	Signal
1	PD24
2	PD25
3	PD26
4	PD27
5	PD28
6	PD29
7	GND
8	PD30
9	PD31
10	PD32
11	PD33
12	PD34
13	PD35
14	GND

J12 TFT Panel			
Pin	Signal	Pin	Signal
1	GND	21	PD1
2	SHFCLK	22	PD2
3	LP	23	PD3
4	FLM	24	PD4
5	GND	25	PD5
6	PD16	26	GND
7	PD17	27	M/DE
8	PD18	28	SWVDD
9	PD19	29	SWVDD
10	PD20	30	PD6
11	PD21	31	PD7
12	GND	32	PD14
13	PD8	33	PD15
14	PD9	34	PD22
15	PD10	35	PD23
16	PD11	36	SW12
17	PD12	37	
18	PD13	38	CONTNEG
19	GND	39	
20	PD0	40	SWVNEG

Operating System Support:
- ❑ Compatible with DOS, Windows 95/98/NT/ CE, Embedded Windows NT, LINUX, Pharlap ETS, QNX, VxWorks®, and others
- ❑ Micro/sys continually validating advanced operating systems on SBC2590
- ❑ Pre-installed operating system packages available. Call for latest list

- ❑ 14-pin header for VGA CRT monitor
- ❑ 40-pin header for IDE peripherals
- ❑ 2-pin header for IDE activity LED
- ❑ 34-pin header for floppy disk drives
- ❑ 50-pin header for digital and analog I/O
- ❑ RJ45 for Ethernet connection
- ❑ 2-pin latching header for hardware reset switch
- ❑ 4-pin header for optional external battery
- ❑ 7-pin, right angle male connector for power input, EBX standard
- ❑ 3 PCB pads for optional CPU fan power

J9 COM3 and COM4 Serial Port Connector/Cable		
J9 Pin	Signal	DB9 Pin
1	COM3 RX	2
2	COM3 RTS	7
3	COM3 TX	3
4	COM3 CTS	8
5	-	4
6	-	9
7	GND	5
J9 Pin	Signal	DB9 Pin
8	COM4 RX	2
9	COM4 RTS	7
10	COM4 TX	3
11	COM4 CTS	8
12	-	4
13	-	9
14	GND	5

J2 CRT	
J2 Pin	Signal
1	
2	DDCDAT
3	
4	GND
5	CRT -Vsync
6	GND
7	CRT -Hsync
8	DDCCLK
9	B
10	GND
11	G
12	GND
13	R
14	GND

External Connections:
- ❑ 14-pin header for COM1 and COM2 RS232
- ❑ 14-pin header for COM3 and COM4 RS232
- ❑ 16-pin header for COM1/COM3/COM4 RS422 and RS485
- ❑ 10-pin header for KBD, mouse, and speaker
- ❑ 26-pin header for LPT port
- ❑ Dual stacked standard 4-pin USB connectors
- ❑ 20-pin header for tochscreen/keypad
- ❑ 40-pin header TFT color panel displays, to 24-bit color
- ❑ 14-pin header for TFT color panel extension to 36-bit color

Ordering Information:

Single Board Computer:

SBC2590	Pentium CPU, 100 MHz, 8MB SDRAM, 1MB flash
SBC2590-166	Lower Power Pentium MMX CPU, 166 MHz, 8MB SDRAM, 1MB flash
SBC2590-266	Pentium MMX CPU, 266MHz 8MB SDRAM, 1MB flash
DK2590	No charge development kit, available with first order only
SDK-Linux	Linux kit (must also purchase 2590OPT50)
2590OPT2	32MB SDRAM total5
2590OPT3	64MB SDRAM total
2590OPT4	128MB RAM Upgrade
2590OPT11	A/D Converter, 8-Channel
2590OPT12	D/A Converter, 4-Channel
2590OPT20	100/10MHz Ethernet
2590OPT30-8	8MB Flash Disk C:
2590OPT30-24	24MB Flash Disk C:
2590OPT30-48	48MB Flash Disk C:
2590OPT30-64	64MB Flash Disk C:
2590OPT45	Monochrome LCD VEE Generator
2590OPT50	Linux startup kernel installed in flash
SBCOPT16ST	PC/104 Connector Stackthrough Option
SBCOPT120ST	PC/104-Plus Connector Stackthrough Option

Accessories:

CA4021	Breakout cable to DB25 for LPT port
CA4025	Single IDE cable
CA4030	Breakout cable to DB15 for VGA CRT monitor
CA4031-3	Dual 3" floppy cable
CA4039	RS485 breakout cable to DB25
CA4047	Power pigtail cable
CA4048	Breakout cable to two (2) 5-pin miniDIN connectors for KBD and mouse, with speaker
CA4084	TFT (31-pin) cable
CA4089	Breakout cable to two (2) DB9 COM port connectors
FPKIT-M20	640 x 480 monochrome LCD panel kit with backlight and cables
FPKIT-C20	6.4" 640 x 480 TFT color LCD panel kit with backlight and cables

Cables nominally 15", other lengths available

CommBLOK, PidBLOK, trademark Drumlin
IBM, PC trademark IBM Corp.
MSDOS, Microsoft trademark Microsoft Corp.
Turbo Debugger trademark Borland International
VxWorks trademark Wind River