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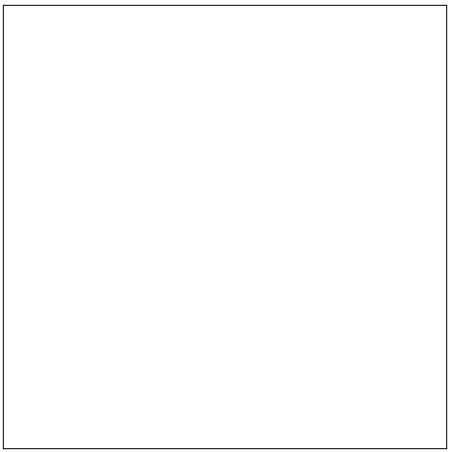
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Advanced 486DX Computer with100MHz Ethernet, Analog, and Digital I/O SBC0486



Features

- ✓ Ready to run 486DX computer
- ✓ Small 5" X 5" format
- ✓ Up to 64MB RAM and 72MB flash
- ✓ COM1, COM2, LPT, KBD, mouse
- ✓ Accelerated VGA and touchscreen
- ✓ 8-channel A/D, 4-channel D/A, 6 timers
- ✓ 100BASE-T/10BASE-T Ethernet
- ✓ PC/104 and PC/104-Plus expansion
- ✓ DOS, LINUX, CE, NT, RTOS

The SBC0486 is an advanced, highly integrated 486DX embedded PC in a 5" x 5" format. It offers an exceptionally large memory capacity of up to 64MB of RAM and 72MB of flash EPROM. In addition to the core processor and memory section, an ample mix of serial, parallel, keyboard, VGA, touchscreen, Ethernet, digital I/O, and analog I/O provides single board solutions to many design challenges.

In its "stackthrough" version, the SBC0486 is an ideal computer to plug into a custom OEM I/O card. Immediately, and easily, an advanced engine is available for software development. The powerful computer offers a wide range of operating system choices. It runs Windows CE. LINUX, DOS, and well known real time operating system (RTOS) packages directly. In its "non-stackthrough" version, the SBC0486 is ideal for applications where its mix of local I/O and networking capabilities provide a truly single board solution. If additional functions are needed, they can be easily added through plug-on PC/104 expansion cards.

The on-board Super VGA drives both CRT monitors and color flat panel displays. Direct connection to active matrix TFT displays allows quick

Software Support

DOS emulation, RUN.EXE™, MSDOS 5.0, LINUX, Windows 95/NT CE, 32-bit RTOS, TurboDebugger™ Comm library, CommBLOK™ PID loop library, PidBLOK™, C, compilers
[Items above in Section 6

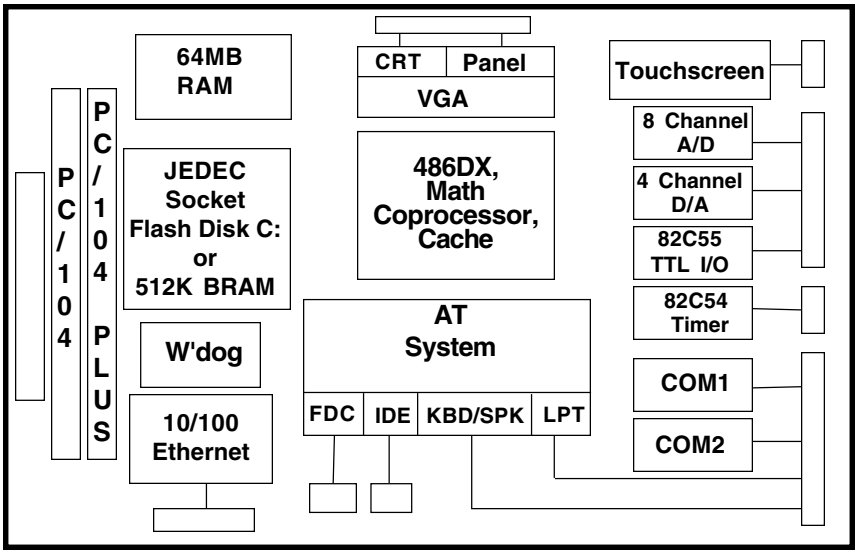
Compatible Hardware

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

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display integration.

The matrix touchscreen interface can be used for resistive matrix touchscreens, or for row-column keypad arrays. A specially configured version, Netsock/410, includes the Ethernet option and the innovative Embedded Netsock™ TCP/IP software stack. This provides instant access to embedded 16-bit networking using the standard Winsock programming interface.

The SBC0486 is completely functional as shipped. Upon the application of 5V, it is ready for download of an application program.

Technical Details:

The SBC0486 core is implemented with the advanced ST Microelectronics STPC system on a chip. The STPC 486DX processor core is clocked at rates from 66MHz to 133MHz, and includes hardware floating point math. While other 486DX systems access RAM with a 32-bit data bus, the STPC accesses RAM on a 64-bit wide data bus, offering performance similar to low end Pentium-based designs. The STPC also integrates the full mix of PC system devices, COM ports, keyboard and mouse ports, PCI and ISA bus controllers, and a hardware accelerated VGA controller. This level of silicon integration reduces power and size requirements, allowing OEM systems to be smaller and more reliable.

The memory subsystem on the SBC0486 includes a DIMM socket that supports 8MB, 16MB, 32MB, or 64MB of 64-bit wide 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 flash.

A 32-pin JEDEC socket on the SBC0486 can be used to implement non-volatile storage in two ways. For large capacity solid state read/write disk requirements, a Disk-On-Chip® flash device can provide a solid state disk from 8MB to 72MB 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 32KB 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 VGA controller supports resolutions to 1,024 x 1,024. It includes hardware acceleration for fast graphic updates. The output can drive a standard RGB CRT monitor, and an LCD flat panel display. Active matrix (TFT) LCD panels are supported, in up to 18-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 and COM2 serial ports are provided, with RS232 levels and RTS and CTS control signals. RS485 operation is also supported on both serial ports. COM1 is 4-wire full duplex RS422/RS485, while COM2 is 2-wire RS485. COM2 can be used to perform Flash Setup™ board configuration, and to download operating systems and application programs onto the SBC0486.

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. There are three 16-bit timers in the STPC device, some of which may be available to the application if not used by BIOS or operating system. An 82C54 device provides three additional 16-bit timer/counters in addition to the three timers in the STPC. Also included on the SBC0486 are a real-time clock and a watch-dog 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 SBC0486 to be the bottom card in a stack. Stackthrough options are available for both expansion connectors, allowing the SBC0486 to be plugged into a custom-designed OEM I/O board as an automation component.

The SBC0486 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, RUN.EXE, preinstalled on the SBC0486. 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 SBC0486 supports a number of alternatives. Due to its extensive PC compatibility, most 32-bit Real Time Operating Systems (RTOS) such as PharLap® ETS, QNX017®, and VxWorks® can easily be booted on the SBC0486. 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 SBC0486. Linux is available preinstalled on the SBC0486. 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 SBC0486 includes an industrial BIOS, the BIOS Boss™ utility, and the Flash Setup utility. BIOS Boss offers easy, menu-driven download of operating systems and application programs into on-board flash memory. Flash Setup allows users to configure the SBC0486, much like CMOS setup on a PC. Operating modes, disk parameters, and network parameters can all be selected, and stored in non-volatile flash memory. Because setup parameters are in flash, not CMOS RAM, there are no issues of battery discharge requiring CMOS reinitialization.

For pre-configured sets of options, Micro/sys can provide OEMs with a single part number for ordering. In addition, custom versions of the SBC0486 are available. Please call Micro/sys Technical Sales for details concerning these programs.

Table 1. SBC0486 Power Requirements

Item	+5V Current
66MHz SBC, 8MB DRAM, no options	2.2A
80MHz SBC, 8MB DRAM, no options	TBD
133MHz SBC, 8MB DRAM, no options	TBD
16MB DRAM option	add 300mA
32MB DRAM option	add 500mA
64MB DRAM option	add 600mA
Ethernet Option	add 195mA
Analog Input Option	add 20mA
Analog Output Option	add 10mA

Specifications:

Mechanical:
- ❑ 5" x 5" x .7"
- ❑ Underside components .23" high, max

Power Requirements:
- ❑ +5V ± 5% (See Table 1)

Environmental:
- ❑ 0° - +70°C operating
- ❑ -40° - +85°C storage
- ❑ 5%-95% relative humidity, non-condensing

Processor Core Section:
- ❑ 486DX CPU
- ❑ 66, 80, or 133MHz CPU core clock rate
- ❑ Hardware floating point math
- ❑ AT-compatible interrupt, DMA, timers

Memory Mapping:
- ❑ 8MB, 16MB, 32MB, or 32MB, or 64MB of 64-bit wide EDO DRAM based at 0000_0000
- ❑ 1MB system flash with BIOS, RUN.EXE O/S , and utilities based at FFF0_0000
- ❑ JEDEC 32-pin socket mapped into 32K window at 000C_8000
- ❑ JEDEC socket supports up to 512K BRAM (16 pages of 32K), or up to 72MB flash disk

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

Parallel Port:
- ❑ Bidirectional LPT standard

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

SVGA Video Output:
- ❑ CRT and color LCD outputs
- ❑ Resolutions to 1,024 x 1,024
- ❑ Direct connect to TFT flat panels
- ❑ 18-bit panel color support

J 15 VGA/TFT Connector			
J8 Pin	Signal	Signal	J8 Pin
1	GND	DCLK	2
3	FPLINE	FPFRAME	4
5	GND	RED 0	6
7	RED 1	RED 2	8
9	RED 3	RED 4	10
11	RED 5	GND	12
13	GREEN 0	GREEN 1	14
15	GREEN 2	GREEN 3	16
17	GREEN 4	GREEN 5	18
19	GND	BLUE 0	20
21	BLUE 1	BLUE 2	22
23	BLUE 3	BLUE 4	24
25	BLUE 5	GND	26
27	DISPLAY ENB	TFT VCC	28
29	TFT VCC	TFT CLK	30
31	TFT DAT	HOR SYNC	32
33	GND	VER SYNC	34
35	GND	BLUE	36
37	GND	GREEN	38
39	GND	RED	40

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

J4 Touch Screen Connector	
Pin	Signal
1	Row 0
2	Row 1
3	Row 2
4	Row 3
5	Row 4
6	Row 5
7	Row 6
8	Row 7
9	Column 0
10	Column 1
11	Column 2
12	Column 3
13	Column 4
14	Column 5
15	Column 6
16	Column 7

Real Time Clock:
- ❑ 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

Digital I/O and Extra Timers:
- ❑ 82C55 provides 24 lines of TTL-level digital, I/O, 2.5mA source/sink
- ❑ 82C54 provides 3 extra 16-bit timer/ counters, I/O pins accessible

A/D Converter Option:
- ❑ Eight 12-bit channels
- ❑ ±1/2 LSB linearity
- ❑ 6usec conversion time
- ❑ 0 to +5, 0 to +10, ±5, ±10V input ranges
- ❑ Software-programmable input range

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D/A Converter Option:

- ❑ Four 12-bit channels
- ❑ ±1/2 LSB linearity
- ❑ 3usec settling time
- ❑ 0 to +5V output range

J16 Analog and Digital I/O Connector			
Pin	Signal	Signal	J2 Pin
1	DIO A0	DIO A1	2
3	DIO A2	DIO A3	4
5	DIO A4	DIO A5	6
7	DIO A6	DIO A7	8
9	DIO B0	DIO B1	10
11	DIO B2	DIO B3	12
13	DIO B4	DIO B5	14
15	DIO B6	DIO B7	16
17	DIO C0	DIO C1	18
19	DIO C2	DIO C3	20
21	DIO C4	DIO C5	22
23	DIO C6	DIO C7	24
25	GND	GND	26
27	Analog Out 0	GND	28
29	Analog Out 1	GND	30
31	Analog Out 2	GND	32
33	Analog Out 3	GND	34
35	Analog In 7	GND	36
37	Analog In 6	GND	38
39	Analog In 5	GND	40
41	Analog In 4	GND	42
43	Analog In 3	GND	44
45	Analog In 2	GND	46
47	Analog In 1	GND	48
49	Analog In 0	GND	50

Ethernet Option:
TCP/IP Network Version Ordered as Netsock/410 (refer to separate data sheet)

- ❑ 100BASE-TX and 10BASE-T support
- ❑ RJ45 connector on-board
- ❑ Flash Setup configuration utility includes IRQ, IP address, and DHCP options
- ❑ TCP/IP driver stack preloaded into flash
- ❑ Implements subset of Winsock functions
- ❑ SOCK_DGRAM (UDP datagram) and SOCK_RAW (low level) sockets supported
- ❑ IP, UDP, ARP, DHCP, ICMP protocols supported
- ❑ Dynamically linked with 16-bit application program
- ❑ For 32-bit networking, use operating system; drivers available

J 2 Main I/O Connector			
J2 Pin	Signal	Signal	J2 Pin
1	RX COM1	RTS COM2	2
3	TX COM1	CTS COM2	4
5	N/C	N/C	6
7	GND	RX COM2	8
9	RTS COM2	TX COM2	10
11	CTS COM2	N/C	12
13	N/C	GND	14
15	GND	TX+COM1 RS485	16
17	TX-COM1 RS485	RX+COM1 RS485	18
19	RX-COM1 RS485	+TXRX COM2 RS485	20
21	-TXRX COM2 RS485	+5V	22
23	/Strobe	/AUTOFEED	24
25	Data 0	/ERROR	26
27	Data 1	/INIT	28
29	Data 2	/SELECT IN	30
31	Data 3	GND	32
33	Data 4	Data 5	34
35	Data 6	Data 7	36
37	/ACK	GND	38
39	BUSY	PAPER END	40
41	SELECT	GND	42
43	GND	Mouse CLK	44
45	Mouse DATA	+5V	46
47	+5V	Keyboard DATA	48
49	Keyboard CLK	Speaker	50

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PC/104 Expansion:

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

PC/104-Plus Expansion:

- ❑ Non-stackthrough PC/104-Plus connectors
- ❑ Full 32-bit PCI-type trnasfers supported
- ❑ Stack through option available

DK0486 Development Kit:

- ❑ Free with first SBC0486 purchase
- ❑ Breakout cable to CRT, COM, LPT, KBD, mouse
- ❑ Download cable and utilities
- ❑ Documentation, schematics, sample software

J3 Timer/Counter I/O	
PIN	Signal
1	Clock 0 (7MHz)
2	Gate 0
3	Output 0
4	Clock 1
5	Gate 1
6	Output 1
7	Clock 2
8	Gate 2
9	Output 2
10	GND

External Connections:

- ❑ 50-pin header for COM1, COM2, LPT, KBD, mouse, speaker
- ❑ 40-pin header for VGA (CRT and LCD) speaker
- ❑ 50-pin header for digital and analog I/O
- ❑ 34-pin header for floppy drive
- ❑ 40-pin header for IDE drive
- ❑ 16-pin header for touchscreen/keypad
- ❑ 10-pin header for timer I/O
- ❑ RJ45 for Ethernet connection
- ❑ Power, 7-pin removable terminal strip

Ordering Information:

Single Board Computer:

SBC0486	486DX CPU, 66 MHz, 8MB RAM, 1MB flash
SBC0486-80	486DX CPU, 80 MHz, 8MB RAM, 1MB flash
SBC0486-133	486DX CPU, 133 MHz, 8MB RAM, 1MB flash
DK0486	No charge development kit, available with first order only
Netsock/410	SBC0486 with built-in 16-bit TCP/IP networking
Netsock/410-80	SBC0486-80 with built-in 16-bit TCP/IP networking
Netsock/410-133	SBC0486-133 with built-in 16-bit TCP/IP networking

(refer to separate data sheet)

0486OPT1	16MB RAM Upgrade
0486OPT2	32MB RAM Upgrade
0486OPT3	64MB RAM Upgrade
0486OPT11	A/D Converter, 8-Channel
0486OPT12	D/A Converter, 4-Channel
0486OPT20	100/10MHz Ethernet
0486OPT25	MSDOS 5.0 in Bootable Flash ROMdisk A:
0486OPT30-8	8MB Flash Disk C:
0486OPT30-24	24MB Flash Disk C:
0486OPT30-40	40MB Flash Disk C:
0486OPT30-72	72MB Flash Disk C:

SBCOPT16ST	PC/104 Connector Stackthrough Version
SBCOPT120ST	PC/104-Plus Connector Stackthrough Version

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Accessories:

CA4084	Cable to 31-pin Hirose TFT VGA Panel connector
CA4085	Cable to DB15 for VGA CRT
CA4086	Breakout cable for COM1, COM2, LPT, KBD, and Mouse, with speaker
FPKIT-C20	6.4" 640 x 480 color LCD panel kit with backlight and cables

Cables nominally 15", other lengths available

RUN.EXE trademark Micro/sys, Inc.
CommBLOK, PidBLOK, Drumlin
IBM, PC trademark IBM Corp.
MSDOS, Microsoft trademark Microsoft Corp.
Turbo Debugger trademark Inprise Corp.

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