XE–800 Single Board Computer Reference Manual

Document #6515, rev. F06

CONTACT INFORMATION
Front Desk: 303–430–1500
Technical Support: 303–426–4521
FastHelp@octagonsystems.com
www.octagonsystems.com

Copyright

Disclaimer

Technical Support

Carefully recheck your system before calling Technical Support. Run as many tests as possible; the more information you can provide, the easier it will be for Technical Support staff to help you solve the problem. For additional technical assistance, try the following:

Technical Support telephone: 303–426–4521
E-mail Technical Support: fasthelp@octagonsystems.com
Applications Notes (via web): www.octagonsystems.com

Revision History

Revision	Reason for Change	Date
A	Production Release	05 / 04
B	Added “Excessive Thermal Stress” section Clarified “Y” adapter for keyboard/mouse	08 / 04
C05	Update document number	01 / 05
D05	Clarify RTS signal for RS–485, corrected mating connectors	06 / 05
E05	Clarified IDE support and power supply requirements	11 / 05
F06	Removed reference to CD	08 / 06

IMPORTANT!

Please read the following section before installing your product:

Octagon's products are designed to be high in performance while consuming very little power. In order to maintain this advantage, CMOS circuitry is used.

CMOS chips have specific needs and some special requirements that the user must be aware of. Read the following to help avoid damage to your card from the use of CMOS chips.

Using CMOS circuitry in industrial control

Industrial computers originally used LSTTL circuits. Because many PC components are used in laptop computers, IC manufacturers are exclusively using CMOS technology. Both TTL and CMOS have failure mechanisms, but they are different. Described below are some of the failures that are common to all manufacturers of CMOS equipment.

The most common failures on CPU control cards are over voltage of the power supply, static discharge, and damage to the serial and parallel ports. On expansion cards, the most common failures are static discharge, over voltage of inputs, over current of outputs, and misuse of the CMOS circuitry with regards to power supply sequencing. In the case of the video cards, the most common failure is to miswire the card to the flat panel display. Miswiring can damage both the card and an expensive display.

- **Multiple component failures:** The chance of a random component failure is very rare since the average MTBF of an Octagon card is greater than 11 years. In a 7 year study, Octagon has never found a single case where multiple IC failures were not caused by misuse or accident. It is very probable that multiple component failures indicate that they were user-induced.

- **Testing "dead" cards:** For a card that is "completely nonfunctional", there is a simple test to determine accidental over voltage, reverse voltage or other "forced" current situations. Unplug the card from the bus and remove all cables. Using an ordinary digital ohmmeter on the 2,000 ohm scale, measure the resistance between power and ground. Record this number. Reverse the ohmmeter leads and measure the resistance again. If the ratio of the resistances is 2:1 or greater, fault conditions most likely have occurred. A common cause is miswiring the power supply.

- **Improper power causes catastrophic failure:** If a card has had reverse polarity or high voltage applied, replacing a failed component is not an adequate fix. Other components probably have been partially damaged or a failure mechanism has been induced. Therefore, a failure will probably occur in the future. For such cards, Octagon highly recommends that these cards be replaced.

- **Other over-voltage symptoms:** In over-voltage situations, the programmable logic devices, EPROMs and CPU chips, usually fail in this order.

The failed device may be hot to the touch. It is usually the case that only one IC will be overheated at a time.

- **Power sequencing:** The major failure of I/O chips is caused by the external application of input voltage while the power is off. If you apply 5V to the input of a TTL chip with the power off, nothing will happen. Applying a 5V input to a CMOS card will cause the current to flow through the input and out the 5V power pin. This current attempts to power up the card. Most inputs are rated at 25 mA maximum. When this is exceeded, the chip may be damaged.

- **Failure on power-up:** Even when there is not enough current to destroy an input described above, the chip may be destroyed when the power to the card is applied. This is due to the fact that the input current biases the IC so that it acts as a forward biased diode on power-up. This type of failure is typical on serial interface chips but can apply to any IC on the card.

- **Under-rated power supply:** The board may fail to boot due to an under-rated power supply. It is important that a quality power supply be used with the XE–800 SBC that has sufficient current capacity, line and load regulation, hold up time, current limiting, and minimum ripple. The power supply for the XE–800 must meet the startup risetime requirements specified in the ATX Power Design Guide, version 1.1, section 3.3.5. This assures that all the circuitry on the CPU control card sequences properly and avoids system lockup.

- **Excessive signal lead lengths:** Another source of failure that was identified years ago at Octagon was excessive lead lengths on digital inputs. Long leads act as an antenna to pick up noise. They can also act as unterminated transmission lines. When 5V is switched onto a line, it creates a transient waveform. Octagon has seen sub-microsecond pulses of 8V or more. The solution is to place a capacitor, for example 0.1 µF, across the switch contact. This will also eliminate radio frequency and other high frequency pickup.

Avoiding damage to the heatsink or CPU

WARNING!

When handling any Octagon Single Board Computer, extreme care must be taken not to strike the heatsink (if installed) against another object, such as a table edge. Also, be careful not to drop the Single Board Computer, since this may cause damage to the heatsink or CPU as well.

Note Any physical damage to the single board computer card is not covered under warranty.

Excessive Thermal Stress

This card is guaranteed to operate over the published temperature ranges and relevant conditions. However, sustained operation near the maximum temperature specification is not recommended by Octagon or the CPU chip manufacturer due to well known, thermal related, failure mechanisms. These failure mechanisms, common to all silicon devices, can reduce the MTBF of the cards. Extended operation at the lower limits of the temperature ranges has no limitations.

Table of Contents

List of Figures

List of Tables

Overview: Section 1 – Installation

Section 1 provides installation and programming instructions, startup options, and system configuration program examples. The following chapters are included:

Chapter 1: Overview

Chapter 2: Quick start

Chapter 3: Setup programs

Chapter 4: Save and run programs

Chapter 1: Overview

Description

The XE–800 is a Single Board Computer (SBC) in the EPIC™ form factor. It is intended for higher-performance, low-power embedded control applications. The XE–800 SBC integrates serial communications, IDE hard disk port, CompactFlash socket, digital I/O, six USB ports, keyboard and mouse port, and video. The XE–800 SBC can be used in a stand-alone mode or expanded through a PC/104 or PC/104 *Plus* interface.

The XE–800 SBC comes with a BIOS loaded on a flash device for easy updates. It is fully compatible with most popular operating systems.

XE–800 SBC major hardware features

CPU

The CPU is a high-performance, low-power AMD Geode GX1 processor with a clock speed of 300 MHz. It uses the CS5530A companion chip for some of the peripherals. The XE–800 SBC has an ISA bus speed of 8.33 MHz.

SDRAM

The memory socket can accept up to 256 MB capacity SO-DIMM modules.

On-board flash

On board is a 512 KB SMT boot flash that contains the BIOS.

CompactFlash socket

The CompactFlash socket accepts a Type I or Type II 3V CompactFlash card. The CompactFlash appears as an IDE device to the system. It is implemented with an ATA-4 compliant IDE controller, and appears in Setup as the Primary IDE device.

Hard disk and IDE port

The XE–800 has two ATA-4 compliant IDE controllers. The primary channel is dedicated to the CompactFlash. The secondary channel supports two additional IDE devices through a 2 mm, 44-pin connector. This connector supplies power to the devices. Octagon Systems has a 44-pin to 40-pin Hard Drive Adapter cable (part #4080 or #6246) to connect IDE devices with a 40-pin interface.

USB ports

The CS5530A companion chip supports two USB 1.1 channels, accessed through a 10-pin header. USB 1.1 provides speeds up to 12 Mbps. The Octagon two-port USB cable (part #6288) provides a direct connection from the 10-pin connector to two USB devices. USB is available when using an operating system that supports USB. There is no support from Octagon for DOS legacy USB.

Four additional 2.0 USB channels are supported by an on-board PCI-to-USB controller. These channels are accessed through standard USB connectors. USB 2.0 provides speeds up to 480 Mbps.

All six channels are open HCI compliant.

Note that USB devices are hot-swappable when a device is plugged into a standard USB connector, as pins on the connectors determine the order in which they make contact. Devices are not hot-swappable when connected to a non-standard header. You can hot swap a device on the four 2.0 connectors; through the USB connector on the two-port USB cable; or through another USB connector wired to the 10-pin header, but you cannot hot swap at the 10-pin header itself.

LPT and floppy

The XE–800 does not provide connectors for LPT parallel port or floppy disk drive. These functions, if required, can be obtained through USB devices. For DOS operating system they can be obtained through PC/104 or PC/104 *Plus* devices.

Digital I/O

The 48 digital I/O lines will interface with logic devices, switch inputs, LEDs and industry standard opto module racks. The I/O lines are 0–5V logic compatible. They can be individually programmed as inputs or outputs.

Ethernet

The XE–800 provides one 10/100BaseT Ethernet port and supports the IEEE 802.3 Ethernet standard.

Serial ports protected against ESD

The XE–800 SBC has two serial ports. COM1 and COM2 both provide RS–232C. COM2 also supports RS–422 and RS–485 interfaces. COM1 and COM2 are routed through a 20-pin connector for RS–232C. RS–422 and RS–485 are provided through a separate 5-pin connector.

PC/104 and PC/104 *Plus* interface

The PC/104 interface accepts an 8- or 16-bit PC/104 expansion board. The PC/104 *Plus* accepts industry-standard PC/104 *Plus* boards. PC/104 expansion boards are available from several manufacturers. Up to four PC/104 or PC/104 *Plus* expansion boards may be stacked on the XE–800 SBC.

Video

The XE–800 SBC supports CRT monitors up to 1280 x 1024 x 16 bpp (bits per pixel) resolution, and flat panel displays with up to 1024 x 768 x 16 bpp resolution.

Keyboard and mouse port

The keyboard controller accepts an AT style keyboard and has a PS/2 connector. The mouse port is combined with the keyboard port and is accessed with a “Y” cable. Note that with some “Y” cables you may have to plug the mouse into the keyboard icon, and the keyboard into the mouse icon; if the mouse and keyboard do not function at power up, try switching them. A keyboard connects directly to the XE–800 while a mouse requires the “Y” cable. Most operating systems do not require a keyboard or a mouse; however, some operating systems do require both to be connected for proper booting.

Real time calendar/clock with battery backup

The real time clock is fully AT compatible. An optional off-card battery powers the real time clock when the 5 volt supply is removed.

Setup information stored in EEPROM for high reliability

Loss of Setup data is serious in industrial applications. Most PCs store Setup information in battery-backed CMOS RAM. If the battery fails or is replaced during routine maintenance, this information is lost. Without a keyboard and monitor in embedded applications, time consuming re-initialization is required. The XE–800 SBC stores the Setup information in EEPROM with 1024 words available to the user. Software routines to use this available memory come with the XE–800 SBC.

Watchdog timer added for safety

The watchdog timer resets the system if the program stops unexpectedly. The watchdog is enabled, disabled and strobed under software control; it can also be enabled or disabled in Setup. The time-out period is programmable from 2 ms to 120 seconds, with a variability of ±50%.

Hardware reset

A hardware reset ensures complete reset of the system and all attached peripherals. A hardware reset can be done by any of the following methods:

- An expired watchdog timer cycle
- Depressing the reset switch
- Cycling power
- Power supervisor reset

5 Volt only operation lowers system cost

- 5V ±5%
- ±12V supplied to PC/104 connector from the power connector; not required for XE–800 SBC operation
- +3.3V supplied to PC/104 *Plus* connector from the power connector; not required for XE–800 SBC operation

Rugged environmental operation

■ Operating temperature	–40° to 70°C @ 300 MHz, with no air flow –40° to 80°C @ 300 MHz, with forced air flow
■ Nonoperating temperature	–55° to 95°C, nonoperating
■ Relative humidity	5% to 95% noncondensing
■ Shock	40g, 3 axis
■ Vibration	5g, 3 axis

Size

115 mm x 165mm x 29.5 mm, EPIC™ form factor

XE–800 SBC major software features

Diagnostic software verifies system integrity automatically

The XE–800 SBC has built-in diagnostic software that can be used to verify on-card I/O and memory functions. On power-up, a series of tests is performed. If a problem occurs, the failed test can be identified by a flashing LED or a beep code. The test is performed automatically every time the system is reset or powered up. Memory verification does not require software, test equipment, monitor, keyboard, disks, or test fixtures. See the “Troubleshooting” chapter for a listing of tests and failures and their descriptions.

Phoenix software BIOS

The XE–800 SBC has a Phoenix Software BIOS with Octagon BIOS extensions. The BIOS extensions support the INT17 functions.

Octagon BIOS extensions

On-board BIOS extensions allow easy access to watchdog timer functions, serial EEPROM, digital I/O, etc.

Boot sequence

An XE–800 SBC can be configured to boot from CompactFlash, a hard disk, or a CD–ROM.

Chapter 2: Quick start

This chapter covers the basics of setting up an XE–800 SBC system. The following topics are discussed:

- Component diagrams, connectors, jumpers and cables
- Mounting the XE–800 SBC
- Connecting a monitor and keyboard
- Installing an operating system

Component diagrams, connectors, jumpers and cables

Figures 2–1 and 2–2 show the connectors and jumpers and their locations on the XE–800 SBC. Figure 2–3 shows the dimensions of the XE–800 SBC in inches and millimeters. The sections immediately following those figures describe the connectors and jumpers, and some cables that you might require.

WARNING!

The XE–800 SBC contains static-sensitive CMOS components. To avoid damaging your card and its components:

- **Ground yourself before handling the card**
- **Disconnect power before removing or inserting a PC/104 or PC/104 *Plus* expansion board.**

Figure 2–1 XE–800 SBC component diagram (top)

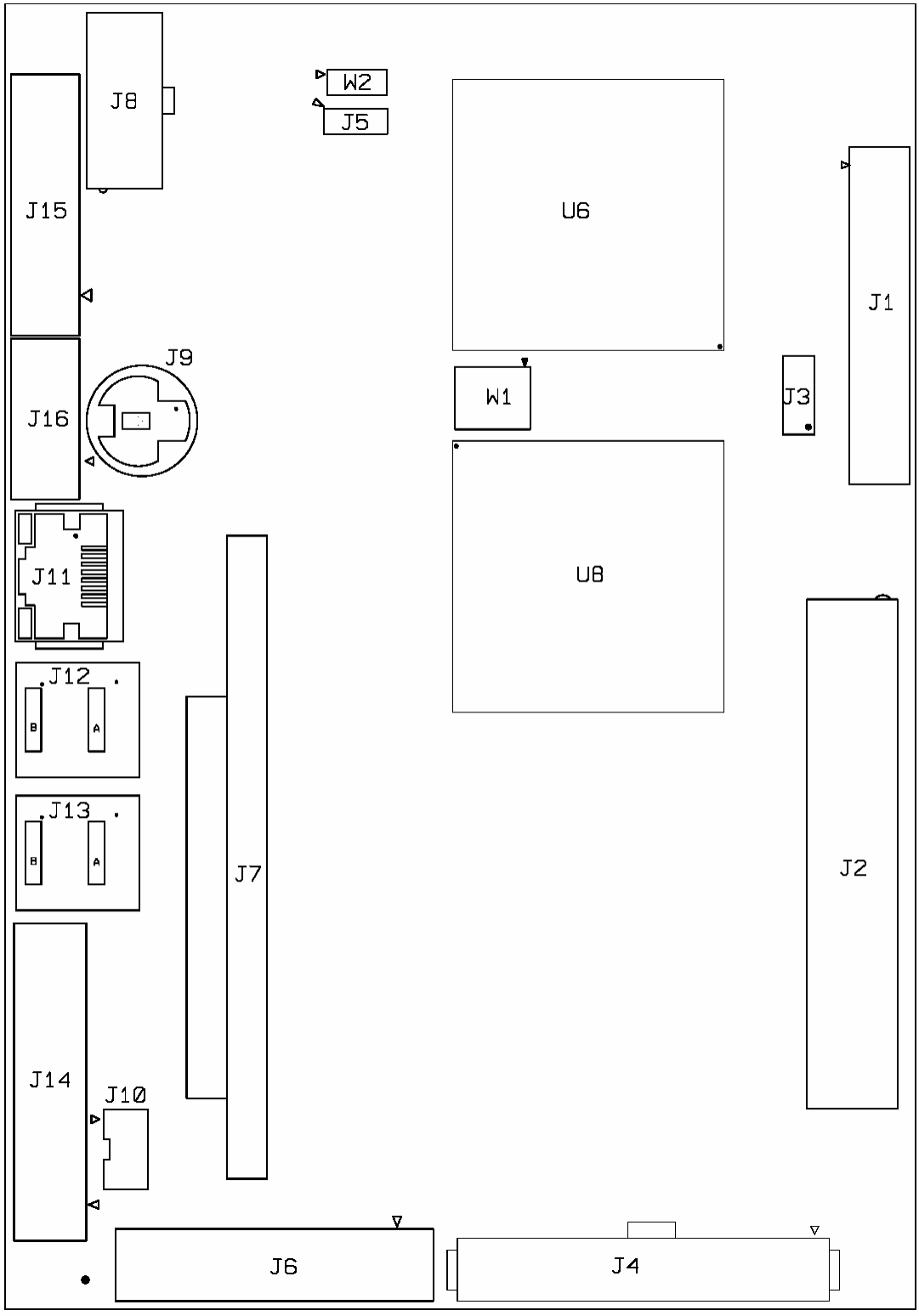


Figure 2–2 XE–800 SBC component diagram (bottom)

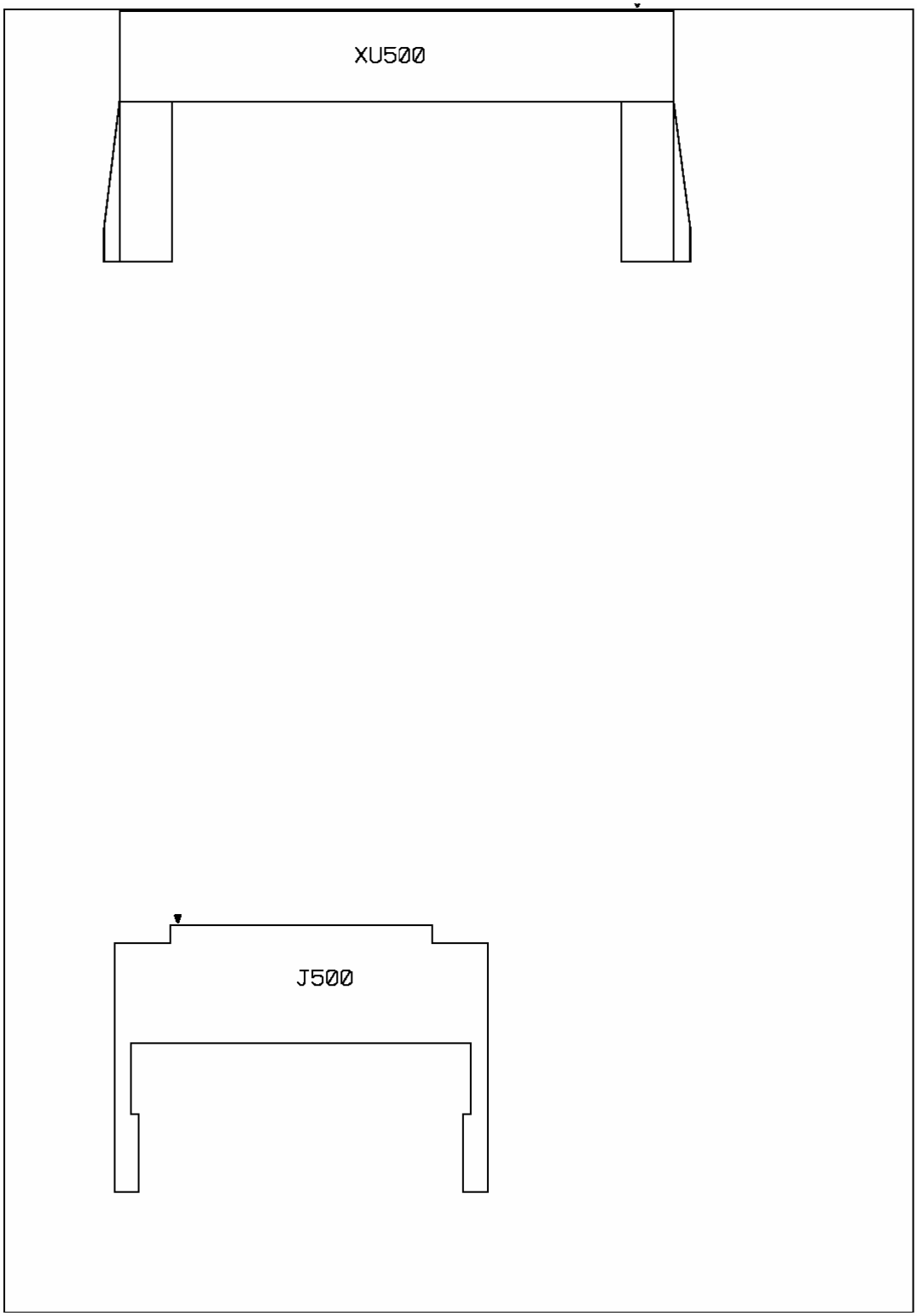
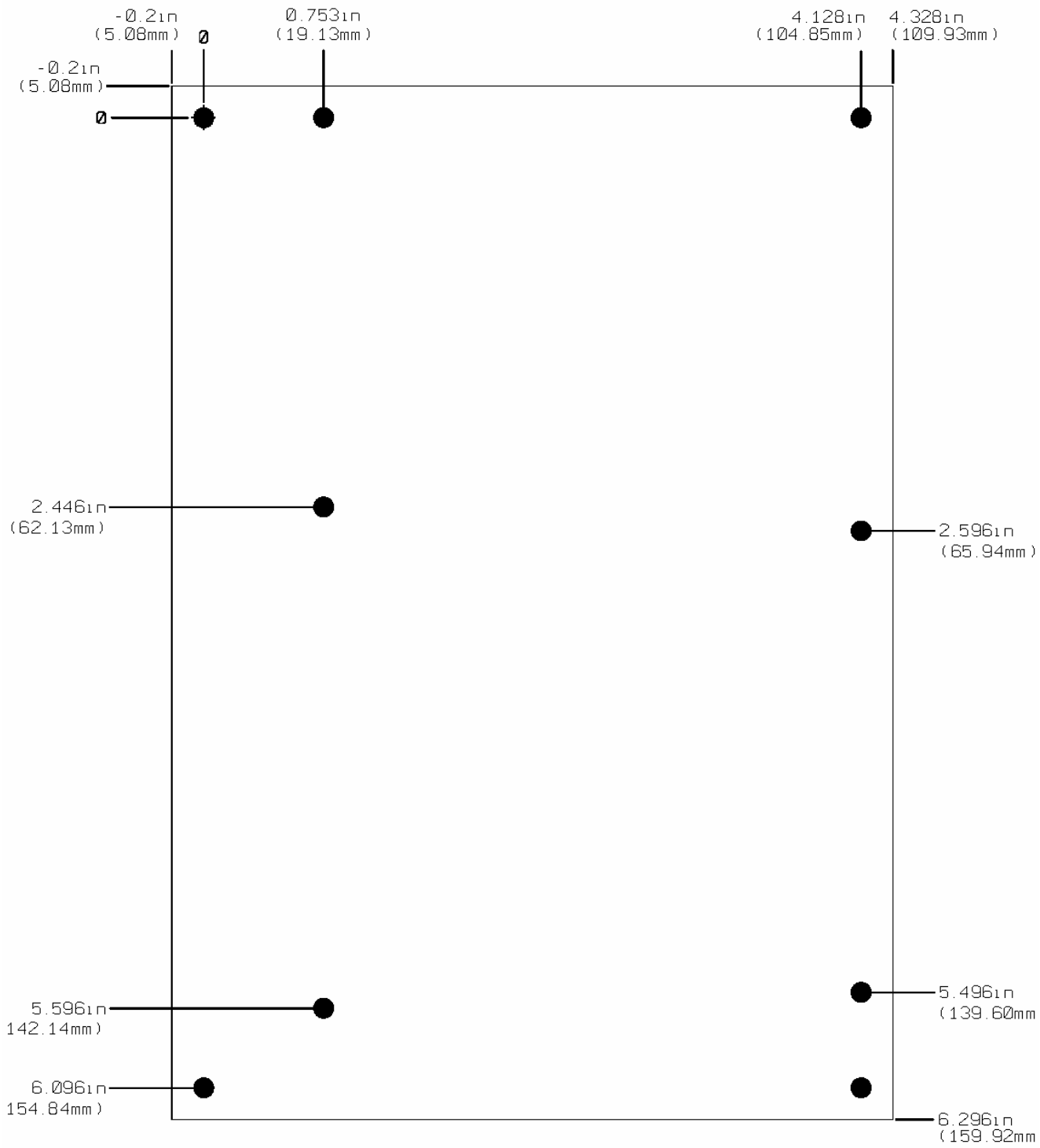


Figure 2–3 XE–800 SBC dimensions



XE–800 SBC connectors and jumpers

Table 2–1 lists the connector reference designators and function for each of the connectors. Table 2–2 lists the jumper block reference designators and functions for each of the jumper blocks. To view the physical location of each connector and jumper block refer to the illustration on page 18. For information on mating connectors see page 100. For information on cables you might require see the following section.

Table 2–1 XE–800 SBC connector functions

Connector	Function
J1	Flat Panel Display
J2	PC/104 *Plus*
J3	CRT Video
J4	Hard drive/IDE
J5	COM2 RS–422/RS–485
J6	Digital I/O 2
J7	PC/104
J8	Power
J9	Keyboard/Mouse
J10	AT battery
J11	Ethernet
J12	USB3,4 (USB 2.0)
J13	USB5,6 (USB 2.0)
J14	Digital I/O 1
J15	COM1/2
J16	USB1,2 (USB 1.1)
J500	CompactFlash
XU500	SDRAM SODIMM

Table 2–2 XE–800 SBC jumper functions

Jumper	Function
W1	Display jumper / system jumpers
W2	COM2 RS–422/RS–485 termination

Custom cables

To conserve board real estate a few connectors on the XE–800 are non-standard or provide alternate interfaces. The cables listed below connect to the XE–800 SBC and provide industry-standard interfaces. For ordering information see page 117.

- **COM PORT VTC-20F Cable** This cable connects to the 20-pin COM1/2 port and provides two DB-9 female connectors. A VTC-20M provides two DB-9 male connectors.

- **1.25 mm COM2 RS-422/485 Cable** This cable connects to the 5-pin header for RS-422/485 on COM2 and provides a standard DB-9 interface.

- **2 mm VGA-12 Cable** Provides a standard 15-pin VGA interface.

- **44-pin to 40-pin IDE Cable** Converts the 44-pin IDE header to a 40-pin IDE header.

- **Keyboard/Mouse "Y" Cable** Connects to the PS/2 keyboard/mouse port to provide keyboard and mouse interfaces. A keyboard will plug directly into the XE–800 port.

- **Two-port USB Cable** Converts the 10-pin header for USB1,2 into two standard USB connectors.

- **XE–800 ATX Power Cable** Connects to the 10-pin ATX power connector and provides a standard 20-pin ATX connector.

Caution

USB devices are hot-swappable when a device is plugged into a standard USB connector, as pins on the connectors determine the order in which they make contact. Devices are not hot-swappable when connected to a non-standard header. You can hot swap a device through the USB connector on the two port USB cable, or through another USB connector wired to the 10-pin header, but you cannot hot swap at the 10-pin header itself.

Mounting the XE–800

WARNING!

The XE–800 contains static-sensitive CMOS components. To avoid damaging your card and its components:

- **Ground yourself before handling the card and observe proper ESD precautions**
- **Disconnect power before removing or inserting a PC/104 or PC/104 *Plus* expansion board**

Equipment required

To install the XE–800 SBC you will need the following equipment (or equivalent):

- XE–800 SBC
- +5V power supply – see the *XE–800 SBC power supply requirements* section. You might also need an XE–800 ATX power cable, part #6537.
- A device with an operating system. The device could be a CompactFlash, hard disk, or CD ROM. The operating system can be Windows NT, Windows CE.net, Linux, QNX, or DOS. **Note: Windows 2000 and Windows XP/XP Embedded will run with known issues, however, new driver development is not supported by the CPU manufacturer.**
- PS/2 style keyboard
- SVGA monitor
- 2 mm VGA-12 Cable, part #6392
- VTC-20F Cable, part #4866 (for serial console)
- Null modem adapter, #2740 (for serial console)
- Windows HyperTerminal or equivalent terminal emulation software (for serial console)
- Your PC (for serial console)

Hardware components required to mount the XE–800 SBC (included):

- 9 threaded hex standoffs (4–40 x ¾")
- 9 screws (4–40 x 3/16")
- 9 internal star lock washers (#4)
- 9 nuts (4–40)

Refer to the XE–800 SBC component diagram, figure 2–1 on page 18, for the location of various connectors, and to the mounting hole diagram, figure 2–3 on page 20, for mounting the XE–800 SBC system.

Hardware mounting

1. Use the standoffs, washers, and screws and place them in the nine holes on the XE–800 SBC board. Refer to Figure 2–3 for the center-to-center mounting hole dimensions and for the location of the designated holes used for mounting the hardware.

   WARNING!

   All nine standoffs, screws and washers must be used to secure the XE–800 SBC. The standoffs ensure full support of the board.

   WARNING!

   Verify that the washers and standoffs do not touch any of the component pads adjacent to the mounting holes. Damage will occur at power-up.

2. Connect a 5V power source to the XE–800 SBC. Refer to the Power Supply Requirements section, page 25. The power supply connector is located at J8. Refer to Figure 2–4 and Table 2–3.

Note The +12V, –12V, and +3V signals are routed to the PC/104 and PC/104 *Plus* bus only.

WARNING!

Make sure the power supply is OFF when connecting the power cable to the XE–800 SBC board. Damage to the XE–800 SBC may occur if the power is ON when connecting the power cable.

WARNING!

Accidentally crossing the wires, i.e., plugging +5V wires into the ground connector or the ground wires into the +5V connector will damage the XE–800 SBC.

Figure 2–4 Power connector, J8

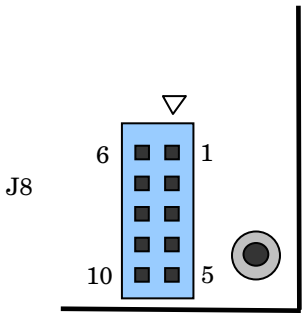


Table 2–3 Power connector: J8

Pin	Function	Function	Pin
1	nc	nc	6
2	GND	+5v	7
3	GND	+5v	8
4	+12V	–12V	9
5	+3V	GND	10

XE–800 SBC power supply requirements

The XE–800 SBC is designed to operate from a single +5 VDC supply, connected at J8. The connector is a 10-pin ATX PC power supply connector, and connects to a 10-pin ATX power supply, or with an adapter cable, to a standard 20-pin ATX power supply. The typical current requirement for the XE–800 SBC is listed in the *Technical Data* appendix. If you are using the PC/104 or PC/104 *Plus* interface, you may also require ±12 VDC and/or +3V.

The user should consider factors such as the power cable conductor gauge, number and length of conductors, mating connectors, and the power requirements of external devices such as hard drives, floppy drives, displays, mouse, and keyboard.

It is important that a quality power supply be used that has sufficient current capacity, line and load regulation, hold up time, current limiting, and minimum ripple.

The power supply for the XE–800 must meet the startup risetime requirements specified in the ATX Power Design Guide, version 1.1, section 3.3.5. This assures that all the circuitry on the XE–800 sequences properly and avoids system lockup.

Also, select a power supply that discharges quickly. If large power supply output capacitors are used, powering the system down and then up may lock up the XE–800 SBC. If the power supply does not drain below 0.7V, the CMOS components on the XE–800 SBC will act like diodes and forward bias, potentially damaging the XE–800 SBC circuitry.

The proper selection of a quality power supply ensures reliability and proper functioning of the XE–800 SBC.

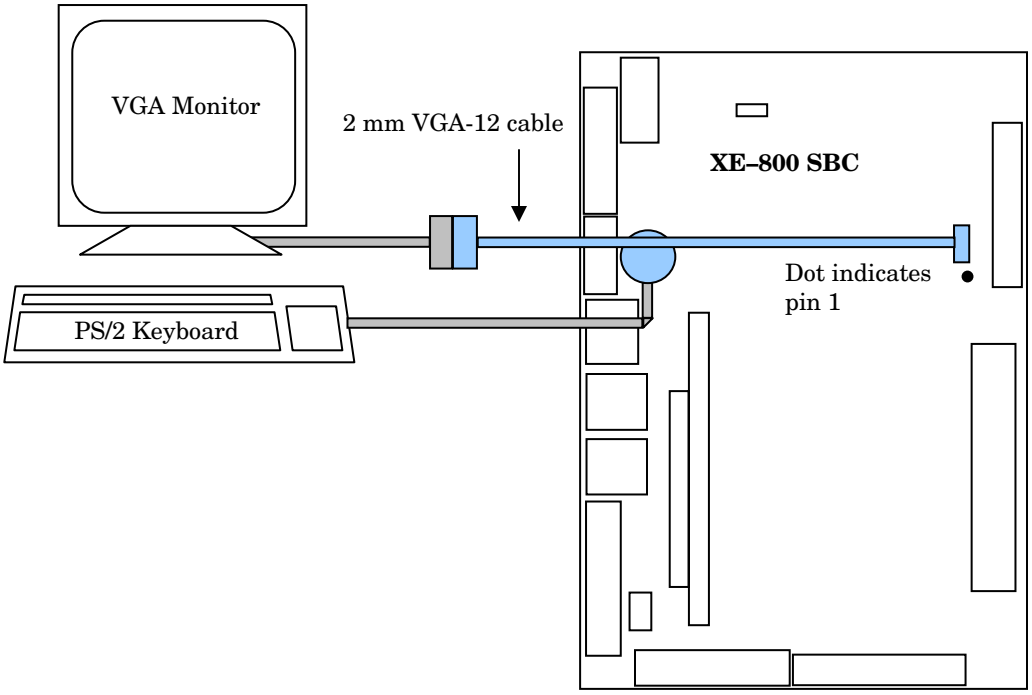
Connecting a monitor and keyboard

Figure 2–5 shows the XE–800 SBC with a monitor and keyboard. The following sections describe how to connect these items.

WARNING!

The video connector is not keyed, and can be plugged in incorrectly. Ensure that pin 1 of the cable is connected to pin 1 of the connector (indicated by the dot). Incorrect connection could damage your equipment.

Figure 2–5 Connecting a monitor and keyboard



Monitor

The XE–800 SBC interfaces to a standard SVGA monitor through the J3 connector using a 2 mm VGA-12 cable. Connect one end of the 2 mm VGA-12 cable into J3 and connect the other end to a SVGA monitor cable.

Note The video jumper, W1[5–6], must be installed to use a monitor. This jumper is installed by default.

Keyboard and mouse

The XE–800 SBC accepts an AT style keyboard and has a PS/2 type connector, located at J9. The mouse port shares the keyboard connector.

To use a keyboard, plug the keyboard directly into J9. To connect a mouse, use a laptop-style “Y” connector, available at computer stores, that splits the signals into

keyboard and mouse connectors.

Note **With some "Y" cables you may have to plug the mouse into the keyboard icon, and the keyboard into the mouse icon; if the mouse and keyboard do not function at power up, try switching them.**

Installing an operating system

The XE–800 SBC does not come with an installed operating system. You can install an operating system onto a hard drive or CompactFlash. Octagon Systems has OS Embedder™ kits available for several operating systems. These kits directly support the unique features of Octagon products, such as digital I/O, watchdog timer, etc., eliminating the need to write special drivers. Other software kits may also be available. Contact Octagon Systems for information concerning the software development kits.

To install an operating system you will need:

- 2 mm VGA-12 video cable, #6392
- PS/2 style keyboard
- VGA monitor
- CD-ROM drive
- Operating system media
- Hard drive or CompactFlash to install the operating system onto.
- If installing onto a hard drive, an IDE cable with master and slave connectors.

OS on CD-ROM onto a hard drive or CompactFlash

Refer to Figure 2–6 on page 29 for the following:

1. Attach the 2 mm VGA-12 video cable to J3.
2. Connect the PS/2 keyboard to J9, a VGA monitor to the VGA-12 video cable, and a CD-ROM drive to J4. Configure the CD-ROM drive as a master.
3. If using a hard drive, configure it as a slave device and install it on the IDE cable connected to J4.

Note IDE devices have a jumper or a switch that designates whether the device is a master or a slave device. If only one device is connected to a port, it must be configured as a master. If two devices are connected, one must be configured as a master and one as a slave. The XE–800 does not use the CS signal (Cable Select) to designate master or slave on a multi-connector cable. You can use BIOS Setup to designate either the master or the slave as a boot device.

4. If using a CompactFlash, install it into the CompactFlash socket.

5. Apply power to the XE–800 SBC system. A logon message similar to the one below will appear on your PC monitor:

```
Copyright 1985-2003 Phoenix Technologies Ltd.
All Rights Reserved
Octagon Systems: XE-800 V1.00
Build Time: 01/27/04 16:59:27

CPU =Cyrix MediaGXm300 MHz
638K System RAM Passed
130048K Extended RAM Passed
System BIOS shadowed
```

6. Enter Setup by pressing the F2 key during BIOS POST sequence (this occurs between the memory test and bootup).

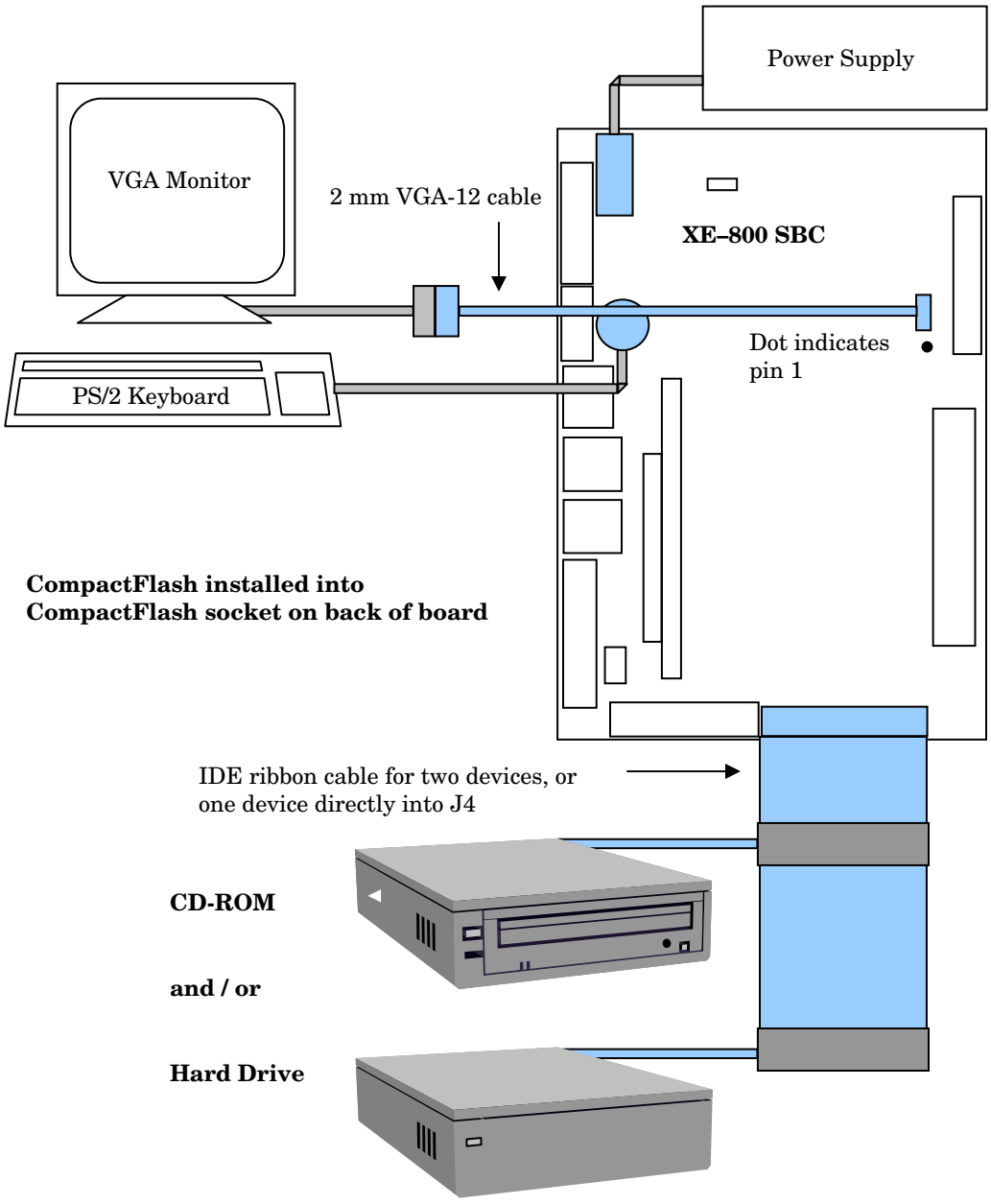
```
                              PhoenixBIOS Setup Utility
Main     Advanced     Boot      Exit
+-------------------------------------------------------+-------------------------+
| System Time:                 [00:00:36]               | Item Specific Help      |
| System Date:                 [01/01/1988]             |                         |
| Legacy Diskette A:           [Disabled]               |                         |
| Legacy Diskette B:           [Disabled]               |                         |
| > Primary Master             [None]                   | <Tab>, <Shift-Tab>, or  |
| > Primary Slave              [None]                   | <Enter> selects field.  |
| > Secondary Master           [3253MB]                 |                         |
| > Secondary Slave            [None]                   |                         |
| >Memory Cache:                                        |                         |
| >Boot option:                                         |                         |
| System Memory:               640 KB                   |                         |
| Extended Memory:             130048 KB                |                         |
+-------------------------------------------------------+-------------------------+

F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

Note Your display message may be slightly different

7. Configure the CD–ROM as a master device in BIOS Setup, and change the boot sequence to CD-ROM drive first.
8. Insert the operating system media into the CD-ROM drive.
9. Reboot the system. The system should boot to the CD-ROM.
10. Follow the on-screen dialog to load the operating system. Refer to the OS documentation for further information.

Figure 2–6 Installing an operating system



Chapter 3: Setup programs

This chapter discusses running the Setup configuration program on the XE–800 SBC. Setup configures devices set up by the BIOS such as serial ports, floppy drives, etc.

Operating systems other than DOS

If you are using an operating system other than DOS the X jumper should be removed. The X jumper maps the INT17 extended BIOS into the 0xD8000-0xDFFFF memory. This can cause problems with applications or hardware running on other operating systems if they attempt to use this memory range. Removing the X jumper frees this memory for use by other operating systems.

Setup

Setup can be entered by pressing the “F2” key during the BIOS POST sequence (this occurs between the memory test and boot).

Also, by removing the “S” jumper W1[1–2], you will force the setup to revert to the factory programmed defaults shown in the following menus. This allows the user to reconfigure the setup.

Note The Setup defaults might vary slightly from those shown in the following menus depending on the BIOS revision on your card.

The system will display the XE–800 SBC PhoenixBIOS Setup Utility Main menu. Select the submenu by using the up/down arrows, then press <ENTER> (when using a monitor connected to the XE–800 SBC). For a serial console configuration, Ctrl + E is up and Ctrl + X is down.

Main menu

The Main menu allows you to set the basic system configuration.

```
                              PhoenixBIOS Setup Utility
Main     Advanced       Boot      Exit
System Time:                    [00:00:36]          Item Specific Help
System Date:                    [01/01/1988]
Legacy Diskette A:              [Disabled]
Legacy Diskette B:              [Disabled]
> Primary Master                [None]              <Tab>, <Shift-Tab>, or
> Primary Slave                 [None]              <Enter> selects field.
> Secondary Master              [None]
> Secondary Slave               [None]
>Memory Cache:
>Boot options:
System Memory:                  640 KB
Extended Memory:                130048 KB

F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

System Time: Sets the time for the system clock.

System Date: Sets the date for the system clock.

Legacy Diskette A: Enables or disables a legacy floppy disk drive. Choices are Disabled, 360 KB 5 ¼", 1.2 MB 5 ¼", 720 KB 3 ½", 1.44/1.25 MB 3 ½", 2.88 MB 3 ½". Note that the XE–800 does not support a floppy drive directly. This feature should be left disabled unless you are using a PC/104 floppy drive. This also frees up INT6 for other applications.

Legacy Diskette B: Enables or disables a second legacy floppy disk drive. Note that Diskette A must be enabled before Diskette B is accessible. The menu items for Diskette B are then the same as for Diskette A. See note under Diskette A.

>Primary Master Accesses submenu for a Primary Master disk drive. Options are None, CD-ROM, ATAPI Removable, Other ATAPI, User, and Auto. This channel is hardwired to the CompactFlash, and cannot be used for other devices.

>Primary Slave Same as Primary Master. This channel is reserved and cannot be used.

>Secondary Master Same as Primary Master. Note that the XE–800 SBC only supports three IDE devices total (CompactFlash and two Secondary devices.)

>Secondary Slave Same as Primary Master. Note that the XE–800 SBC only supports three IDE devices (CompactFlash and two Secondary devices.)

>Memory Cache: Enables or Disables the memory cache.

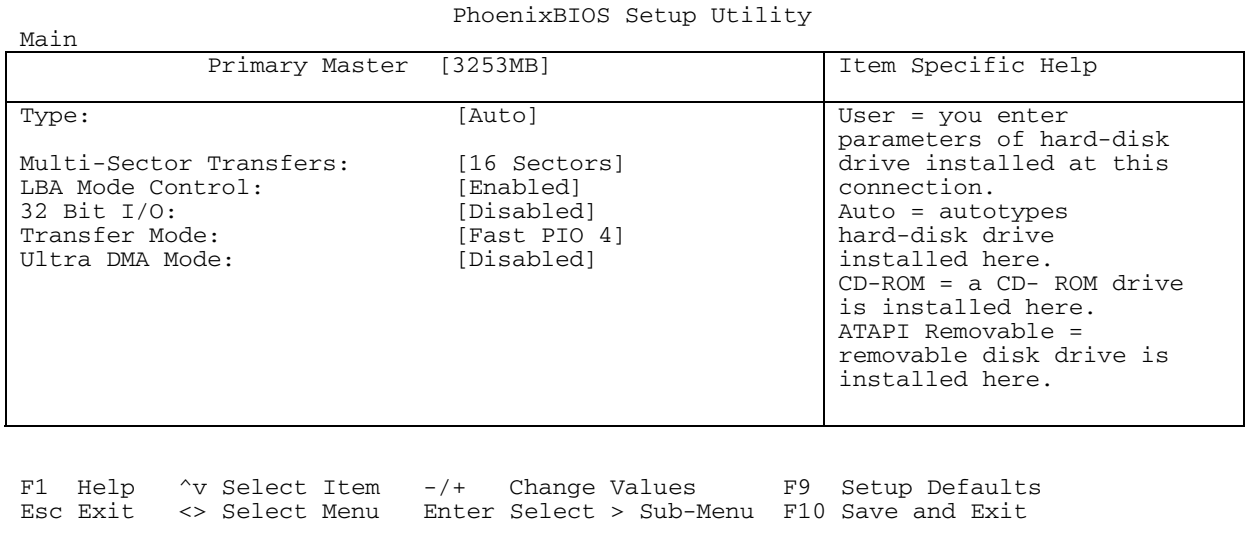
>Boot options: Enables or Disables the following features: Quickboot Mode, Summary Screen, Floppy Check, Hard disk Pre-Delay. Skipping these tests during boot will decrease the time needed to boot the system.

System Memory: Displays the amount of system memory which is on the card.

Extended Memory: Displays the amount of extended memory on the card.

Hard drive submenus

The Hard drive submenus allow you to set the primary/secondary/master/slave parameters. Except for older disk drives, the Auto selection will detect and display the correct parameters.



Type: Specifies types of hard drives. Choices are None, Auto, CD-ROM, ATAPI removable, Other ATAPI, and User. Selecting User allows you to specify the parameters of your hard drive.

Note UltraDMA modes are not supported directly by the XE–800. These modes require an 80-pin connector, and there is no adapter available for the 44-pin, 2mm IDE connector used on the XE–800.

Advanced menu

The Advanced menu allows you to set advanced system configuration. Note that if items are incorrectly set in this menu, the system might malfunction.

```
                              PhoenixBIOS Setup Utility
Main     Advanced        Boot     Exit
```

	Item Specific Help
Setup Warning Setting items on this menu to incorrect values may cause your system to malfunction. Serial Video: [Enabled] Baud Rate: [38K] POST Video Mode: [Text] >Advanced Chipset Control >I/O Device Configuration >PCI Configuration Secured Setup Configurations [No] Installed O/S: [Other] Reset Configuration Data: [No] Large Disk Access Mode: [DOS] Watchdog: [Disabled] PCI IRQ Routing: [Method 1]	Enables redirection of video and keyboard to serial port COM1.

```
F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

Serial Video: Enabled, Disabled. Enables redirection of video and keyboard to COM1.

Baud Rate: 9600, 19.2K, 38.4K, 57.6K, 115K. Selects baud rate for serial console.

Post Video Mode: Text, Graphical. Selects which video mode to display during POST.

Secured Setup Configurations: Yes or No. Yes prevents the operating system from overriding selections you have made in Setup.

Installed O/S: ` Other, Win95. Selects the operating system you use most often.

Reset Configuration Data: Yes or No. Yes erases all configuration data in a section of memory for ESCD (Extended System Configuration Data) which stores the configuration settings for non-PnP plug in devices. Select Yes when required to restore the manufacturer's defaults.

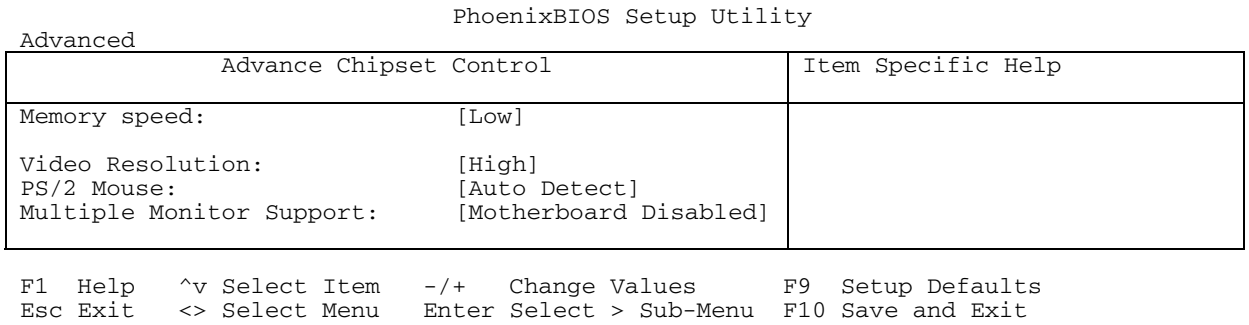
Large Disk Access Mode: DOS, Other. Select DOS if you have DOS. Select Other for another operating system such as Unix.

Watchdog: Enabled, Disabled. Enables watchdog timer.

PCI IRQ Routing: Method 1, 2.

Advanced Chipset Control submenu

The Advanced Chipset Control submenu allows you to set the video and PS/2 mouse configurations.



Memory speed: Low, Medium, High. Configures DRAM performance options. High is a 100 MHz memory clock, Medium is an 80 MHz memory clock, and Low is a 66 MHz memory clock. Low is recommended for Industrial Temperature Range Applications

Video Resolution: Low, Medium, High, Super.

PS/2 Mouse: Disabled, Enabled, Auto Detect. Frees up IRQ12 if disabled.

Multiple Monitor Support: Motherboard Disabled, Motherboard Primary, Adapter Primary.

I/O Device Configuration submenu

The I/O Device Configuration submenu allows you to set the I/O configurations.

```
                        PhoenixBIOS Setup Utility
Advanced
+-------------------------------------------+-------------------------------+
|          I/O Device Configuration         | Item Specific Help            |
+-------------------------------------------+-------------------------------+
| Serial port A:                [Enabled]   |                               |
|  Base I/O address:            [3F8]       |                               |
|  Interrupt:                   [IRQ 4]     |                               |
| Serial port B:                [Enabled]   |                               |
|  Base I/O address:            [2F8]       |                               |
|  Interrupt:                   [IRQ 3]     |                               |
|  Interface:                   [RS232]     |                               |
| Parallel port:                [Disabled]  |                               |
|  Mode:                        [Bi-directional]                            |
|  Base I/O address:            [378]       |                               |
|  Interrupt:                   [IRQ 7]     |                               |
| Local Bus IDE Adapter:        [Both]      |                               |
|                                           |                               |
+-------------------------------------------+-------------------------------+

F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

Serial port A: Enabled, Disabled, Auto, OS controlled

Base I/O address: 3F8*, 2F8, 3E8, 2E8

Interrupt: IRQ3, IRQ4*

Serial port B: Same as Serial Port A.

Base I/O address: 3F8, 2F8*, 3E8, 2E8

Interrupt: IRQ3*, IRQ4

Interface: RS232, RS422, RS485

Parallel port: Disabled, Enabled, Auto, OS controlled. Enabled allows user to set configuration, while Auto uses the BIOS or OS configuration. Note that the XE–800 does not support a parallel port directly. This feature should be left disabled unless you are using a PC/104 parallel port. This also frees up IRQ5, IRQ7, and the base address for other applications.

Mode: Output only, Bi-directional, EPP, ECP, Floppy. If ECP mode is selected another menu item appears for selection of DMA channel, with choices of DMA1 or DMA3.

Base I/O address: 378, 278, 3BC

Interrupt: IRQ5, IRQ7

Local Bus IDE Adapter: Disabled, Primary, Secondary, Both. Enables the integrated local bus IDE adapter. Note: CompactFlash is on the Primary channel. The mutifunction IDE drive cable uses the Secondary channel.

* default

PCI Configuration submenu

The I/O Device Configuration submenu allows you to set the PCI configurations.

```
                              PhoenixBIOS Setup Utility
Advanced
               PCI Configuration                          Item Specific Help

>PCI/PNP ISA UMB Region Exclusion                         Reserve specific
>PCI/PNP ISA IRQ Resource Exclusion                       upper memory blocks
>PCI/PNP ISA DMA Resource Exclusion                       for use by legacy ISA
 ISA graphics device installed:          [No]             devices

F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

PCI/PNP ISA UMB Region Exclusion	See submenu
PCI/PNP ISA IRQ Resource Exclusion	See submenu
PCI/PNP ISA DMA Resource Exclusion	See submenu
ISA graphics device installed:	Yes, No

PCI/PNP ISA UMB Region Exclusion submenu

The PCI/PNP ISA UMB Region Exclusion submenu reserves the specified block of upper memory for use by legacy ISA devices. Options are Available or Reserved.

```
                              PhoenixBIOS Setup Utility
Advanced
          PCI/PNP ISA UMB Region Exclusion                Item Specific Help

C800 - CBFF:                             [Available]      Reserves the specified
CC00 - CFFF:                             [Available]      block of upper memory
D000 - D3FF:                             [Available]      for use by legacy ISA
D400 - D7FF:                             [Available]      devices
D800 - DBFF:                             [Available]
DC00 - DFFF:                             [Available]

F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

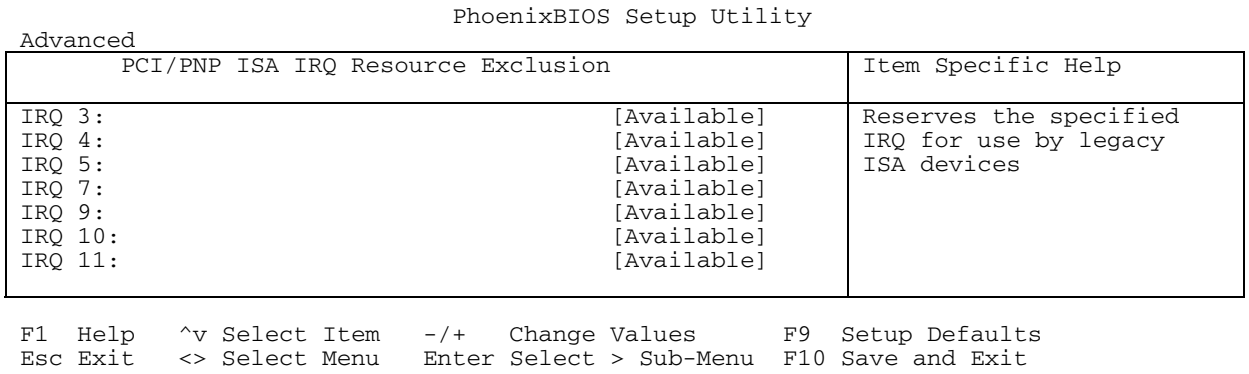
Available means the operating system is free to configure or use the region for automatic assignment during start-up operations.

Reserved means the operating system cannot automatically use or assign the region. The region will be assigned later by the function or device attached.

If you experience problems with an auxiliary card, consult the manual for the card and use this screen to reserve the regions required by the card.

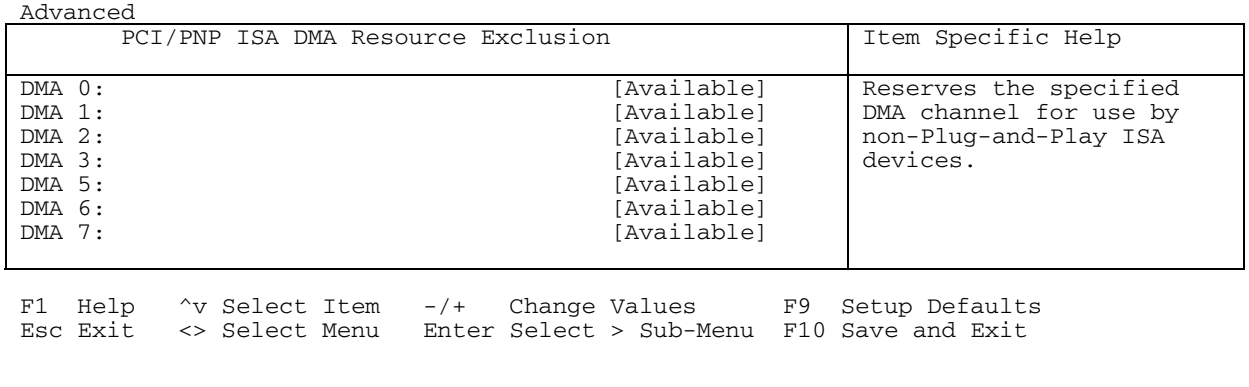
PCI/PNP ISA IRQ Resource Exclusion submenu

The PCI/PNP ISA IRQ Resource Exclusion submenu reserves the specified IRQ for use by legacy ISA devices. Options are Available or Reserved.



PCI/PNP ISA DMA Resource Exclusion submenu

The PCI/PNP ISA DMA Resource Exclusion submenu reserves the specified DMA channels for use by legacy ISA devices. Options are Available or Reserved.



Boot menu

The Boot menu allows you set the order of drives for booting.

PhoenixBIOS Setup Utility

Advanced

Boot Order	Item Specific Help
+Removable Devices +Hard Drive CD-ROM Drive	Keys used to view or configure devices: <Enter> expands or collapses devices with a + or - <Ctrl+Enter> expands all <Shift + 1> enables or disables a device. <+> and <-> moves the device up or down. <n> May move removable device between Hard Disk or Removable Disk <d> Remove a device that is not installed.

F1 Help ^v Select Item -/+ Change Values F9 Setup Defaults
Esc Exit <> Select Menu Enter Select > Sub-Menu F10 Save and Exit

Expanded Boot screen

The expanded screen allows you set the order of drives for booting.

PhoenixBIOS Setup Utility

Advanced

Boot Order	Item Specific Help
-Removable Devices Legacy Floppy Drives -Hard Drive Bootable Add-in Cards CD-ROM Drive	Same description as Boot menu.

F1 Help ^v Select Item -/+ Change Values F9 Setup Defaults
Esc Exit <> Select Menu Enter Select > Sub-Menu F10 Save and Exit

Exit menu

The Exit menu allows you to save or discard changes made during Setup. Esc does not exit this menu, you must select one of the menu items and press Enter. You can also press F9 or F10 at any time to exit Setup. When using the serial console F9 and F10 are not available; you must press down/up arrow to get to the proper option then press enter.

```
                              PhoenixBIOS Setup Utility
Main     Advanced      Boot     Exit
```

	Item Specific Help
Exit Saving Changes Exit Discarding Changes Load Setup Defaults Discard Changes Save Changes	Exit System Setup and save your changes to CMOS.

```
F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

Chapter 4: Save and run programs

Save and run your programs on the XE–800 SBC

Once you have written, tested and debugged your application, you can then save it to a device such as CompactFlash or hard drive. When you reboot the XE–800 SBC, your program can automatically load and execute.

This chapter describes the following:

- Saving an application program to hard disk or CompactFlash
- Autoexecuting the program from the XE–800 SBC
- Overriding autoexecution of your program.

The examples in this chapter are for ROM–DOS; the procedures will vary for different operating systems. Some Microsoft programs make undocumented DOS calls. With ROM–DOS, an error returns when an undocumented DOS call is made, causing your program to operate erratically. We recommend using Microsoft's MSDOS when using programs with undocumented DOS calls.

Saving programs and support files

A disk drive or CompactFlash must contain proper formatting. To format the CompactFlash or to add your own operating system, please refer to the Compact Flash, SDRAM, and battery backup chapter.

WARNING!

Reformatting the CompactFlash requires the use of a hard drive or R/W CD-ROM to restore system files.

Adding your application

1. To add your application to your CompactFlash use the DOS COPY command
2. Add or remove any device drivers for your application. You may want to do the same for the CONFIG.SYS file on the CompactFlash. Remember to add these drivers to your drive as well.
3. To autoexecute your application, add your application name to the AUTOEXEC.BAT file.

Overriding the autoexecution of your application

You may stop the autoexecution of your application by doing one of the following options:

Option 1

1. Press F5 or F8 on your local keyboard. For more information, see your ROM–DOS manual. Note that this option does not work if you are using a terminal emulator (serial console).

Option 2

1. Press Ctrl–C when the system is first starting. This halts all batch files.
2. Change AUTOEXEC.BAT and/or CONFIG.SYS to not call out your program.

Option 3

1. Remove CompactFlash from target system.
2. Install CompactFlash in host system CompactFlash adapter.
3. Edit Config.sys and/or Autoexec.bat.
4. Reinstall CompactFlash in target system.

Overview: Section 2 – Hardware

Section 2 discusses usage, functions, and system configurations of the XE–800 SBC major hardware features. The following chapters are included:

Chapter 5: Serial ports

Chapter 6: Console devices

Chapter 7: CompactFlash, SDRAM, and battery backup

Chapter 8: External drives

Chapter 9: Bit-programmable digital I/O

Chapter 10: CRTs and flat panels

Chapter 11: Ethernet

Chapter 12: PC/104 and PC/104 *Plus* expansion

Chapter 13: USB

Chapter 5: Serial ports

Description

The XE–800 SBC has two serial ports, COM1 and COM2, which are accessed for RS-232C at the 20-pin connector at J15. For RS-422/485 use the 5-pin connector at J5. These serial ports interface to a printer, terminal, or other serial device. Both ports support 5–, 6–, 7–, or 8–bit word lengths, 1, 1.5, or 2 stop bits, and baud rates up to 115.2K.

The serial ports have the following specifications:

- 16550 compatible
- 16-byte FIFO buffers
- IEC 1000, level 3, ESD protection
  — Contact discharge ±6 kV
  — Air–gap discharge ±8 kV
- Backdrive protection
- Up to 115.2k baud operation

Mating receptacle

Use a VTC-20F or VTC-20M cable to connect the COM ports to external serial equipment. The P2 and P3 connectors on these cables are DB-9 female (VTC-20F) or DB-9 male (VTC-20M) connectors which plug directly into a 9-pin serial cable. For RS-422 or RS-485 on COM2, use a 1.25 mm RS422/485 Cable (part #6393) and connector J5.

Figure 5–1 (following page) shows two serial devices connected to the XE–800 SBC. It also shows the schematic for connecting RS–422 and RS–485 devices. Note that you cannot use COM2 for RS–232 and RS–422/485 at the same time.

Figure 5–2 shows a null modem adapter connected to the COM1 port of a VTC-20F. A null modem adapter is required when connecting a serial console.

Serial port configurations

COM1 and COM2 are 8-wire RS–232 interfaces, using the 20-pin connector at J15. COM2 can also be configured in BIOS Setup for 4-wire RS–422/RS–485 interfaces. RS–422 and RS–485 use the J5 connector. Some configurations of RS–422/RS–485 also require termination jumpers.

The COM ports configurations are shown in table 5–1. Tables 5–2 and 5–3 show the COM pin-outs for the two COM ports, and table 5–4 shows the jumper settings.

Figure 5–1 COM ports

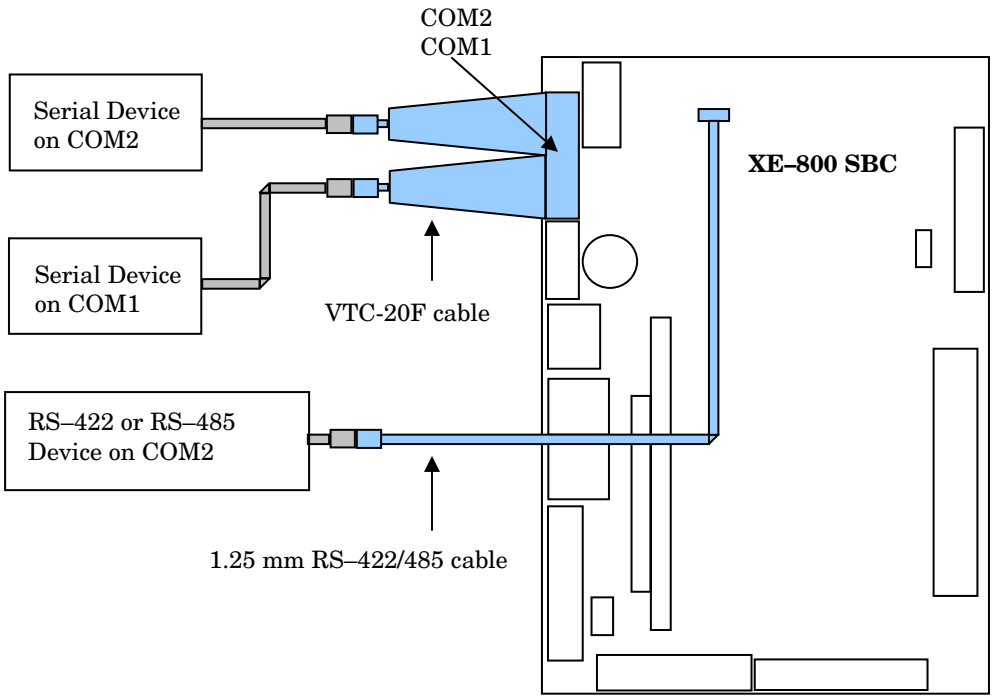


Figure 5–2 VTC-20F cable and null modem adapter

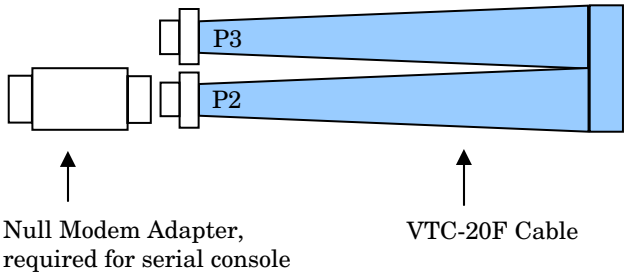


Table 5–1 Serial port configurations

COM Port	Address	IRQ	Interface	BIOS Setup for COM2	Connector
COM1	3F8h*, 2F8h, 3E8h, 2E8h	IRQ4*, IRQ3	RS–232 – 8 wire	NA	J15
COM2	3F8h, 2F8h*, 3E8h, 2E8h	IRQ4, IRQ3*	RS–232 – 8 wire	RS232	J15
COM2	3F8h, 2F8h*, 3E8h, 2E8h	IRQ4, IRQ3*	RS–422 – 4 wire RS–485 – 2 wire	RS422/485	J7

* = default

Table 5–2 COM1 and COM2 connector pin-outs (J15 connector)

COM1		COM2	
Pin#	**RS–232 signal**	**Pin#**	**RS–232 signal**
1	DCD	11	DCD
2	DSR	12	DSR
3	RxD	13	RxD
4	RTS	14	RTS
5	TxD	15	TxD
6	CTS	16	CTS
7	DTR	17	DTR
8	RI	18	RI
9	GND	19	GND
10	nc	20	nc

Table 5–3 J7 – COM2 connector pin-outs and pin-outs for 1.25 mm RS–422/485 cable

J7 connector		DB–9 connector	
Pin#	**Signal**	**Pin #**	**Pin#**
1	TXD+	1	
2	TXD–		6
	nc	2	
	nc		7
	nc	3	
	nc		8
4	RXD+	4	
5	RXD–		9
3	GND	5	

Table 5–4 COM2 jumper: W2

W2 – COM2 jumper		
COM Port	**Interface**	**Jumper Settings**
COM2	RS–422/RS–485 no termination	No jumpers on W2
	RS–422/RS–485 with termination	W2[1–3], W2[2–4]*

* Default. These jumpers terminate the network. If the XE–800 SBC is not at an end of the network, leave these jumpers off . See Figure 5–2.

Setup menu for COM ports

The I/O Device Configuration submenu allows you to set the I/O configurations. You must enable COM2 and select the interface you are using. You must also set the jumpers for the interface (see table above).

```
                        PhoenixBIOS Setup Utility
Advanced
              I/O Device Configuration          Item Specific Help

Serial port A:                [3F8/IRQ4]
Serial port B:                [Disabled]
Interface:                    [RS-232]
Parallel port:                [Disabled]
 Mode:                        [Bi-directional]
 Base I/O address:            [378]
 Interrupt:                   [IRQ 7]
 DMA channel:                 [DMA 1]

F1  Help   ^v Select Item   -/+   Change Values      F9  Setup Defaults
Esc Exit   <> Select Menu   Enter Select > Sub-Menu  F10 Save and Exit
```

Function and use of serial ports

COM1 as serial console device

You can use COM1 as a console device to communicate with another PC. For COM1 to be a serial console, the “V” video jumper W1[5–6] must be removed. See the Console devices chapter for more information.

Note When interfacing the XE–800 SBC to your desktop PC, you must use a null modem adapter.

COM ports as RS–232 I/O

COM1 and COM2 are 8-wire RS–232 interfaces. You can connect two serial I/O devices. COM1 is always configured as RS–232. COM2 must be enabled and configured in BIOS Setup.

In the default configuration, the video jumper W1[5–6] is installed. This jumper automatically disables the Serial Video option in the Advance menu in Setup, and the COM1 port is available for serial I/O devices. In some instances, such as

running a program on the XE–800 SBC that will ultimately be used on another card without on-board video, you might want to remove the video jumper and still use COM1 as a COM port instead of a serial console. In this instance, you must go into Setup and set Serial Video in the Advanced menu to Disabled.

COM2 as RS–422 and RS–485 networks

COM2 can also be used as RS–422 or RS–485. RS–422 and RS–485 use differential signaling to communicate between the devices on a network. Differential signal reduces the effect of environmental noise, allowing communication over distances up to 1200 meters.

The RS–422 and RS–485 receivers provide a marking condition for shorted, open, or inactive lines. Note that RTS is used differently by RS–422 and RS–485. Review the information in the following sections regarding RTS.

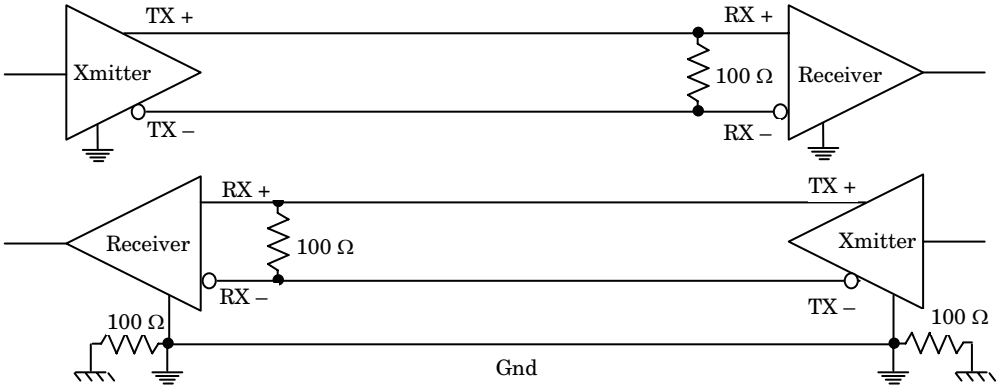
RS–422 is a point-to-point configuration. RS–485 is a multi-node configuration that allows up to 32 nodes on a network. COM2 can be configured in BIOS Setup as either RS–232, RS–422, or RS–485. Refer to table 5–4 on page 46 for jumper settings for terminating an RS–422/485 network.

RS–422

RS–422 is typically point to point configuration. RS–422 is also specified for multi-drop (party-line) applications where only one driver is connected to, and transmits on, a "bus" of up to 10 receivers. The device at the end of an RS–422 network must be terminated. The XE–800 SBC optionally terminates with a 100 ohm resistor. Refer to Table 5–4. Figure 5–3 shows a typical RS–422 four-wire interface circuit.

The RTS signal controls the RS–422 transmitter. The RS–422 transmitter is enabled when the RTS signal is enabled.

Figure 5–3 Typical RS–422 four-wire interface circuit



RS–485

An application may implement a node as either the "host" node or as a "remote" node in an RS–485 network. There can be as many as 32 nodes without any bus repeaters in the network. A host is referred to as the node that initiates communication; a remote is referred to as a node that is addressed by the host.

In any given communication sequence in an RS–485 network, there can only be one host. The host is responsible for initiating communication, maintaining network registration, and providing housekeeping tasks with other nodes. Remotes, however, cannot initiate a communication. They can only respond to messages that are addressed to them from the host.

The devices at each end of an RS–485 network must be terminated. Any node located between the end points should not be terminated. The XE–800 SBC optionally terminates with a 100 ohm resistor. Refer to Table 5–4 on page 46.

Figures 5–4 and 5–5 show typical RS–485 networks. Note that for 2-wire RS–485 networks the transmit and receive pairs must be connected together external to the XE–800 (TXD+ tied to RXD+, TXD– tied to RXD–).

The RTS* signal is used to control the transmitter and receiver in RS–485 mode. The RTS* signal is controlled by the Modem Control Register bit 1 (MCR[1], which is offset 0x04 from the UART base address). Writing MCR[1] to 0 (default state) sets RTS* to an inactive state (RTS* = logic high) and DISABLES the RS–485 Transmitter and ENABLES the Receiver. Writing MCR[1] to 1 sets RTS* to an active state (RTS* = logic low), and ENABLES the RS–485 Transmitter and DISABLES the RS–485 Receiver.

Figure 5–4 Typical RS–485 4–wire interface circuit

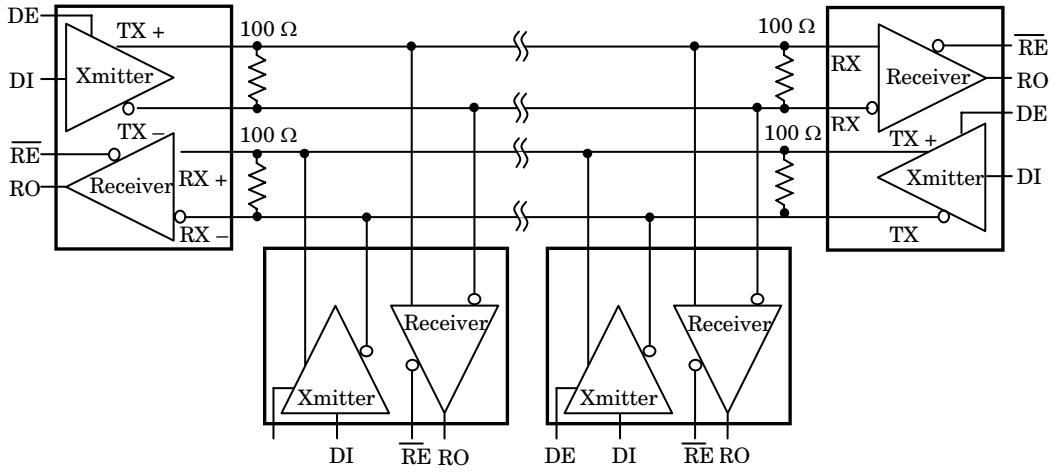
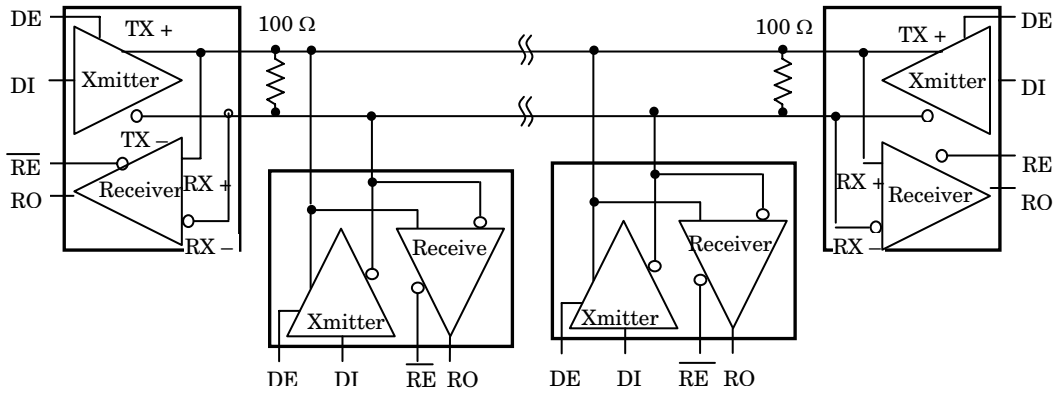


Figure 5–5 Typical RS–485 2–wire half duplex interface circuit



Chapter 6: Console devices

Description

The XE–800 SBC has three options for console devices. You can use a monitor and a keyboard as your console. You can use COM1 as the console, or you can run the system without a console device.

Selecting console devices

The following represent the options on the XE–800 SBC for console devices:

- A standard VGA/SVGA monitor and a keyboard.
- Serial console from COM1. A serial cable/null modem adapter plugged into a host PC running HyperTerminal (or equivalent) provides both input and output. The local keyboard also allows input but is not required.
- No console device means no video output, either from a monitor or the serial console. A local keyboard allows input but is not required.

Monitor and keyboard console

To use a monitor and keyboard as the console, you will need the following equipment (or equivalent):

- XE–800 SBC
- 2 mm VGA-12 video cable, #6392
- PS/2 style keyboard
- VGA monitor

WARNING!

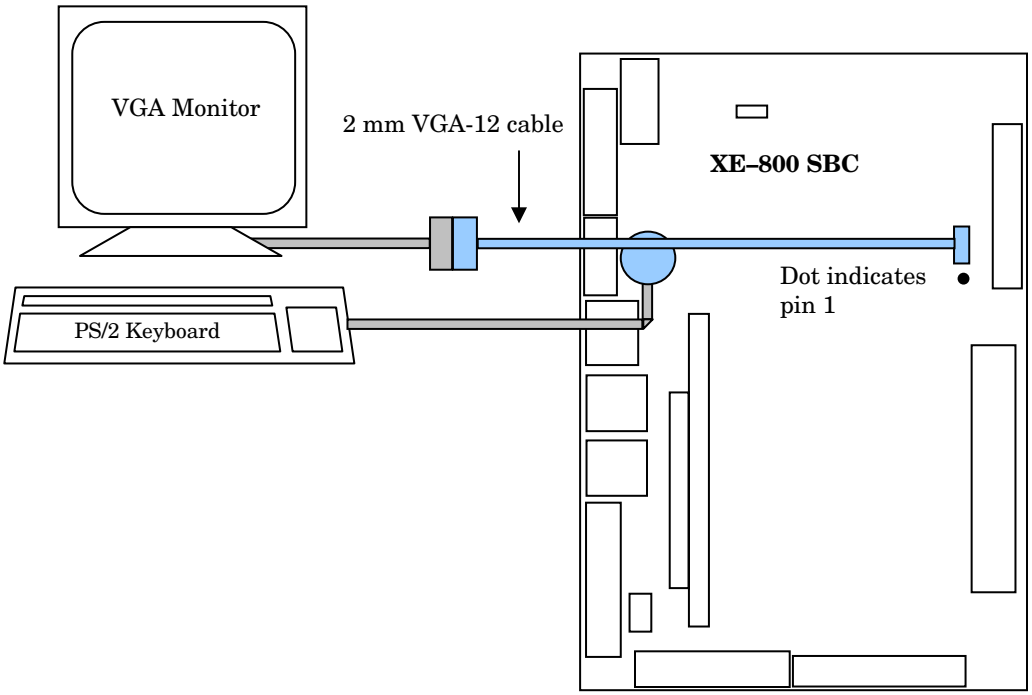
The video connector is not keyed, and can be plugged in incorrectly. Ensure that pin 1 of the cable is connected to pin 1 of the connector (indicated by the dot). Incorrect connection could damage your equipment.

To connect a monitor and keyboard:

1. Refer to Figure 2–1 on page 18 for the location of various connectors and jumpers before installing the XE–800 SBC.
2. Make sure that the “V” video jumper, W1[5–6], is installed.
3. Connect the VGA-12 video cable into J3.
4. Connect a VGA monitor to the VGA-12 cable, and a PS/2 style keyboard to J9.
5. If you want a mouse, use a “Y” style PS/2 adapter in J9. This allows both a mouse and a keyboard to be connected. Note that with some “Y” cables you may

have to plug the mouse into the keyboard icon, and the keyboard into the mouse icon; if the mouse and keyboard do not function at power up, try switching them.

Figure 6–1 Monitor and keyboard as console



Serial console

COM1 is used as the console device if the serial console is enabled in BIOS Setup.

To use COM1 as the console, you will need the following equipment (or equivalent):

- XE–800 SBC
- VTC-20F cable, #4866
- Null modem adapter, #2470 (9–pin to 9–pin)
- Host computer running HyperTerminal (or equivalent)
- Serial cable to connect XE–800 SBC COM1 to host computer serial port
- PS/2 style keyboard (optional)

Refer to Figure 2–1 on page 18 for the location of various connectors and jumpers before installing the XE–800 SBC.

1. Remove the “V” video jumper, W1[5–6].
2. Connect a VTC-20F cable to J15 of the XE–800.
3. Connect the null modem adapter to P2 (COM1 side) of the VTC-20F cable.

4. Connect the serial cable between the null modem adapter and the serial port of the host computer.

Follow these steps to use the serial console:

5. For communication using HyperTerminal (or equivalent), the following settings must be used:

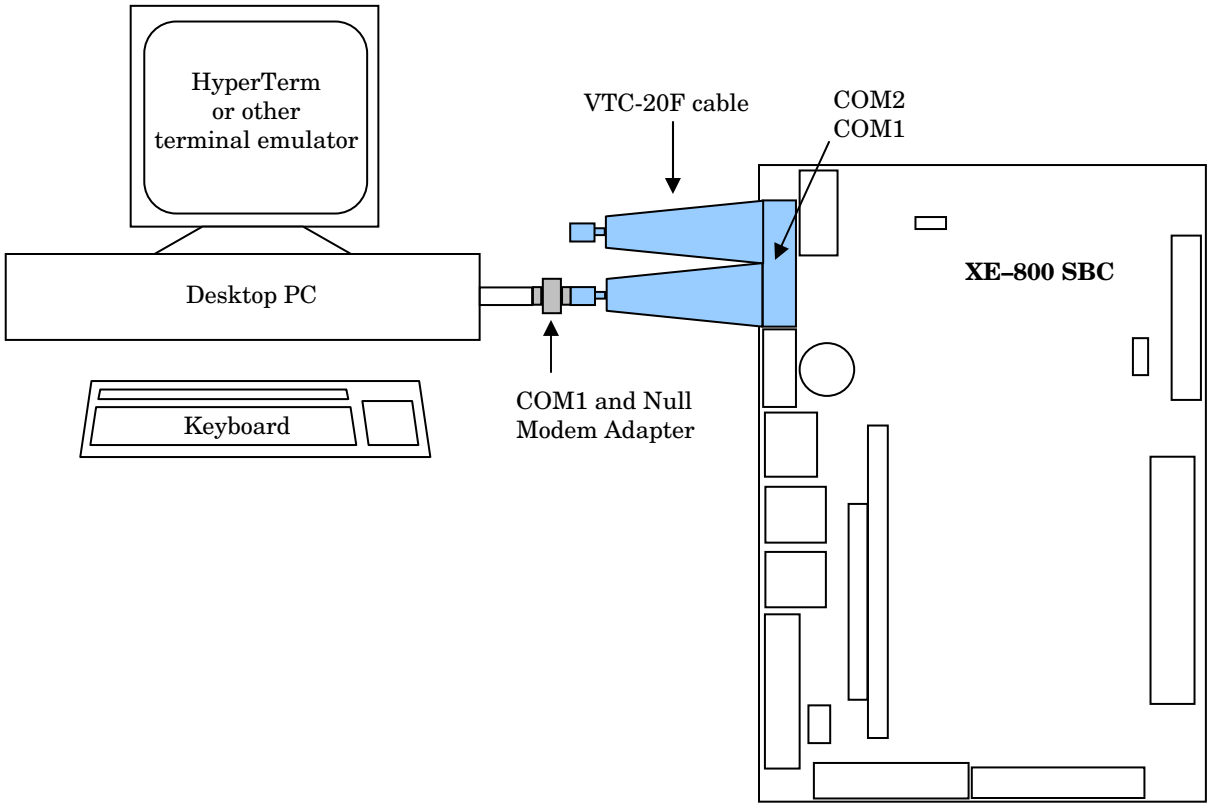
Connect using:	**Direct to COM1, COM2, COM3, or COM4** (select the port the serial cable is connected to)
Baud rate:	**38400**
Communications parameters:	**no parity, 8 data bits, 1 stop bit**
Flow control:	**none**
Terminal support:	**ANSI**
ANSI terminal option–Wrap lines that exceed terminal width:	**Yes (uncheck box)**

6. Start HyperTerminal. You are now ready to establish communications between the host PC and the XE–800 SBC.

7. Power on the XE–800 SBC. Console data will be redirected to COM1 and will be displayed on the host computer.

8. If you do not get the proper logon message check the HyperTerminal serial parameters of the host PC to make sure they match the settings in step 5. You might also try removing the “S” jumper to force the XE–800 SBC card to the system defaults, which includes 38400 baud rate.

Figure 6–2 The XE–800 SBC and a serial console



Chapter 7: CompactFlash, SDRAM, and battery backup

Description

The XE–800 SBC is shipped with a 512 KB Surface Mount (SMT) flash. It is soldered directly onto the PCB board. This flash contains the BIOS.

The memory socket can accept up to 256 MB capacity SO-DIMM modules.

A battery backup connector is provided at J10 for an AT battery to back up the real time clock.

CompactFlash

The CompactFlash socket supports 3.3 V devices. The CompactFlash appears to the system as an IDE device. It is automatically detected and configured as a hard drive during bootup. To configure the XE–800 SBC to boot from a CompactFlash, refer to the following section “Creating a Bootable CompactFlash.”

The CompactFlash socket is connected to the Primary IDE channel. This channel is configured for a Master device only. Therefore, if a CompactFlash device is installed, it will show up as a Master on the Primary IDE channel. Any additional IDE devices will show up as Secondary IDE devices.

Note Octagon Systems only recommends Industrial Grade CompactFlash (NAND technology) that implements ECC error code correction, and wear level technology.

Creating a bootable CompactFlash

A CompactFlash as shipped from the factory may or may not be formatted; even if formatted, it may or may not be bootable. The following sequence shows how to create a bootable CompactFlash, and how to configure the XE–800 SBC to boot from the CompactFlash.

CAUTION

You must use an external drive such as a hard drive or CD to sys the CompactFlash. See step 5.

1. Create a bootable external device.

Note Octagon offers OS Embedders that include a CD boot disk for a variety of operating systems. Contact your Octagon representative for additional information.

2. Change the boot sequence in BIOS Setup so the XE–800 SBC boots from the external drive first. Reboot from the external device.

3. Use FDISK to create partitions on the CompactFlash. Refer to your operating system manual for the appropriate parameters for using FDISK. You might also have to refresh the MBR (Master Boot Record).

4. Reboot, using the external device.

5. Format the CompactFlash. If using DOS, format with the Format /S command. This will copy the hidden files for making the CompactFlash a bootable device. If the CompactFlash is already formatted, use the Sys command to copy the hidden files.

   For other operating systems, follow the on-screen instructions to format and sys the CompactFlash.

6. Copy your operating system from the external device to the CompactFlash.
7. Change the boot sequence in Setup so that the CompactFlash (hard drive) is first. Remove the external device and power off the XE–800 SBC.
8. Reboot.

SDRAM

The memory socket can accept up to 256 MB capacity SO-DIMM modules using PC100 or PC133 memory sticks. Note that if the memory Speed in BIOS Setup is set to High, you must use PC133 memory sticks.

Battery backup for real time calendar clock

An AT battery can be installed to back up the CMOS real time clock. The battery can be installed J10.

Installing an AT battery

1. Power off the XE–800 SBC.
2. Install the 3.6V AT clock battery J10.

Table 7–1 Battery Connector

J10 – battery connector	
Pin#	**Pin Name**
1	Battery +
2	Key
3	nc
4	Battery –

Note See Appendix A: Mating connectors for mating information on the battery connector.

Chapter 8: External drives

Description

The XE–800 SBC is compatible with any standard IDE hard drive that has a 16-bit IDE interface. This includes CD-ROMs, CompactFlashes, and other IDE-compatible drives. The BIOS supports all IDE devices so no additional software is needed.

UltraDMA modes are not supported directly by the XE–800. These modes require an 80-pin connector, and there is no adapter available for the 44-pin, 2mm IDE connector used on the XE–800.

Note **The BIOS supports three IDE devices (which includes a CompactFlash).**

Hard disk controller

The XE–800 SBC supports three 16-bit IDE devices. Since the CompactFlash is connected to the primary IDE channel with a dedicated IDE controller, additional IDE devices connected through J4 will show up in Setup as secondary IDE devices (master and slave).

Standard IDE devices such as hard drives and CD-ROM drives are interfaced via a 44-pin connectors at J10. For those IDE devices that use a 40-pin interface, use the Octagon Systems IDE cable, #4080 or #6246.

UltraDMA modes are not supported directly by the XE–800. These modes require an 80-pin connector, and there is no adapter available for the 44-pin, 2mm IDE connector used on the XE–800.

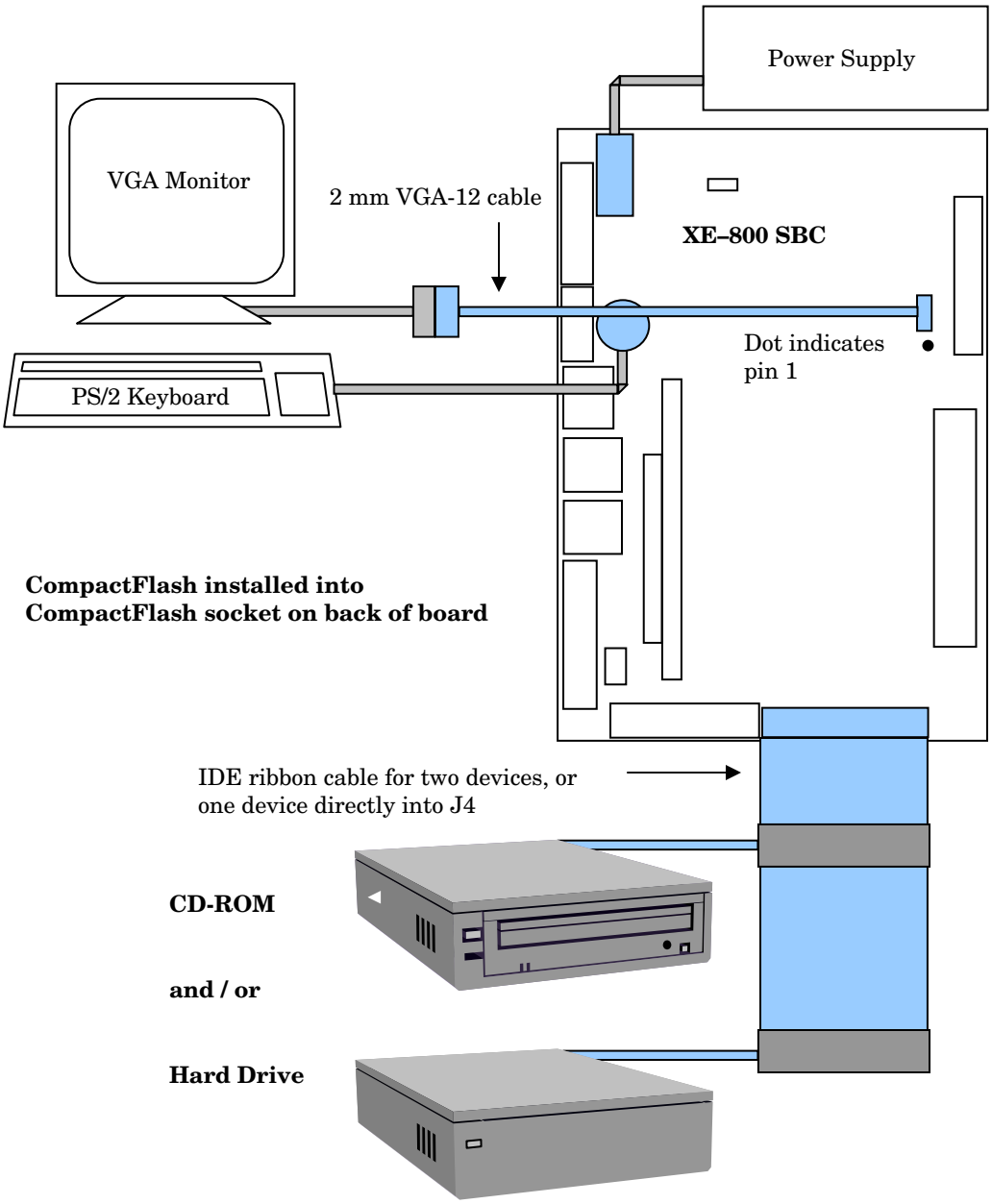
IDE combinations:

- 2 hard drives
- 1 hard drive and 1 CD-ROM drive
- CompactFlash and either of the above combinations

Master/slave designation for IDE devices

IDE devices have a jumper or a switch that designates whether the device is a master or a slave device. If only one device is connected to a port, it must be configured as a master. If two devices are connected, one must be configured as a master and one as a slave. The XE–800 does not use the CS signal (Cable Select) to designate master or slave on a multi-connector cable. You can use BIOS Setup to designate either the master or the slave as a boot device.

Figure 8–1 XE–800 SBC with IDE device



Installing a hard drive

1. Disconnect power to the XE–800 SBC.
2. Insert one end of the hard drive cable into the rear of the hard drive. Make sure pin 1 on the cable is connected to pin 1 of the drive.
3. Insert the other end of the cable into J4.
4. If you are connecting two IDE devices, ensure that one of them is configured as a master and one is configured as a slave (see page 117). If connecting one IDE device, ensure that it is configured as a master. The BIOS will not be able to detect an IDE device that is configured as a slave unless a master device is also installed.
5. Execute the BIOS Setup program to configure your system for a hard drive. You can execute this program by pressing “F2” during system bootup. The system steps you through the configuration. Also, refer to the Setup programs chapter for more information on the BIOS Setup program.
6. If you want to boot the system from the hard drive, you need to format the drive accordingly, and change the boot order in Setup.

Chapter 9: Bit-programmable digital I/O

Description

The bit-programmable digital I/O lines can be used to sense switch closures, turn on lamps and LEDs, and interface with other devices that have TTL input or output such as printers and scales. The digital I/O lines drive the Octagon MPB series opto-isolation module racks directly, controlling AC and DC loads to 240V at 3A. Tables 9–1 and 9–2 show the pinouts for the digital I/O connectors, arranged by function and by pin number. Figure 9–1 shows typical I/O configurations.

The I/O lines have the following specifications:

- Each I/O chip has 24 I/O lines, grouped into 3 ports of 8 bits
- Each bit is programmable as either 5V input or 5V output
- Read back state of each pin
- Easy-to-program
- Each line can sink and source 15 mA

Table 9–1 J6 and J14 arranged by function – digital I/O connectors

J14 (Digital I/O 1) and J6 (Digital I/O 2)					
Pin #	**Port A**	**Pin #**	**Port B**	**Pin #**	**Port C**
19	Bit 0	10	Bit 0	13	Bit 0
21	Bit 1	8	Bit 1	16	Bit 1
23	Bit 2	4	Bit 2	15	Bit 2
25	Bit 3	6	Bit 3	17	Bit 3
24	Bit 4	1	Bit 4	14	Bit 4
22	Bit 5	3	Bit 5	11	Bit 5
20	Bit 6	5	Bit 6	12	Bit 6
18	Bit 7	7	Bit 7	9	Bit 7
				2	+5V safe*
				26	Gnd

* +5V safe is fused through a 750 mA automatic, resetting fuse

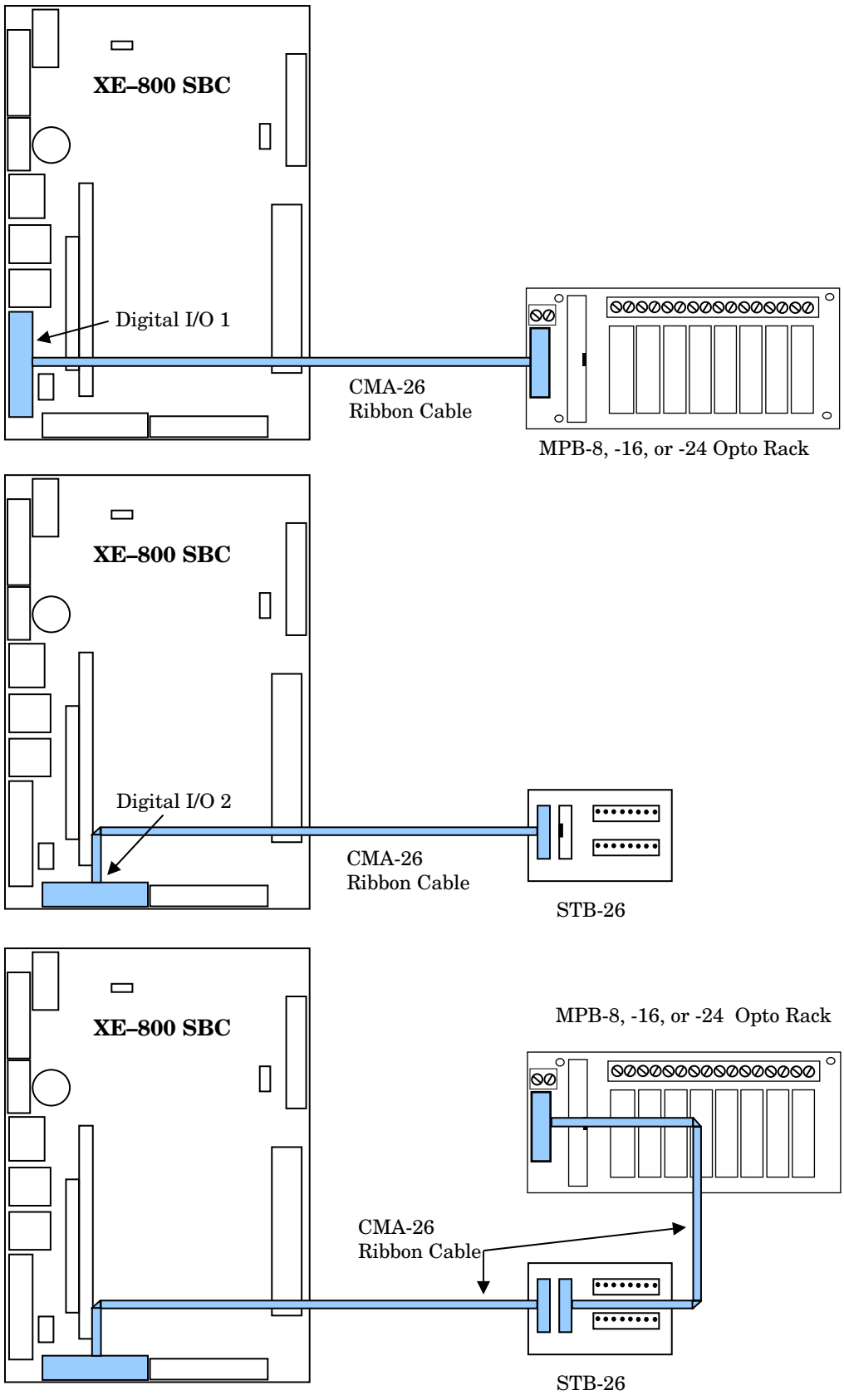
Note See the Accessories appendix for connector information for the digital I/O connector.

Table 9–2 J6 and J14 arranged by pins – digital I/O connectors

J14 (Digital I/O 1) and J6 (Digital I/O 2)			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	Port B, bit 4	Vcc (+5V)*	2
3	Port B, bit 5	Port B, bit 2	4
5	Port B, bit 6	Port B, bit 3	6
7	Port B, bit 7	Port B, bit 1	8
9	Port C, bit 7	Port B, bit 0	10
11	Port C, bit 5	Port C, bit 6	12
13	Port C, bit 0	Port C, bit 4	14
15	Port C, bit 2	Port C, bit 1	16
17	Port C, bit 3	Port A, bit 7	18
19	Port A, bit 0	Port A, bit 6	20
21	Port A, bit 1	Port A, bit 5	22
23	Port A, bit 2	Port A, bit 4	24
25	Port A, bit 3	Gnd	26

* +5V safe is fused through a 750 mA automatic, resetting fuse

Figure 9–1 Typical digital I/O configuration



Interfacing to switches and other devices

The STB-26 terminal board provides a convenient way of interfacing switches or other digital I/O devices to the I/O ports. I/O lines at the connectors can be connected to an STB-26 with a CMA-26 cable. Parallel I/O devices are then connected to the screw terminals on the STB-26. The illustration on page 60 shows an STB-26 terminal board connected to I/O 2. Refer to the STB-26 product sheet for more information.

Opto-module rack interface

You can interface digital I/O lines to an 8-, 16-, or 24-position opto-module rack. One end of the CMA-26 cable plugs into the I/O connector and the other plugs into an MPB–8, MPB–16, or an MPB–24 opto rack. Refer to the *MPB opto racks data sheet* for more information.

You can also use a CMA–26 cable to connect the I/O port to an STB–26 terminal board and then to the opto rack. The STB–26 has two 26-pin connectors, one of which connects to the I/O port, the other which connects to the opto rack. The illustration on page 60 shows both of these configurations.

For either configuration, run a separate power line to +5V and ground on the opto-rack.

Use the following table to determine the corresponding opto-channel position for ports A, B, and C for each I/O chip.

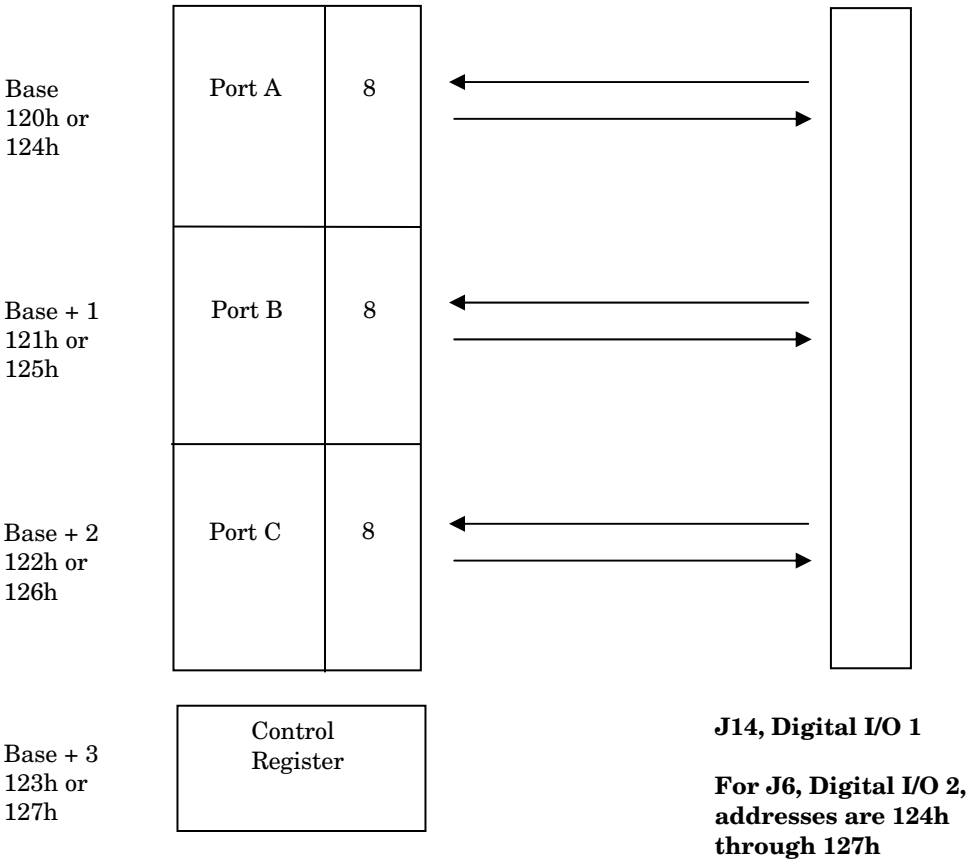
Table 9–3 Digital I/O opto-rack interface

Digital I/O opto-rack interface			
MPB opto rack		**I/O port**	**Connector pin**
Opto-module position		**Port C**	
0		Bit 0	13
1		Bit 1	16
2		Bit 2	15
3	**MPB-08**	Bit 3	17
4		Bit 4	14
5		Bit 5	11
6		Bit 6	12
7		Bit 7	9
		Port A	
8		Bit 0	19
9		Bit 1	21
10		Bit 2	23
11	**MPB-16**	Bit 3	25
12		Bit 4	24
13		Bit 5	22
14		Bit 6	20
15		Bit 7	18
		Port B	
16		Bit 0	10
17		Bit 1	8
18		Bit 2	4
19	**MPB-24**	Bit 3	6
20		Bit 4	1
21		Bit 5	3
22		Bit 6	5
23		Bit 7	7

Organization of banks

Each I/O digital bank has a total of 24 I/O lines connected to a 26-pin header. The lines are configured into three groups: ports A, B and C, each group consisting of 8 bits. Any of the lines at ports A, B or C can be configured individually as inputs or outputs.

Figure 9–2 Organization of banks



Port addressing

Ports A, B, C and the control register are addressable. The base I/O address for I/O 1 is fixed at 120h. The base address for I/O 2 is fixed at 124h. Ports A, B, C and the control register are addressable, with reference to the base address.

I/O lines pulled low

The I/O lines at ports A, B, and C are always pulled low. This allows a known state upon powerup. 10K ohm resistor networks are used to configure the I/O lines as low.

Configuring and programming the I/O ports

Each I/O chip has three ports with eight parallel I/O lines (bits) per port. All lines can be programmed as all inputs, all outputs or individually as inputs or outputs. You can alter which bits are inputs or outputs by writing a control command to the control register of the I/O bank. When a line is configured as an output, it can sink a maximum of 15 mA at 0.4V or can source 15 mA at 2.4V. On powerup and software or hardware reset, all digital I/O lines are reset as inputs.

Programming the I/O

Follow these steps to program the I/O chip:

1. Configure the I/O port bit directions, either as inputs or outputs.
2. Write to port A, B, or C with the desired level or read the bit level from the desired port.

Configuring the I/O

Follow these steps to configure the I/O chip.

Note In the following examples, "base" for I/O always refers to the base address for I/O 1 (120h). For I/O 2, base is 124h.

1. Write a "2" to the control register (base address + 3). This places the I/O chip in "direction" mode: (base address = 120h)

```
OUT 123h, 2  (control register, direction mode)
```

2. Set the direction of each bit. A "0" written to the corresponding line indicates an input and a "1" bit indicates an output. Each bit corresponds to the equivalent I/O line.

Table 9–4 I/O port byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Port I/O Line
X								7
	X							6
		X						5
			X					4
				X				3
					X			2
						X		1
							X	0

For example, writing 00011100 to port C (base address + 2) will configure port C I/O lines 0, 1, 5, 6, and 7 to be inputs and lines 2, 3, and 4 to be outputs:

```
OUT 122h, 1Ch (00011100 binary = 1C hexadecimal)
```

3. Write a "1" to the control register (base register + 3). This places the I/O chip into "preset" mode:

```
OUT 123h, 1   (control register, preset mode)
```

4. Write a bit pattern to appear at the outputs of the desired I/O port when the I/O chip is put in “operation” mode; all input bits are unaffected.

5. Write a “3” to the control register (base register + 3). This places the I/O chip back into “operation” mode:

```
OUT 123h, 3   (control register)
```

Writing and reading from I/O

Writing to or reading from the desired I/O port is accomplished with single program statements:

1. To write a bit pattern to the desired I/O port:

```
OUT 122h, FFh
```

All output bits of port C go high; all input bits are unaffected.

2. To read a bit pattern from the desired I/O port:

```
PORTC = INP(122h)
```

The byte read from port C is assigned to variable PORTC.

I/O output program examples

To configure ports A, B, and C as all outputs, issue the commands:

```
OUT 123h, 2   ‘Direction’ Mode

OUT 120h, FFh ‘PortA’

OUT 121h, FFh ‘PortB’

OUT 122h, FFh ‘PortC’

OUT 123h, 3   ‘Operation’ Mode
```

Ports A, B, and C will now output all “1”s after issuing the following commands:

```
OUT 120h, FFh (portA)

OUT 121h, FFh (portB)

OUT 122h, FFh (portC)
```

or all “0”s after:

```
OUT 120h, 0 (portA)

OUT 121h, 0 (portB)

OUT 122h, 0 (portC)
```

I/O input program examples

To configure ports A and C as inputs and port B as outputs, issue the following commands:

```
OUT 123h, 2   'Direction Mode'

OUT 120h, 0

OUT 121h, FF

OUT 122h, 0

OUT 123h, 3   'Operation Mode'
```

To read ports A and C, issue the following commands:

```
PORTA = INP(120h)   (port A)

PORTC = INP(122h)   (port C)
```

Enhanced INT 17h function definitions

This section provides definitions for the following functions using the INT17 handler, I17HNDLR.EXE: Initialize I/O, Write I/O, and Read I/O.

I17HNDLR.EXE is a TSR program and is called out by the XE–800 SBC BIOS. By default, when the "X" jumper is on, the INT17 extended BIOS is operational. If the "X" jumper is removed and DOS is the operating system, the I17HNDLR.EXE TSR can be used. Once executed, the TSR is active, but it must be executed each time the system is rebooted. Copy the I17HNDLR.EXE utility to your boot device and add it to your AUTOEXEC.BAT.

Note The INT17 functions can only be used with DOS operating systems. If you use a different operating system, the INT17 functionality can still be used by your application but must be integrated into your software.

Initialize I/O

```
Function:            efh
Subfunction:         00h
Purpose:             To set the directions and to program the
                     initial values of an I/O port.
Calling registers:   Ah     efh
                     AL     00h
                     DI     Port A configuration
                            Initial Data  Direction Mask
                            xxxxxxxx      xxxxxxxxB
                            direction: 1=output, 0=input
                     BX     Port B configuration
                            Initial Data  Direction Mask
                            xxxxxxxx      xxxxxxxxB
                            direction: 1=output, 0=input 0->input
                     CX     Port C configuration
                            Initial Data  Direction Mask
```

```
                              xxxxxxxx      xxxxxxxxB
                              direction: 1=output, 0=input
                        DX    ffffh
Return registers:       Carry flag cleared if successful
                        Carry flag set if error
                        AL    Error code
Comments:               This function is used to initialize the
                        I/O before normal use.
```

Programming example:

```
/* Inline assembly code for Borland C++ 3.1 */
asm {
            mov   ax,0ef00h
            mov   di,00ffh      /*port A all outputs,
                                   init data=all 0's */
            mov   bx,55ffh      /*port B all outputs,
                                   init data=55h*/
            mov   cx,0000h      /*port C all inputs*
            mov   dx,0ffffh
            int   17h
      }
```

Write I/O

```
Function:               efh
Subfunction:            01h
Purpose:                To write a value to an I/O port.
Calling registers:      AH    efh
                        AL    01h
                        DI    Port A mask and data
                              Mask    Data
                              xxxxxxxx  xxxxxxxxB
                              Mask: 1=bit to be changed
                        BX    Port B mask and data
                              Mask    Data
                              xxxxxxxx  xxxxxxxxB
                              Mask: 1=bit to be changed
                        CX    Port C mask and data
                              Mask    Data
                              xxxxxxxx  xxxxxxxxB
                              Mask: 1=bit to be changed
                        DX    ffffh
Return registers:       Carry flag cleared if successful
                        Carry flag set if error
                        AL    Error code
Comments:               This function is used to initialize the
                        I/O.
```

Programming example:

```
/* Inline assembly code for Borland C++ 3.1 */
asm {
            mov   ax,0ef01h
            mov   di,00ffh   /*port A: no change */
            mov   bx,8000h   /*port B: bit 7 set to 0*/
            mov   cx,0202h   /*port C: bit 1 set to 0*/
```

```
            mov   dx,0ffffh
            int   17h
      }
```

Read I/O

```
Function:            efh
Subfunction:         02h
Purpose:             To read from an I/O port.
Calling registers:   AH     efh
                     AL     02h
                     DX     ffffh
Return registers:    AL     Port A data
                     Ah     Port B data
                     BL     Port C data
Carry flag cleared if successful
Carry flag set if error
                     AL     Error code
Comments:            This function is used to read from the
                     I/O.
```

Programming example:

```
/* Inline assembly code for Borland C++ 3.1 */
asm {
            mov    ax,0efoch
            mov    dx,0ffffh
            int    17h
            mov    aData,al
            mov    bData,ah
            mov    cData,bl
      }
```

Chapter 10: CRTs and flat panels

Description

The video system on the XE–800 SBC is implemented with the CS5530A companion chip. It supports CRTs and TFT flat panel displays. Displays from CGA through XVGA are supported. The XE–800 SBC supports 3V flat panel displays through the connector. 5V panels must be powered from an alternate source.

Standard VGA monitors with analog inputs are connected using a 2 mm VGA–12 cable (p/n 6392) connected to J3. Flat panel displays are connected using a 40-pin connector.

Note EL panels, and some quarter VGA panels are not supported. Call Technical Support for information.

Video features

Below is a list of standard video features installed on the XE–800 SBC:

- CRT support with resolutions to 1280 x 1024 x 16 at 60 Hz
- Flat panel support with the following resolutions:
  640 x 480 x 24 bpp
  800 x 600 x 24 bpp
  1024 x 768 x 16 bpp
- Support for plasma and TFT flat panel displays
  3V flat panel support (5V requires alternate power source)
  Flat panel power sequencing

Connecting a monitor

To use a monitor or a flat panel, the Video jumper (W1[5–6]) must be installed. This is the default configuration. The 10-pin connector at J3 supports an analog CGA/VGA/SVGA/XVGA CRT color or monochrome monitor. The 2 mm VGA–12 cable connects to J3 and provides a DB–15 video mating connector for a CRT. Refer to figure 10–1 for a diagram of connecting a CRT, and table 11–1 for the pinout for J3.

The XE–800 SBC supports both an analog monitor and/or a flat panel display. The CT.COM and FP.COM programs allow you to toggle between the monitor and the flat panel. If the flat panel supports simultaneous mode, the SM.COM program will allow you to display images from both the monitor and the flat panel at the same time. These programs are on the Utility zip file along with other diagnostic and configuration utilities (see page 113). Refer to the README file.

To connect a monitor you will need the following equipment (or equivalent):

- XE–800 SBC
- 2 mm VGA-12 cable, p/n 6392
- VGA/SVGA monitor

To connect a monitor:

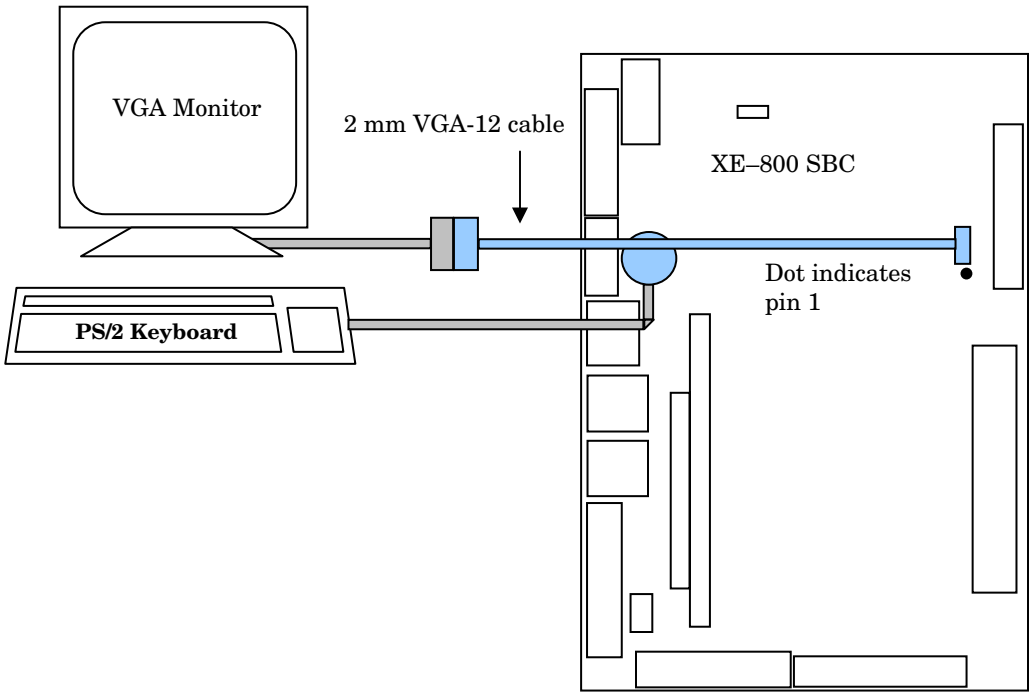
1. Ensure that the Video jumper (W1[5–6]) is installed.
2. Plug the VGA–12 adapter cable into J3 on the XE–800 SBC.
3. Plug the DB–15 end of the VGA–12 cable into the VGA cable of the monitor.

Refer to Figure 10–1.

Table 10–1 J3 – CRT connector

J3, CRT Connector			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	RD	GR	2
3	BL	GND	4
5	+5V	GND	6
7	HSYNCOUT	DDC SDA	8
9	DDC SCL	VSYNCOUT	10

Figure 10–1 The XE–800 SBC and a VGA monitor



Connecting a flat panel display

Due to the varied selection of available flat panels, the XE–800 SBC is factory configured and programmed for a VGA/SVGA/XVGA CRT monitor. If you are using a flat panel, you must reprogram the video BIOS with the appropriate flat panel driver. To reprogram your video BIOS refer to *Programming the video BIOS* in this chapter. Note that 3V flat panels are supported through the connector, while 5V panels require an alternate power source.

The Utility zip file (page 113) contains text files for each of the supported flat panels. These text files include wiring diagrams specific to individual flat panels. Refer to the specific text file associated with your flat panel to build an interface cable, and to determine the correct settings for the flat panel jumpers. Flat panel displays are connected using a 40-pin connector at J1.

Table 10–2 shows the pinout for the connector for flat panels.

Flat panels requiring bias voltage

Some flat panels require a bias voltage. To determine if your flat panel requires bias voltage, refer to the text file in the Utility zip file which is specific to your flat panel or refer to your flat panel information. If your flat panel requires a bias voltage, refer to the manufacturer's documentation for procedures on supplying the proper bias voltage.

WARNING!

Since improper voltage levels can severely damage the flat panel, make sure the bias voltage is correct before the flat panel is connected to the XE–800 SBC.

Connecting the flat panel to the XE–800 SBC

Text files are located in the Utility zip file. These text files include wiring diagrams specific to individual flat panels. Refer to the specific text file associated with your flat panel to build your cable. The maximum recommended cable length is 18 inches. Table 10–2 shows the pinout for the flat panel connector.

1. Ensure that the Video jumper (W1[5–6]) is installed.
2. Refer to the text file associated with your flat panel to determine the supply voltage for your panel, and whether a bias voltage is required.
3. Connect a cable from the flat panel to the flat panel connector. Refer to Figure 10–2.

Warning

Improper wiring or connection from the flat panel to the XE–800 SBC can damage the XE–800 SBC and the flat panel. Verify the flat panel cable connections before connecting the cable to the XE–800 SBC and applying power to the system.

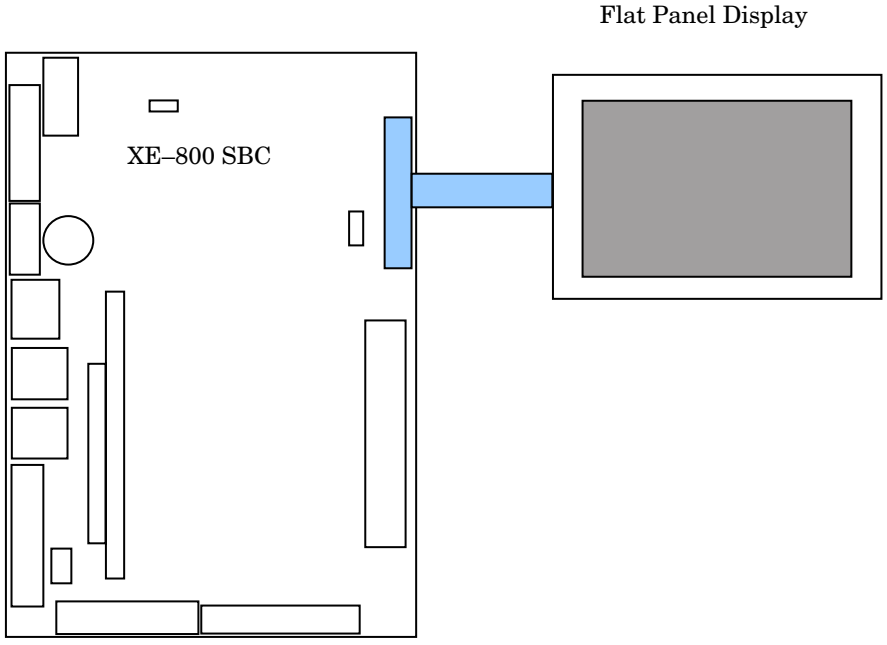
Note See Appendix A – Connectors for mating information.

Table 10–2 Flat panel connector: J1

J1 – flat panel connector			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	FPCLK	Gnd	2
3	Gnd	FPDATA[12]	4
5	FPDATA[0]	FPDATA[13]	6
7	FPDATA[1]	FPDATA[14]	8
9	FPDATA[2]	SCL	10
11	FPDATA[3]	SDA	12
13	Gnd	FPDATA[15]	14
15	FPDATA[4]	FPDATA[16]	16
17	FPDATA[5]	FPDATA[17]	18
19	FPDATA[6]	Gnd	20
21	FPDATA[7]	FPDISPEN	22
23	Gnd	VCC3	24
25	FPDATA[8]	VCC3	26
27	FPDATA[9]	FPVSYNC	28
29	FPDATA[10]	Gnd	30
31	FPDATA[11]	FPHSYNC	32
33	Gnd	VCC3	34
35	PCIRST*	VCC3	36
37	Gnd	Gnd	38
39	Gnd	Gnd	40

* active low

Figure 10–2 The XE–800 SBC and a flat panel display



Programming the video BIOS

The XE–800 SBC BIOS is factory configured and programmed for a 640 x 480 CRT monitor. If you wish to use a flat panel, you must reprogram the video BIOS with the appropriate flat panel driver. To reprogram your video BIOS, load the appropriate driver from the Utility zip file (page 113).

Note Refer to the README.DOC file for a list of the supported flat panel displays. If your particular display is not currently listed, contact Octagon Technical Support (303–426–4521) for assistance.

To load a new BIOS to support a different flat panel:

1. Attach a CRT monitor, a PS/2 compatible keyboard, and a CompactFlash to the XE–800 SBC.

Note If a monitor and keyboard are not available, connect the XE–800 SBC to your PC by using a remote serial console. Refer to the Serial Console section in the Console devices chapter.

2. Power on the XE–800 SBC.
3. Select the correct .DAT file. Example: LQ12S31.DAT
4. Run PGMVIDEO. Example:

```
XE-800 SBC C:\> PGMVIDEO \XE800\BIOS\LQ12S31.DAT
```

5. Power off the XE–800 SBC.
6. Install the flat panel and then apply power to the system.

Additional notes on video BIOS

The video BIOS is stored in EEPROM. If this BIOS should become corrupted, you will have to reprogram it. To do so, remove the Video jumper W1[5–6] and the “S” jumper W1[1–2]. Connect a serial console to COM1 to establish communication with the XE–800 SBC. Repeat the procedure above to program the video BIOS.

Chapter 11: Ethernet

Description

The XE–800 SBC provides a 10/100BaseT Ethernet port and supports the IEEE 802.3 Ethernet standard. The XE–800 SBC uses the Intel 82551ER Ethernet chip. This chip is fully Plug-N-Play compatible.

The Ethernet controller IC chip provides the following:

- 8K x 16 SRAM buffer
- Integrated 10/100 BaseT transceiver interface
- Two LEDs for link and traffic status integrated into connector

The XE–800 SBC Ethernet uses twisted–pair wiring cable, which is built in a star configuration. The interface terminates at the standard, 8–position, RJ–45 latching jack.

CAUTION

Use a strain relief loop when connecting to the XE–800 SBC Ethernet connector to avoid damaging the connector.

The Ethernet port uses IRQ11.

For more information on programming the Ethernet port, see the README file in the Ethernet directory of the Utility zip file (see page 113).

Table 11–1 Ethernet LEDs

Ethernet LEDs		
Function	**Color**	**Description**
Activity LED	Amber	Activated by access to I/O space
Link LED	Green	Activated by network link

Chapter 12: PC/104 and PC/104 Plus expansion

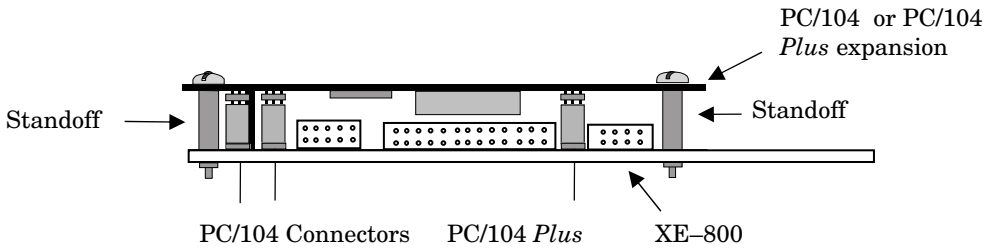
Description

The PC/104 and PC/104 *Plus* connectors allow you to interface expansion modules such as A/D converters, CardBus, digital I/O, serial ports, etc. Modules can be stacked to form a highly integrated control system. The PC/104 *Plus* expansion bus supports mastering devices.

Note The actual maximum number of modules in a stack is limited primarily to the capacitive loading on the bus and the electrical noise environment. This is especially true when wide temperature operation is required. Good design practice dictates that the modules present only one load to each bus signal. Unfortunately, there are modules on the market that violate this practice by loading the bus more heavily. Typically, it is the IOW*, IOR*, MEMW*, and RSTDRV* lines. For example, if the IOW* line is routed to four ICs on the module without a buffer, then the loading is equivalent to four PC/104 modules. Stacks with three or more expansion modules should be carefully tested under all environmental conditions. If possible, query the manufacture of the expansion module regarding loading. All Octagon products present one load.

The situation is even more critical for the PC/104 *Plus* connector since the bus speed is four times faster. The PC/104 *Plus* connector and the PC/104 *Plus* module represent one load each. Adding more than one PC/104 *Plus* module (two loads) should trigger the same testing as discussed in the previous paragraph.

Figure 12–1 Typical PC/104 module stack



WARNING!

When installing any PC/104 or PC/104 *Plus* module, avoid excessively flexing the XE–800 SBC. Mate pins correctly and use the required mounting hardware.

Note See *Appendix A - Connectors* for mating information.

Chapter 13: USB

Description

Universal Serial Bus (USB) is a hardware interface for peripherals such as the keyboard, mouse, joystick, scanner, printer, and telephony devices. USB 2.0 has a maximum trasnfer rate of 480 Mbits/sec; USB 1.1 has a maximum transfer rate of 12 Mbits/sec. Peripherals can be plugged in and unplugged while power is applied to the system (see Caution below). Up to 127 devices can be attached. The XE–800 SBC contains four USB 2.0 compliant ports and two USB 1.1 compliant ports.

The 2.0 compliant ports are accessed via standard USB connectors at J12 (USB 3 and 4) and J13 (USB 5 and 6). The 1.1 compliant ports are accessed via a 10-pin, 0.1" pitch connector at J16 (USB 1 and 2).

Octagon provides a cable that routes the J16 signals to standard USB connectors (Octagon p/n 6288). This cable consists of two five-pin connectors that mate with the J16 connector on one end, and two USB connectors at the other end. Ensure that the arrow on the five-pin connectors is matched to the pin 1 end of J16. Any USB device can then plug into either USB interface on the USB adapter cable, or into a multi-port hub that then plugs into the USB adapter cable.

An operating system capable of utilizing the USB ports and USB devices is required for USB operation.

Caution

USB devices are hot-swappable when a device is plugged into a standard USB connector (J12 and J13), as pins on the connectors determine the order in which they make contact. Devices are not hot-swappable when connected to a non-standard header (J16). You can hot swap a device through the USB Adapter cable connected to J16, or through another USB connector wired to the 10-pin header, but you cannot hot swap at the 10-pin header itself.

Overview: Section 3 – System management

Section 3 provides information on managing the XE–800 SBC in the areas of internal control and troubleshooting. The following chapters are included:

Chapter 14: Watchdog timer and hardware reset

Chapter 15: Serial EEPROM

Chapter 16: System jumpers, user jumper, and BIOS recovery

Chapter 17: Troubleshooting

Chapter 14: Watchdog timer and hardware reset

Description

The watchdog timer is a fail-safe against program crashes or processor lockups. It has a programmable timeout period, ranging from 2.0 milliseconds to 2 minutes (see next section). The watchdog timer can be enabled or disabled in Setup. INT17 software calls, a built–in function on the XE–800 SBC, can also be used to enable and set the timeout, extend the timeout, strobe, and disable the watchdog timer from your application. If the timer expires, it performs a hardware reset.

Timeout period (ranges)

Although the timeout periods are listed as 2.0 milliseconds to 2 minutes, the actual timeouts are ranges of ±50% of the listed values. Therefore, for a selected timeout period of 2 minutes, the timeout could expire in as little as one minute or as long as three minutes. To ensure that the watchdog does not reset the system accidentally, always **strobe the watchdog at a rate of at least twice the selected timeout period.**

Booting, power down, and strobing the watchdog timer

When the watchdog is enabled in Setup, it sets the timeout period for two minutes. The BIOS will strobe the watchdog during the boot process and once more just before booting is finished. The user's application must then begin strobing. The watchdog will continue until it is disabled or power down occurs.

If the watchdog is enabled in Setup and your operating system cannot load up before the timer expires, your system could reset. Also, if you do not disable the watchdog and your strobing application ends before power down you could again reset. If these watchdog situations should occur, remove the "S" jumper W1[1–2] and reboot. This causes the XE–800 SBC to boot using Setup defaults (watchdog disabled). Enter Setup, then change and save the watchdog settings in Setup.

Watchdog function definitions using enhanced INT 17h handler

This section provides definitions for the watchdog functions using the INT17 handler, stored in the extended BIOS area that is enabled by the X jumper, or the I17HNDLR.EXE utility. I17HNDLR.EXE is a TSR program. Once executed it is active, but it must be executed each time the system is rebooted. If you use a different BIOS, the INT17 functions can still be used by your application. Copy the I17HNDLR.EXE utility to your hard drive and add it to your AUTOEXEC.BAT.

The INT17 handler is designed for DOS based applications. If you use a different operating system and the watchdog functions are required for your application, source code is available on the Octagon Product CD-ROM to access the watchdog. OS Development Kits are available from Octagon for Linux, QNX, and Windows CE.net that have watchdog drivers for these operating systems. Contact Octagon Systems for more information.

Enable watchdog

Function:	fdh
Subfunction:	01h
Purpose:	To enable the watchdog.
Calling registers:	AH fdh AL 01h BX timeout (0=2 ms, 1=20 ms, 2=60 ms, 3=200 ms, 4=2 s, 5=20 s, 6=120 s, 7=na) DX ffffh
Return registers:	None
Comments:	This function enables the watchdog. Once the watchdog is enabled, it has to be strobed at least twice per timeout period specified or until the watchdog is disabled. Otherwise, a system reset will occur.

Programming example:

```
/* Inline assembly code for Borland C++ 3.1 */
/* set watchdog to two second timeout */
  asm {
            mov ax,0fd01h
            mov bx,4
            mov dx,0ffffh
            int 17h
        }
```

Strobe watchdog

```
Function:            fdh
Subfunction:         02h
Purpose:             To strobe the watchdog.
Calling registers:   AH     fdh
                     AL     02h
                     DX     ffffh
Return registers:    None
Comments:            This function strobes the watchdog.  Once the
                     watchdog is enabled, it has to be strobed at
                     least twice per timeout period or until the
                     watchdog is disabled.  Otherwise, a system reset
                     will occur.
```

Programming example:

```
/* Inline assembly code for Borland C++ 3.1 */
  asm {
            mov ax,0fd02h
            mov dx,0ffffh
            int 17h
        }
```

Disable watchdog

```
Function:            fdh
Subfunction:         03h
Purpose:             To disable the watchdog.
Calling registers:   AH     fdh
                     AL     03h
                     DX     ffffh
Return registers:    None
Comments:            This function disables the watchdog.  Once the
                     watchdog is enabled, it has to be strobed at
                     least twice per timeout period or until the
                     watchdog is disabled.  Otherwise, a system reset
                     will occur.
```

Programming example:

```
/* Inline assembly code for Borland C++ 3.1 */
  asm {
               mov ax,0fd03h
               mov dx,0ffffh
               int 17h
        }
```

Hardware reset

The reset switch (Switch SW1) allows you to reset the system without turning off the power. This provides a more complete reset than the <CTRL><ALT><DEL> method. Depressing this button pulls the circuit to ground and resets the system.

The RESET command accomplishes the same thing as the reset button. Refer to the component diagram in the Quick start chapter for the location of the reset switch, and to *Appendix B, Software utilities*, for information on the Reset utility.

WARNING!

When using COM1 as the console, the <CTRL><ALT> <DEL> commands on the host system keyboard only reset the host system. Use the RESET command to issue a hardware reset on the XE–800 SBC.

Chapter 15: Serial EEPROM

Description

Up to 1024 words of user-definable data can be saved in the serial EEPROM. The serial EEPROM does not require battery backup to maintain the data when the system power is off. The serial EEPROM is easily accessible via software interrupts by most programming languages.

Enhanced INT 17h function definitions

The serial EEPROM definitions include the following functions: Read a single word from serial EEPROM, Write a single word to serial EEPROM, Read multiple words from serial EEPROM, Write multiple words to serial EEPROM, and Return serial EEPROM size.

Serial EEPROM

Read a single word from the serial EEPROM

```
Function:            fch
Subfunction:         00h
Purpose:             To read a single word from the on-board serial
                     EEPROM.
Calling registers:   AH     fch
                     AL     00h
                     BX     Word address (zero based)
                     DX     ffffh (User area relative address)
Return registers:    Carry flag cleared if successful
                     AX     Word read
Carry flag set if error
                     AL     Error code
                Error code  Meaning
                     ffh    Unknown error
                     01h    Function not implemented
                     02h    Defective serial EEPROM
                     03h    Illegal access
Comments:            This function reads a word from the user area of
                     the serial EEPROM.
```

Programming example:

```
/* Read word 2*/
unsigned int seeData;
/* Inline assembly code for Borland C++ 3.1*/
asm {
     mov ax,0fc00h
     mov bx,02h /* Read word 2*/
     mov dx,0ffffh
     int 17h
     mov seeData,ax/* store data in c environment */
```

```
    }
```

Write a single word to the serial EEPROM

Function:	fch	
Subfunction:	01h	
Purpose:	To write a single word to the on-board serial EEPROM.	
Calling registers:	AH	fch
	AL	01h
	BX	Word address (zero based)
	CX	Data word to write
	DX	ffffh (User area relative address)
Return registers:	Carry flag cleared if successful	
	Carry flag set if error	
	AL	Error code

Error code	**Meaning**
ffh	Unknown error
01h	Function not implemented
02h	Defective serial EEPROM
03h	Illegal access

Comments: This function writes a word to the user area of the serial EEPROM.

Programming example:

```
/* Write 0x1234 to word 3*/
unsigned int seeData = 0x1234;
/* Inline assembly code for Borland C++ 3.1*/
asm {
  mov ax,0fc01h
  mov bx,03h /* Write word 3*/
  mov cx,seeData/* Get write data from c environment */
  mov dx,0ffffh
  int 17h
    }
```

Read multiple words from the serial EEPROM

Function:	fch	
Subfunction:	02h	
Purpose:	To read multiple words from the on-board serial EEPROM.	
Calling registers:	AH	fch
	AL	02h
	BX	Word address (zero based)
	CX	Word count
	DX	ffffh
	ES:DI	Destination pointer
Return registers:	Carry flag cleared if successful	
	AX	Word read
Carry flag set if error		
	AL	Error code

Error Code	**Meaning**
ffh	Unknown error
01h	Function not implemented

	02h	Defective serial EEPROM
	03h	Illegal access
Comments:	This function reads multiple words from the user area of the serial EEPROM.	

Programming example:

```
/* Read 10 words starting at word 5*/
unsigned int far*seeDataPtr = new unsigned int[10];
/* Allocate storage /
/ Inline assembly code for Borland C++ 3.1*/
asm {
  mov ax,0fc02h
  mov bx,05h /* Read starts at
        word 5*/
  mov cx,10  /* Read 10 words */
  mov dx,0ffffh
  les di,seeDataPtr
  int 17h
  }
```

Write multiple words to the serial EEPROM

Function:	fch	
Subfunction:	03h	
Purpose:	To write multiple words to the on-board serial EEPROM.	
Calling registers:	AH	fch
	AL	03h
	BX	Word address (zero based)
	CX	Word count
	DX	ffffh
	DS:SI	Source pointer
Return registers:	Carry flag cleared if successful	
	Carry flag set if error	
	AL	Error code
Error Code	**Meaning**	
	ffh	Unknown error
	01h	Function not implemented
	02h	Defective serial EEPROM
	03h	Illegal access
Comments:	This function writes multiple words to the user area of the serial EEPROM.	

Programming example:

```
/* Write 8 words starting at word 6*/
unsigned int far*seeDataPtr = new unsigned int[8];
/* Allocate storage /
  unsigned int far tmpPtr = seeDataPtr;
  for(int I=0;I<8;I++)
  seeDataPtr = I;  / initialize data /
/ Inline assembly code for Borland C++ 3.1*/
  asm {
  push   ds
  mov ax,0fc03h
  mov bx,06h /* Write starts at
        word 6*/
  mov cx,8   /* Write 8 words */
  mov dx,0ffffh
  lds si,seeDataPtr
  int 17h
```

```
    pop ds
    }
```

Return serial EEPROM size

Function:	fch	
Subfunction:	04h	
Purpose:	To obtain the size of the on-board serial EEPROM.	
Calling registers:	AH	fch
	AL	04h
	DX	ffffh
Return registers:	Carry flag cleared if successful	
	AX	Size of the serial EEPROM (in words)
	BX	Size available to user (in words)
Carry flag set if error		
	AL	Error code

Error code	**Meaning**
ffh	Unknown error
01h	Function not implemented
02h	Defective serial EEPROM
03h	Illegal access

Comments: This function returns the size (in words) of the serial EEPROM. Since the user cannot access all of the serial EEPROM, this function determines how much space is available to the user. This avoids the user from accessing unavailable addresses.

Programming example:

```
unsigned int seeUserSize;
/* Inline assembly code for Borland C++ 3.1*/
asm {
    mov ax,0fc04h
    mov dx,0ffffh
    int 17h
    mov seeUserSize,bx
    }
```

Chapter 16: System jumpers, user jumper, and BIOS recovery

System jumpers

Various system function options are selected with jumper block W1.

The “S” jumper selects whether the card boots from user defined parameters (defined in the Setup Programs chapter), or the BIOS defaults. Removing this jumper allows the user to return to factory programmed defaults.

The “X” enables or disables the BIOS extension area. The default is enabled, which uses the INT17 calls.

The “V” jumper enables or disables the on-card video, allowing an external video card, or the serial console to be used.

The “U” jumper is user defined and can be used for program control.

The “R” jumper, when removed, allows the BIOS to be reinstalled from a remote system over a serial console connection.

Table 16–2 System configuration jumper: W1

W1 – System Configuration		
Label	**Description**	**W1**
S	System parameters option jumper: Installed = enable User Setup options* Removed = enable BIOS Setup default	[1–2]*
X	BIOS extension enable Installed = enable extended BIOS* allows use of INT17 calls without loading I17HNDLER.EXE Removed = disables extended BIOS frees location D8000 - DFFFF	[3–4]*
V	Video jumper: Installed = enable on-card video* Removed = disable on-card video	[5–6]*
U	User jumper	[7–8]*
R	Bios recovery jumper: Installed = normal BIOS operation* Removed = allows new BIOS to be installed	[9–10]*

* = default

System jumper

The system jumper is W1[1–2]. When this jumper is present the system boots using the parameters stored in Setup. When this jumper is removed the system boots using the factory defaults for all parameters in Setup. Note that if you must remove the system jumper to recover your system, the user-defined parameters in Setup will not be changed unless you enter Setup, make the changes, and exit saving changes.

Extended BIOS jumper

The extended BIOS jumper is W1[3–4]. The extended BIOS memory region (D8000h to DFFFh) contains the Octagon INT17 functions. When this jumper is removed, this memory region is freed up for other uses. Note that if you want to use the INT17 functions, you must either leave the jumper installed or copy those functions elsewhere.

You can also modify the extended BIOS using the MAKEBIOS.BAT file. Type MAKEBIOS ? for a list of available options.

Note If you are using an operating system other than DOS the X jumper should be removed. The X jumper maps the INT17 extended BIOS into the 0xD8000-0xDFFFF memory. This can cause problems with applications or hardware running on other operating systems if they attempt to use this memory range. Removing the X jumper frees this memory for use by other operating systems.

Video jumper

The video jumper is W1[5–6]. When this jumper is installed the on-card video is enabled. To use a serial console, or an extension-card video (such as a PC/104), remove this jumper.

User jumper

The user jumper is W1[7–8] and is associated with GPIO 23 of the Winbond SuperIO controller. The INT17 functions provide an easy method to implement software routines according to whether or not a jumper has been installed. Refer to the INT17 calls to read user jumper on page 88.

BIOS recovery jumper

The BIOS recovery jumper on the XE–800 SBC is W1[9–10]. This jumper allows you to reinstall the BIOS from a floppy disk using a serial link from COM1 of the XE–800 SBC to COM1 of a host computer. When the BIOS recovery jumper is removed, the system will use the boot block recovery process to program a new BIOS.

The BIOS recovery process uses the embflash.exe utility. This utility can be obtained from Octagon Technical Support. To use the BIOS recovery jumper the following steps must be taken:

1. Copy the EMBFLASH.EXE, PLATFORM.BIN, CLIENT.BIN, and BIOS.ROM files to the root directory of a bootable floppy disk.
2. Remove power from the XE–800 SBC.
3. Remove the W1[9–10] BIOS jumper and the video jumper W1[5–6].
4. Connect a serial console between the XE–800 SBC and a host computer as described on page 50.
5. Put the bootable floppy disk from step 1 with the embflash.exe and support files in drive A of the host computer, and reboot the host computer from the floppy drive.

6. Power up the XE–800 SBC. If you have a post card, you can place it on the XE–800 SBC PC/104 bus and the system will boot to a post A1, or you can allow about 5 seconds for the system to boot to the boot block recovery state.

7. On the host computer type embflash<enter>. The host computer will display a status screen that shows the progress of the BIOS programming.

8. When the status screen indicates the process is complete power down the XE–800 SBC and replace the W1[9–10] jumper. The new BIOS will now be used when the XE–800 SBC is re-started.

BIOS programming using PHLASH.EXE

The BIOS on the XE–800 SBC can be reprogrammed using the PHLASH.EXE utility. This utility can be found in the Utility zip file (see page 113). To program the new BIOS the following steps must be taken:

1. Copy PHLASH.EXE, PLATFORM.BIN, and BIOS.ROM from the \XE800\EXTBIOS subdirectory to the root of a bootable CompactFlash disk.

2. Boot the XE–800 SBC from the CompactFlash disk with a CRT monitor or flat panel connected to the system. Note that HIMEM.SYS or other memory managers cannot be used in CONFIG.SYS.

3. At the DOS prompt for the “C” drive type phlash <enter>.

The utility will display a progress screen and tell you when the process is done. You may need to push the reset button or cycle the power on the system to boot from the updated BIOS.

INT17 calls to read user jumper

The user jumper is W1[7–8]. The INT17 functions provide an easy method to implement software routines according to whether or not a jumper is installed.

```
Function:            0fbh
Sub-Function:        0bh
Purpose:             To read user jumper

Calling Registers:   AH     0fbh
                     AL     0bh
                     DX     0ffffh

Return Registers:    Carry flag cleared if successful
                     AL     Jumper data
                            bit 0 user jumper A. 1=on, 0=off
Carry flag set if error
                     AL     Error code
Comments:            This function shall be used to read the user
                     jumper
```

Programming example:

```
 /* Inline assembly code for Borland C++ 3.1 */
unsigned char aData;
asm {
```

```
        MOV AX, 0fb0bh
        MOV DX, 0ffffh
        INT 17h
        MOV aData, AL
            }
if (aData & 1)
printf("U1 jumper is ON\n");
```

Chapter 17: Troubleshooting

If your system is not working properly, check the following items.

Boot Block Recovery

The XE–800 SBC supports boot block recovery. This feature allows the user to reprogram the system BIOS over COM1 using an VTC-20F cable, a null modem adapter, a floppy disk, and a host computer. This option should only be necessary if a BIOS has been programmed into the XE–800 SBC and is either corrupted or non-bootable. For more information covering the boot block recovery process read the Boot block recovery section in chapter 16 and call Octagon Systems Technical Support.

Memory conflicts using operating system other than DOS

If you are using an operating system other than DOS the X jumper should be removed. The X jumper maps the INT17 extended BIOS into the 0xD8000-0xDFFFF memory. This can cause problems with applications or hardware running on other operating systems if they attempt to use this memory range. Removing the X jumper frees this memory for use by other operating systems.

No system LED activity

If there is no LED activity at CR9, check the following:

- Make sure all PC/104 or PC/104 *Plus* expansion cards are removed from the XE–800 SBC. This ensures that other cards are not interacting with the XE–800 SBC.
- Remove the jumper from the “S” position at W1[1–2].
- Check all power connections to the XE–800 SBC card.
- Measure the supply voltage at the J8 power connector and verify that the voltage at the XE–800 SBC card is +5V (+/–0.25V).
- Make sure your power module provides +5V (+/–0.25V) and at least 2.5A of current.

No CRT or flat panel video

If the LEDs appear to be functioning properly, but there is no video activity, check the following:

- Make sure all PC/104 or PC/104 *Plus* expansion cards are removed from the XE–800 SBC. This ensures that other cards are not interacting with the XE–800 SBC.
- Remove the jumper from the “S” position at W1[1–2].
- If using a CRT monitor, check the cable and connections going from the J3

connector to the monitor.

- If using a flat panel display, check the following:
  Check the power and cables going to the flat panel display.
  Make sure that the power module has enough current capacity to power both the XE–800 SBC card and the flat panel.
- If a flat panel BIOS has been programmed into the XE–800 SBC that is incorrect for the flat panel being used and an analog monitor is not present or is not displaying the video data correctly, the system can be booted via the serial console by doing the following:

  1. Remove the “S” and the “V” jumper.
  2. Connect the COM port of a host computer running HyperTerminal or some other terminal software to COM1 on the XE–800 SBC using a serial console (see page 50.) The serial port settings on the host computer should be 38.4K baud, 8, N, and none.
  3. Power up the XE–800 SBC; it will boot using the serial console interface. Once the system has successfully booted you can use the pgmvideo.exe utility to either program the desired flat panel VIDEO BIOS into the XE–800 SBC or program in the CRT.DAT file for analog monitor support to recover the system.
  4. Replace the “S” and “V” jumpers and re-boot the system.

Video is present but is distorted

If video is present but is distorted, check the following:

- Make sure all PC/104 or PC/104 *Plus* expansion cards are removed from the XE–800 SBC. This ensures that other cards are not interacting with the XE–800 SBC.
- Remove the jumper from the “S” position at W1[1–2].
- If using a CRT monitor, check the cable and connections going from the J3 connector to the monitor.
- If using a flat panel display, check the following:

  1. Cable and connections going from the XE–800 SBC to the flat panel display.
  2. Signal cable going to the flat panel display. If the cable length is too long, the distortion may be caused by noise. 18” or less is the recommended length. Cable shielding may be required.
  3. Power cable going to the flat panel display.
  4. Power module for the flat panel. Make sure that the power module has enough current capacity to power both the XE–800 SBC and the flat panel.

No serial console activity

If the serial console does not appear to be functioning correctly, check the following:

- Make sure all PC/104 or PC/104 *Plus* expansion cards are removed from the XE–800 SBC. This ensures that other cards are not interacting with the XE–800 SBC.
- Remove the jumper from the "S" position at W1[1–2].
- Make sure the COM1/2 connector on the XE–800 SBC is used.
- Make sure a null modem adapter is installed between COM1 of the VTC-20F cable and the serial port of your PC.
- Make sure that your terminal emulator (such as HyperTerminal) on your PC is set up properly. Refer to the Console devices chapter. Refer to the HyperTerminal manual for information on setting up communication parameters.
- After verifying the above conditions, you can monitor voltage levels by connecting an oscilloscope between the TxD* line on COM1 and ground. After power-up, you should see a burst of activity on the oscilloscope screen. The voltage level should switch between +/–8V.

Garbled serial console screen activity

If you do get activity on your console screen but the message is garbled, check the following:

- Remove the jumper from the "S" position at W1[1–2] to ensure the default settings for COM1.
- Make sure that your terminal emulator (such as HyperTerminal) on your PC is set up properly. Refer to the Console devices chapter. Refer to the HyperTerminal manual for information on setting up communication parameters.

System generates a BIOS message but locks up when booting

- Remove the jumper from the "S" position at W1[1–2] and reboot.
- Verify that all the necessary boot files exist on the boot device. Copy any missing files to the boot device.
- If no files are missing, overwrite any files which may have become corrupted. In addition, you may want to format the boot device.

System will not boot from CompactFlash

Many CompactFlash devices as shipped from the factory are not bootable devices. Refer to the CompactFlash, SDRAM, and battery backup chapter to make your CompactFlash bootable.

System locks up on power-up; may or may not respond to reset switch

A common cause is using a non-Octagon power supply such as a PC desktop supply. Most of these PC supplies are rated at 5V at 20A or more. Switching supplies usually requires a 20% load to operate properly, that is, 4A or more. Since a typical Octagon system takes less than 2A, the supply does not regulate properly. Output drift up to 6–7V and/or 7–8 voltage spikes have been reported. If the power supply comes up slowly the sequencing of ICs on the board may be out of sync, thus, causing the system to lock up.

The power supply for the XE–800 must meet the startup risetime requirements specified in the ATX Power Design Guide, version 1.1, section 3.3.5. This assures that all the circuitry on the XE–800 sequences properly and avoids system lockup.

System locks up after power-down/power-up

If the power supply does not drain below 0.7V, the CMOS components on the card will act like diodes and forward bias. This is typically caused by using power supplies that have large output capacitors. Either use a different power supply that discharges faster, leave the power off until the supply has adequate time to discharge or place a 100 ohm, large wattage resistor across the output capacitor.

LED signaling of “beep” codes

Description

The XE–800 SBC has a bicolor LED that is used by the BIOS to indicate the BIOS processing state.

Immediately after the XE–800 SBC powers on, the amber LED is on and the green LED is off. Once the card boots, the CR9 amber LED turns off and the green LED is on.

If the BIOS finds an error during the power on self test (POST) the amber LED is flashed in a pattern indicating the POST code failure. The visual beep codes are defined in Table 17–1.

Count the number of flashes in each of four sets. Subtract one from each set, the resulting number matches the POST error found in the Table 17–1.

For example:

Flash–Flash pause

Flash–Flash–Flash–Flash pause

Flash–Flash–Flash–Flash–Flash pause

Flash–Flash–Flash–Flash

Is counted as 2–4–5–4. After subtracting one from each set the result is 1–3–4–3. This is a failure of the first 64K of base RAM.

Table 17–1 BIOS beep codes

Port 80 Code	Beep Sequence	POST Routine Description
02h		Verify Real Mode
03h		Disable Non-Maskable Interrupt (NMI)
04h		Get CPU type
06h		Initialize system hardware
07h		Disable shadow and execute code from the ROM
08h		Initialize chipset with initial POST values
09h		Set IN POST flag
0Ah		Initialize CPU registers
0Bh		Enable CPU cache
0Ch		Initialize caches to initial POST values
OEh		Initialize I/O component
0Fh		Initialize the local bus IDE
10h		Initialize Power Management
11h		Load alternate registers with initial POST values
12h		Restore CPU control word during warm boot
13h		Initialize PCI Bus Mastering devices
14h		Initialize keyboard controller
16h	1-2-2-3	BIOS ROM checksum
17h		Initialize cache before memory Auto size
18h		8254 timer initialization
1Ah		8237 DMA controller initialization
1Ch		Reset Programmable Interrupt Controller
20h	1-3-1-1	Test DRAM refresh
22h	1-3-1-3	Test 8742 Keyboard Controller
24h		Set ES segment register to 4 GB
28h	1-3-3-1	Auto size DRAM
29h		Initialize POST memory manager
2Ah		Clear 512 KB base RAM
2Ch	1-3-4-1	ROM failure on address line xxxx
2Eh	1-3-4-3	RAM failure on data bits xxxx of low byte of memory bus
2Fh		Enable cache before system BIOS shadow
32h		Test CPU bus-clock frequency
33h		Initialize Phoenix Dispatch Manager
36h		Warm start shutdown
38h		Shadow system BIOS ROM
3Ah		Auto size cache
3Ch		Advanced configuration of chipset registers
3Dh		Load alternate registers with CMOS values
41h		Initialize extended memory for ROMPilot
42h		Initialize interrupt vectors
45h		POST device initialization
46h	2-1-2-3	Check ROM copyright notice
47h		Initialize I20 support
48h		Check video configuration against CMOS
49h		Initialize PCI bus and devices
4Ah		Initialize all video adapters in system

4Bh		QuietBoot start (optional)
4Ch		Shadow video BIOS ROM
4Eh		Display BIOS copyright notice
4Fh		Initialize MultiBoot
50h		Display CPU type and speed
51h		Initialize EISA board
52h		Test keyboard
54h		Set key click if enabled
55h		Enable USB devices
58h	2-2-3-1	Test for unexpected interrupts
59h		Initialize POST display service
5Ah		Display prompt “Press F2 to enter Setup”
5Bh		Disable CPU cache
5Ch		Test RAM between 512 and 640 KB
60h		Test extended memory
62h		Test extended memory address lines
64h		Jump to UserPatch1
66h		Configure advanced cache registers
67h		Initialize Multi Processor APIC
68h		Enable external and CPU caches
69h		Setup System Management Made (SMM) area
6Ah		Display external L2 cache size
6Bh		Load custom defaults (optional)
6Ch		Display shadow-area message
6Eh		Display possible high address for UMB recovery
70h		Display error messages
72h		Check for configuration errors
76h		Check for keyboard errors
7Ch		Set up hardware interrupt vectors
7Dh		Initialize Intelligent System Monitoring
7Eh		Initialize coprocessor if present
80h		Disable onboard Super I/O ports and IRQs
81h		Late POST device initialization
82h		Detect and install external RS232 ports
83h		Configure non-MCD IDE controllers
84h		Detect and install external parallel ports
85h		Initialize PC-compatible PnP ISA devices
86h		Re-initialize onboard I/O ports
87h		Configure Motherboard Configurable Devices (optional)
88h		Initialize BIOS Data Area
89h		Enable Non-Maskable Interrupts (NMIs)
8Ah		Initialize Extended BIOS Data Area
8Bh		Test and initialize PS/2 mouse
8Ch		Initialize floppy controller
8Fh		Determine number of ATA drives (optional)
90h		Initialize hard-disk controllers
91h		Initialize local-bus hard-disk controllers
92h		Jump to UserPatch2
93h		Build MPTABLE for multi-processor boards
95h		Install CD-ROM for boot

96h		Clear huge ES segment register
97h		Fix up Multi Processor table
98h	1-2	Search for option ROMs. One long, two short beeps on checksum failure.
99h		Check for SMART drive (optional)
9Ah		Shadow options ROMs
9Ch		Set up Power Management
9Dh		Initialize security engines (optional)
9Eh		Enable hardware interrupts
9Fh		Determine number of ATA and SCSI drives
A0h		Set time of day
A2h		Check key lock
A4h		Initialize typematic rate
A8h		Erase F2 prompt
Aah		Scan for F2 keystroke
Ach		Enter Setup
Aeh		Clear Boot flag
B0h		Check for errors
B1h		Inform ROMPilot about the end of POST
B2h		POST done - prepare to boot operating system
B4h	1	One short beep before boot
B5h		Terminate QuietBoot (optional)
B6h		Check password (optional)
B7h		Initialize ACPI BIOS
B9h		Prepare Boot
Bah		Initialize SMBIOS
BBh		Initialize PnP Option ROMs
BCh		Clear parity checkers
BDh		Display MultiBoot menu
Beh		Clear screen (optional)
BFh		Check virus and backup reminders
C0h		Try to boot with Int 19h
C1h		Initialize POST Error Manager (PEM)
C2h		Initialize error logging
C3h		Initialize error display function
C4h		Initialize system error handler
C5h		PnP dual CMOS (optional)
C6h		Initialize note dock (optional)
C7h		Initialize note dock late
C8h		Force check (optional)
C9h		Extended checksum (optional)
Cah		Redirect Int15h to enable remote keyboard
CBh		Redirect Int 13h to Memory Technologies Devices such as ROM, RAM, PCMCIA, and serial disk
CCh		Redirect Int 10h to enable remote serial video
CDh		Re-map I/O and memory for PCMCIA
Ceh		Initialize digitizer and display message
D2h		Unknown interrupt

Technical assistance

Carefully recheck your system before calling Technical Support. Run as many tests as possible; the more information you can provide, the easier it will be for Technical Support staff to help you solve the problem. For additional technical assistance, try the following:

Technical Support telephone: 303–426–4521
E-mail Technical Support: fasthelp@octagonsystems.com
Applications Notes (via web): www.octagonsystems.com

Overview: Section 4 – Appendices

Section 4 contains a series of appendices which provides additional information about the XE–800 SBC.

Appendix A: Technical data

Appendix B: Software utilities

Appendix C: Accessories

Appendix A: XE–800 SBC technical data

Technical specifications

CPU
AMD Geode GX1 CPU, 300 MHz

PCI bus clock
33 MHz

BIOS
AT compatible with industrial extensions

SDRAM
0 MB SDRAM supplied. SO-DIMM socket can be populated with up to 256 MB SDRAM using PC 100 or PC133 memory sticks. Note that if the memory Speed in BIOS Setup is set to High, you must use PC133 memory sticks.

On-board flash
512 KB surface-mounted flash, contains system BIOS

Hard drive
EIDE hard drive support with on-card hard drive controller and BIOS. Accessed via 44-pin connector. Supports up to three EIDE devices. CompactFlash appears as the primary EIDE device.

CompactFlash socket
Supports Type I and Type II CompactFlash devices.

USB
4 ports USB 2.0 compliant, 2 additional ports USB 1.1 compatible

Serial I/O
IEC1000, level 3, ESD protection specification
- — Contact discharge ±6 kV
- — Air–gap discharge ±8 kV

Backdrive protection
16550 compatible
Up to 115.2K baud
16-byte FIFO buffers
Jumper-selectable terminations for RS–422/485 on COM2

Digital I/O
48 I/O lines, sink/source 15mA per line

Keyboard and mouse ports
PS/2 compatible

Video
Supports VGA and SVGA CRTs displays with resolutions up to 1280 x 1024 x 16 bpp, and TFT flat panel displays with resolutions up to 1024 x 768 x 16 bpp. 3V flat panel displays are supported through connector, 5V panels require alternate power source. Some EL panels, and quarter VGA panels are not supported.

Watchdog timer
Time-out is from 2 milliseconds to 2 minutes. Strobed through built–in, enhanced INT 17h function calls.

Real time clock
AT compatible with battery backup.

Expansion
PC/104 and PC/104 *Plus*.

Operating systems
Compatible with Windows NT, Windows CE.net, Linux, QNX, and DOS. **Note: Windows 2000 and Windows XP/XP Embedded will run with known issues, however, new driver development is not supported by the CPU manufacturer.**

PCI bus mastering
Bus mastering devices are supported on the PC/104 *Plus* connector.

Power requirements
5V ±0.25V, 2 Amp minimum recommended supply current.

64 MB SDRAM typically 1500 mA
256 MB SDRAM typically 1700 mA

Note The power supply for the XE–800 must meet the startup risetime requirements specified in the ATX Power Design Guide, version 1.1, section 3.3.5. This assures that all the circuitry on the XE–800 sequences properly and avoids system lockup.

Environmental specifications

Operating temperature	–40° to 70°C @ 300 MHz, with no air flow
	–40° to 80°C @ 300 MHz, with forced air flow
Nonoperating temperature	–55° to 95°C, nonoperating
Relative humidity	5% to 95% noncondensing
Shock	40g, 3 axis
Vibration	5g, 3 axis

Size
115 mm x 165mm x 29.5 mm, EPIC™ form factor

Weight
8 oz.

Excessive Thermal Stress

This card is guaranteed to operate over the published temperature ranges and relevant conditions. However, sustained operation near the maximum temperature specification is not recommended by Octagon or the CPU chip manufacturer due to well known, thermal related, failure mechanisms. These failure mechanisms, common to all silicon devices, can reduce the MTBF of the cards. Extended operation at the lower limits of the temperature ranges has no limitations.

Mating connectors

Table A–1 XE–800 SBC Mating connectors

Connector	Function	Mating Connector
J1	Flat Panel Display	Molex #87568-4093
J2	PC/104 *Plus*	Teka 2MR430-A7WD-368-0
J3	CRT Video	Molex 87568-1073
J4	Hard drive/IDE	AMP #1-111626-0
J5	COM2 RS–422/RS–485	Molex #50079-8100
J6	Digital I/O 2	Amp 746288-6
J7	PC/104	Comm Conn 50711C-104G
J8	Power	Molex 39-01-2100
J9	Keyboard/Mouse	PS/2
J10	AT battery	BERG 65039-033
J11	Ethernet	RJ45
J12	USB3,4	standard USB “A” cable
J13	USB5,6	standard USB “A” cable
J14	Digital I/O 1	Amp 746288-6
J15	COM1/2	Amp 746288-4
J16	USB1,2	Octagon #6288 cable
J500	CompactFlash	N/A
XU1	SDRAM SODIMM	N/A

Maps

Table A–2 XE–800 SBC DMA map

XE–800 SBC DMA map	
Channel	**Description**
Channel 0	Reserved for bus memory refresh
Channel 1	available
Channel 2	available
Channel 3	IDE Interface
Channel 4	Slave
Channel 5	available
Channel 6	available
Channel 7	available

Table A–3 XE–800 SBC I/O map

XE–800 SBC I/O map	
Hex range	**Function**
X000h to X0FFh	Reserved for system
X100h to X11Fh	Off card I/O space (available)
X120h to X127h	Digital I/O
X128h to X16Fh	Off card I/O space (available)
X170h to X17Fh	IDE Controller (secondary)
X180h to X1EFh	Off card I/O space (available)
X1F0h to X1F7h	IDE Controller (primary)
X208h to X20Fh	System I/O space (not available)
X278h to X27Bh	available
X2E8h to X2EFh	System I/O space (not available)
X2F8h to X2FFh	COM (1 or 2 – Setup selectable)
X320h to X377h	System I/O space (not available)
X378h to X37Bh	available
X3F8h to X3FFh	COM (1 or 2 – Setup selectable, default COM1)

Table A–4 XE–800 SBC interrupt map

XE–800 SBC interrupt map		
IRQ	**Default Device**	**Alternate**
IRQ0	System Timer	
IRQ1	Keyboard	
IRQ2	Cascade to IRQ9	
IRQ3	COM2	PC/104
IRQ4	COM1	PC/104
IRQ5	USB1.1	PC/104
IRQ6*	Floppy	PC/104
IRQ7*	LPT	PC/104
IRQ8	RTC Alarm	
IRQ9		PC/104
IRQ10	USB2.0	PC/104
IRQ11		PC/104
IRQ12	Mouse	PC/104
IRQ13	Reserved for FPU	
IRQ14	IDE Primary (CompactFlash)	PC/104
IRQ15	IDE Secondary	PC/104

*available when functions disabled in Setup

Table A–5 XE–800 SBC memory map

XE–800 SBC memory map			
Address	**Size**	**Description**	**Shadowing**
00000H to 9FFFFH	640KB	DOS and extended BIOS RAM	
A0000H to BFFFFH	128KB	Off Card Memory (shadowable)	
C0000H to CBFFFH	48KB	Video BIOS	ENABLED
CC000H to D7FFFH	48KB	Off Card Memory	
D8000H to DFFFFH	32KB	Extended BIOS Area when X jumper installed or off card shadowable	ENABLED
E0000H to FFFFFH	128KB	System BIOS	
10000H to FFFFFFFFH	4GB	Addressable Extended Memory	

Jumper settings

Table A–6 System configuration jumper: W1

W1 – System Configuration		
Label	**Description**	**W1**
S	System parameters option jumper: Installed = enable User Setup options* Removed = enable BIOS Setup default	[1–2]*
X	BIOS extension enable Installed = enable extended BIOS* allows use of INT17 calls without loading I17HNDLER.EXE Removed = disables extended BIOS frees location D8000 - DFFFF	[3–4]*
V	Video jumper: Installed = enable on-card video* Removed = disable on-card video	[5–6]*
U	User jumper	[7–8]*
R	Bios recovery jumper: Installed = normal BIOS operation* Removed = allows new BIOS to be installed	[9–10]*

* = default

Table A–7 COM2 jumper: W2

W2 – COM2 jumper		
COM Port	**Interface**	**Jumper Settings**
COM2	RS–422/RS–485 no termination	No jumpers on W2
	RS–422/RS–485 with termination	W2[1–3], W2[2–4]*

* Default. These jumpers terminate the network. If the XE–800 SBC is not at an end of the network, leave these jumpers off .

Connector pin–outs

The following tables show the pin–outs for the connectors on the XE–800 SBC.

Table A–8 J1 – flat panel connector

J1 – flat panel connector			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	FPCLK	Gnd	2
3	Gnd	FPDATA[12]	4
5	FPDATA[0]	FPDATA[13]	6
7	FPDATA[1]	FPDATA[14]	8
9	FPDATA[2]	SCL	10
11	FPDATA[3]	SDA	12
13	Gnd	FPDATA[15]	14
15	FPDATA[4]	FPDATA[16]	16
17	FPDATA[5]	FPDATA[17]	18
19	FPDATA[6]	Gnd	20
21	FPDATA[7]	FPDISPEN	22
23	Gnd	VCC3	24
25	FPDATA[8]	VCC3	26
27	FPDATA[9]	FPVSYNC	28
29	FPDATA[10]	Gnd	30
31	FPDATA[11]	FPHSYNC	32
33	Gnd	VCC3	34
35	PCIRST*	VCC3	36
37	Gnd	Gnd	38
39	Gnd	Gnd	40
* active low			

Table A–9 J2 – PC/104-Plus connector

J2 – PC/104-*Plus* connector				
Pin	**A**	**B**	**C**	**D**
1	GND/5.0V KEY	Reserved	+5	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	C/BE0*	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3V	C/BE1*	AD15	+3.3V
9	SERR*	GND	SB0*	PAR
10	GND	PERR*	+3.3V	SDONE
11	STOP*	+3.3V	LOCK*	GND
12	+3.3V	TRDY*	GND	DEVSEL*
13	FRAME*	GND	IRDY*	+3.3V
14	GND	AD16	+3.3V	C/BE2*
15	AD18	+3.3V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3*	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	REQ0*	GND	REQ1*	VI/O
24	GND	REQ2*	+5V	GNT0*
25	GNT1*	VI/O	GNT2*	GND
26	+5V	CLK0	GND	CLK1
27	CLK2	+5V	CLK3	GND
28	GND	INTD*	+5V	RST*
29	+12V	INTA*	INTB*	INTC*
30	-12V	Reserved	Reserved	GND/3.3V KEY

* active low

Table A–10 J3 – CRT connector

J3 – CRT Connector			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	RD	GR	2
3	BL	GND	4
5	+5V	GND	6
7	HSYNCOUT	DDC SDA	8
9	DDC SCL	VSYNCOUT	10

Table A–11 J4 – EIDE

J4 – EIDE			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
44	VCC5	NC	43
42	VCC5	VCC5	41
40	Gnd	IDES.LED	39
38	IDESCSI*	IDESCS0*	37
36	IDESA(2)	IDESA(0)	35
34	NC	IDESA(1)	33
32	NC	IDESINTR	31
30	Gnd	IDESDACK*	29
28	NC	IDESIORDY	27
26	Gnd	IDESTOR*	25
24	Gnd	IDESTOW*	23
22	Gnd	IDESDRO	21
20	KEY	Gnd	19
18	IDEDS(15)	IDEDS(0)	17
16	IDEDS(14)	IDEDS(1)	15
14	IDEDS(13)	IDEDS(2)	13
12	IDEDS(12)	IDEDS(3)	11
10	IDEDS(11)	IDEDS(4)	9
8	IDEDS(10)	IDEDS(5)	7
6	IDEDS(9)	IDEDS(6)	5
4	IDEDS(8)	IDEDS(7)	3
2	Gnd	IDESRST*	1

* = active low

Table A–12 J5 – COM2 connector pin-outs for RS–422/RS–485

RS–422/RS–485 (J5 connector)			
RS–422		**RS–485**	
Pin	**Signal**	**Pin**	**Signal ***
1	TXD+	1	TXD+
2	TXD–	2	TXD–
3	GND	3	GND
4	RXD+	4	RXD+
5	RXD–	5	RXD–

* See note on page 48 for two-wire RS–485 connections.

Table A–13 J6 and J14 – Digital I/O connectors

J14 (Digital I/O 1) and J6 (Digital I/O 2)			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	Port B, bit 4	Vcc (+5V)*	2
3	Port B, bit 5	Port B, bit 2	4
5	Port B, bit 6	Port B, bit 3	6
7	Port B, bit 7	Port B, bit 1	8
9	Port C, bit 7	Port B, bit 0	10
11	Port C, bit 5	Port C, bit 6	12
13	Port C, bit 0	Port C, bit 4	14
15	Port C, bit 2	Port C, bit 1	16
17	Port C, bit 3	Port A, bit 7	18
19	Port A, bit 0	Port A, bit 6	20
21	Port A, bit 1	Port A, bit 5	22
23	Port A, bit 2	Port A, bit 4	24
25	Port A, bit 3	Gnd	26

* +5V safe is fused through a 750 mA automatic, resetting fuse

Table A–14 J7 – PC/104 connector

PC/104 Connector		
Pin	**D**	**C**
0	GND	GND
1	MEMCS16*	SBHE*
2	IOCS16*	LA23
3	IRQ10	LA22
4	IRQ11	LS21
5	IRQ12	LS20
6	IRQ15	LS19
7	IRQ14	LA18
8	DACK0*	LA17
9	DRQ0	MEMR*
10	DACK5*	MEMW*
11	DRQ5	SD8
12	DACK6*	SD9
13	DRQ6	SD10
14	DACK7*	SD11
15	DRQ7	SD12
16	+5V	SD13
17	MASTER*	SD14
18	GND	SD15
19	GND	GND/KEY

PC/104 Connector		
Pin	**A**	**B**
1	IOCHCK*	GND
2	D7	RSTDRV
3	D6	+5V
4	D5	IRQ9
5	D4	-5V
6	D3	DRQ2
7	D2	-12V
8	D1	ENDXFR*
9	D0	+12V
10	IOCHRDY	GND/KEY
11	AEN	SMEMW*
12	A19	SMEMR*
13	A18	IOW*
14	A17	IOR*
15	A16	DACK3*
16	A15	DRQ3
17	A14	DACK1*
18	A13	DRQ1
19	A12	REFRESH*
20	A11	SYSCLK
21	A10	IRQ7
22	A9	IRQ6
23	A8	IRQ5
24	A7	IRQ4
25	A6	IRQ3
26	A5	DACK2*
27	A4	TC
28	A3	BALE
29	A2	+5V
30	A1	OSC
31	A0	GND
32	GND	GND

Table A–15 J8 – Power connector

Pin	Function	Function	Pin
1	nc	nc	6
2	GND	+5v	7
3	GND	+5v	8
4	+12V	–12V	9
5	+3V	GND	10

Table A–16 J9 – PS2 Keyboard Mouse

J9 – PS/2 Keyboard Mouse	
Pin #	**Pin Name**
1	KDATA
2	MDATA
3	GND
4	+5V
5	KCLK
6	MCLK

Table A–17 J10 – Battery Connector

J10 – battery connector	
Pin #	**Pin Name**
1	Battery +
2	Key
3	nc
4	Battery –

Table A–18 J11 – Ethernet connectors

J11 – Ethernet connector	
RJ pin	**Pin Name**
1	TxD +
2	TxD –
3	RxD +
4	comm. mode term.
5	comm. mode term.
6	RxD –
7	comm. mode term.
8	comm. mode term.

Table A–19 J12 and J13 – USB connectors

J12 and J13 – USB connectors			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	USB1 power	USB2 power	1
2	USB1 –	USB2 –	2
3	USB1 +	USB2 +	3
4	Gnd	Gnd	4

Table A–20 J14 – Digital I/O 1

Same as J6.

Table A–21 J15 – COM1 and COM2 connector pin-outs

COM1		COM2	
Pin#	**RS–232 signal**	**Pin#**	**RS–232 signal**
1	DCD	11	DCD
2	DSR	12	DSR
3	RxD	13	RxD
4	RTS	14	RTS
5	TxD	15	TxD
6	CTS	16	CTS
7	DTR	17	DTR
8	RI	18	RI
9	GND	19	GND
10	nc	20	nc

Table A–22 J16 – USB connector

J16 – USB connector			
Pin #	**Pin Name**	**Pin Name**	**Pin #**
1	USB1 power	USB2 power	2
3	USB1 –	USB2 –	4
5	USB1 +	USB2 +	6
7	Gnd	Gnd	8
9	Gnd	Gnd	10

Table A–23 J500 – CompactFlash

J500 – CompactFlash connector			
Pin#	**Signal**	**Signal**	**Pin#**
1	GND	DD3	2
3	DD4	DD5	4
5	DD6	DD7	6
7	HDCS0*	GND	8
9	GND	GND	10
11	GND	GND	12
13	+5V	GND	14
15	GND	GND	16
17	GND	A2	18
19	A1	A0	20
21	DD0	DD1	22
21	DD2	NC	24
25	NC	NC	26
27	DD11	DD12	28
29	DD13	DD14	30
31	DD15	HDCS1*	32
33	NC	IOR*	34
35	IOW	+5V	36
37	IRQ14	+5V	38
39	M/S select	NC	40
41	RST*	IORDY	42
43	NC	+5V	44
45	ACTLED	PDIAG	46
47	DD8	DD9	48
49	DD10	GND	50
51	NC	NC	52

*active low

Appendix B: Software utilities

Introduction

This chapter describes the utilities listed below. The drivers and utilities are in a self-extracting zip file, located at the Octagon Systems web site on the XE–800 product page. Download this file to a separate directory on your hard drive, then double click on it to extract the files.

Support commands

GETVIDEO
I17HNDLR.EXE
PGMVIDEO.EXE
PHLASH.EXE
RESET.COM

GETVIDEO.EXE

Purpose

This support command captures the video BIOS settings from the EEPROM. The video BIOS uses these settings to support various flat panel displays.

Syntax

```
GETVIDEO
```

Parameters

None

Example

```
GETVIDEO
```

Press n or enter at the prompt to save the settings to gx1vga.dat.

Remarks

The current settings for the video BIOS are written to a file. This file can then be used by pgmvideo to update the video BIOS settings. This is a useful command to copy the video BIOS from one CPU card to another or to confirm the current video BIOS settings.

I17HNDLR.EXE

Purpose

This support command is an alternate way to use the INT 17h functions when the extended BIOS area is disabled (i.e., the jumper at the "X" position is removed at W1). Also, use this support command to reprogram the extended BIOS area with another BIOS.

Syntax

```
I17HNDLR
```

Remarks

This command is used if the extended BIOS area (D8000–DFFFF) is not used. The I17HNDLR allows the system to use the INT 17h functions.

PGMVIDEO.EXE

Purpose

This support command programs a video BIOS into the EEPROM. A video BIOS is required for a flat panel display.

Syntax

```
PGMVIDEO VIDEO.DAT
```

Parameters

- videobios.dat is the filename of the new video BIOS. For a complete listing, see the Utilities zip file.

Example 1

To program the S64P80.DAT video BIOS (which operates the Sharp 64P80 flat panel and CRT in simultaneous display mode), enter the following command:

```
PGMVIDEO S64P80.DAT
```

See also For more information on supported video BIOS files, see the README.TXT file.

PHLASH.EXE

Purpose

This support command will program a BIOS image from a floppy drive or a subdirectory to the 512K flash EPROM.

Syntax

```
PHLASH
```

Remarks

Phlash.exe must have two files that are located the same directory as the Phlash.exe file. These files are BIOS.ROM, a 256K BIOS image, and platform.bin, a support file that locates the BIOS.ROM file in the 512K flash EPROM. These files can be found in the Utility zip file. Phlash.exe must be run with the video enabled on the target system, and HIMEM.SYS must be disabled. The PHLASH.EXE command will only work with DOS.

RESET.COM

Purpose

This support command enables the watchdog timer and allows time–out to expire, thus restarting the system.

Syntax

```
RESET
```

Remarks

The RESET command also restarts all the expansion I/O cards on the bus. This differs from a <CTRL><ALT><DEL> reboot of the system which only restarts the system but not the expansion cards. The RESET button on the XE–800 SBC also accomplishes the same thing as the RESET command.

Appendix C: Accessories

Table C–1 Cables and accessories

Product	Description	Octagon p/n
COM Port VTC-20F Cable	Dual serial cable (female)	4866
COM Port VTC-20M Cable	Dual serial cable (male)	4989
1.25 mm RS-422/485 Cable	Serial cable for RS-422/485	6393
USB Cable	Two-port USB cable	6288
IDE Cable	44-pin to multi-connector cable: one 40-pin and one 44-pin two 40-pin and one 44-pin	 4080 6246
2 mm VGA-12, Cable, Ribbon, 12”	VGA video cable	6392
Null Modem Adapter, 9 Pin	9-pin to 9-pin	2470
AT battery	Calendar/clock battery backup	3186
XE–800 ATX Power Cable	10-pin to 20-pin ATX cable	6537
KYBD	Keyboard/mouse Y adapter cable	4186186

Table C–2 Digital I/O accessories

Product	Description	Octagon p/n
Cables		
CMA-10-24	24” cable for I/O port, 10-pin	1743
CMA-26-12	12” cable for digital IO port, 26-pin	2776
CMA-26-24	24” cable for digital IO port, 26-pin	1257
Terminal Boards		
STB-26	Terminal board, 26-position	2905
STB-20	Terminal board, 20-position	2904
STB-14	Terminal board, 14-position	2902
STB-10	Terminal board, 10-position	2901
TBD-100	Terminal board with LED indicators	1183
Opto Modules and Racks		
G4-IAC5	Input module, 90-140 VAC	2395
G4-IAC5A	Input module, 180-280 VAC	2396
G4-IDC5	Input module, 15-32 VDC	2397
G4-IDC5B	Input module, 4-16 VDC	2511
G4-IDC5D	Input module, 2.5-28 VDC	2529
G4-OAC5	Output module, 12-140 VAC	2398
G4-OAC5A	Output module, 24-280 VAC	2399
G4-ODC5	Output module, 5-60 VDC	2400
G4-ODC5A	Output module, 5-200 VDC	2503
MPB-08	Opto Rack, 8-position	2512
MPB-16	Opto Rack, 16-position	2513
MPB-24	Opto Rack, 24-position	2514

Warranty

Octagon Systems Corporation (Octagon), warrants that its standard hardware products will be free from defects in materials and workmanship under normal use and service for the current established warranty period. Octagon's obligation under this warranty shall not arise until Buyer returns the defective product, freight prepaid to Octagon's facility or another specified location. Octagon's only responsibility under this warranty is, at its option, to replace or repair, free of charge, any defective component part of such products.

Limitations on warranty

The warranty set forth above does not extend to and shall not apply to:

1. Products, including software, which have been repaired or altered by other than Octagon personnel, unless Buyer has properly altered or repaired the products in accordance with procedures previously approved in writing by Octagon.

2. Products which have been subject to power supply reversal, misuse, neglect, accident, or improper installation.

3. The design, capability, capacity, or suitability for use of the Software. Software is licensed on an "AS IS" basis without warranty.

The warranty and remedies set forth above are in lieu of all other warranties expressed or implied, oral or written, either in fact or by operation of law, statutory or otherwise, including warranties of merchantability and fitness for a particular purpose, which Octagon specifically disclaims. Octagon neither assumes nor authorizes any other liability in connection with the sale, installation or use of its products. Octagon shall have no liability for incidental or consequential damages of any kind arising out of the sale, delay in delivery, installation, or use of its products.

Service policy

1. If a product should fail during the warranty period, it will be repaired free of charge. For out of warranty repairs, the customer will be invoiced for repair charges at current standard labor and materials rates.

2. Customers that return products for repairs, within the warranty period, and the product is found to be free of defect, may be liable for the minimum current repair charge.

Returning a product for repair

1. The customer must call Tech Support at 303-426-4521 to determine if repair service is necessary.

2. If repair service is required, Tech Support will require the customer's name, address, telephone number, email address and a list of problems found.

3. Tech Support will forward this information to the RMA Administrator who will contact the customer to issue the RMA number.

4. The customer must carefully package the product in an antistatic container. Failure to package in antistatic packaging will VOID all warranties. Then package in a safe container for shipping.

5. Write the RMA number on the outside of the shipping container.

6. The customer pays for shipping to Octagon. Octagon pays for shipping back to the customer.

7. Other conditions and limitations may apply to international shipments.

Note PRODUCTS RETURNED TO OCTAGON FREIGHT COLLECT OR WITHOUT AN RMA NUMBER CANNOT BE ACCEPTED AND WILL BE RETURNED FREIGHT COLLECT.

Returns

There will be a 15% restocking charge on returned product that is unopened and unused, if Octagon accepts such a return. Returns will not be accepted 30 days after purchase. Opened and/or used products, non–standard products, software and printed materials are not returnable without prior written agreement.

Governing law

This agreement is made in, governed by and shall be construed in accordance with the laws of the State of Colorado.

The information in this manual is provided for reference only. Octagon does not assume any liability arising out of the application or use of the information or products described in this manual. This manual may contain or reference information and products protected by copyrights or patents. No license is conveyed under the rights of Octagon or others.