Customer Service Support System

BC 4000 Manual

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Customer Service Support System

BC 4000
Chapter 1 - Introduction

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- BC 4000 (80486 EISA Bus Controller)

BC 4000 (80486 EISA Bus Controller)

The BC 4000 board is a 80486 computer on an EISA ATstyle, plugin board. The BC 4000 is available in both a standard 80486DX 33MHz configuration and a higher performance 80486DX/2 66 MHz configuration.

The BC 4000 computer provides all of the functionality of a standard AT PC. It includes VGA video support, two serial ports, one parallel port, keyboard and mouse support, floppy and IDE hard drive support, and up to 64MB of memory.

Figure 1-1, BC 4000 Board

A BC 4000 plugged into a passive EISA backplane can support up to 7 EISA controller cards. Additional ISA cards are also supported.

BC 4000
Chapter 2 - Configuration and Installation

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Configuration and Installation

This chapter explains how to configure and install a BC 4000 board. The configurable options are:

```
* Memory
* Video
* Reset on loss of DCD or DSR
* IDE Controller
* Serial and parallel ports
* Mouse
* A.C. fail interrupt
```

Memory

All BC 4000 system memory is provided in 72-pin by 36-bit standard 70ns SIMM modules in 4MB or 16MB versions. These modules should be installed in the sockets provided. These sockets are labeled as SIMM1, SIMM2, SIMM3 and SIMM4 on Figure 1-1.

Memory size options include 4MB to 64MB. The configurations supported are represented in Table 2-1.

```
          Table 2 - 1
     SIMM Configurations


SIMM 1      SIMM 2     SIMM 3     SIMM 4     Total
```

4MB	None	None	None	4MB
4MB	4MB	None	None	8MB
4MB	4MB	4MB	None	12MB
4MB	4MB	4MB	4MB	16MB
16MB	None	None	None	16MB
4MB	16MB	None	None	20MB
4MB	4MB	16MB	None	24MB
4MB	16MB	4MB	None	24MB
4MB	4MB	16MB	4MB	28MB
4MB	16MB	4MB	4MB	28MB
16MB	16MB	None	None	32MB
4MB	16MB	16MB	None	36MB
16MB	16MB	4MB	None	36MB
4MB	4MB	16MB	16MB	40MB
4MB	16MB	16MB	4MB	40MB
16MB	16MB	4MB	4MB	40MB
16MB	16MB	16MB	None	48MB
4MB	16MB	16MB	16MB	52MB
16MB	16MB	16MB	4MB	52MB
16MB	16MB	16MB	16MB	64MB

Video

Set the Video Switch to match the monitor. Figure 2-1 shows Video Switch (S1). Table 2-2 shows switch settings for each monitor.

Table 2 - 2
Switch Settings for Monitors (S1)

Video Mode	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
CGA (with NMI)	ON	ON	ON	ON	OFF	OFF	OFF	*
MDA (with NMI)	OFF	ON	ON	ON	OFF	OFF	OFF	*
MDA (without NMI)	ON	OFF	ON	ON	OFF	OFF	OFF	*
EGA (with NMI)	OFF	OFF	ON	ON	OFF	OFF	OFF	*
EGA (without NMI)	ON	ON	OFF	ON	OFF	OFF	OFF	*
VGA (Color)**	OFF	ON	OFF	ON	OFF	OFF	OFF	*
VGA (Mono)	ON	OFF	OFF	ON	OFF	OFF	OFF	*
8514	OFF	OFF	OFF	ON	OFF	OFF	OFF	*
NEC 2A	ON	ON	ON	OFF	OFF	OFF	OFF	*
NEC / NEC+	OFF	ON	ON	OFF	OFF	OFF	OFF	*
NEC XL	ON	OFF	ON	OFF	OFF	OFF	OFF	*
NEC 3D	OFF	OFF	ON	OFF	OFF	OFF	OFF	*
NEC 4D /5D	ON	ON	OFF	OFF	OFF	OFF	OFF	*
Portrait	OFF	ON	OFF	OFF	OFF	OFF	OFF	*
Reserved	ON	OFF	OFF	OFF	OFF	OFF	OFF	*
Reserved	OFF	OFF	OFF	OFF	OFF	OFF	OFF	*

* SW8 is OFF for non-interlaced monitors, and ON for interlaced monitors.

** Factory default is non-interlaced VGA (color).

* The BC 4000 video outputs are analog (VGA) and will only function with analog compatible monitors.

Reset on Loss of DCD or DSR

The BC 4000 board can be configured to perform a hardware reset when the Data Carrier Detect (DCD) or Data Set Ready (DSR) signal changes from true to false. Jumpers on jumper block JP3 determine which signal from which COM port will reset the board. Figure 2-2 shows each configuration for JP3.

* A jumper across pins 1 and 2 resets the hardware when the DSR signal drops on COM1.

* A jumper across pins 3 and 4 resets the hardware when the DSR signal drops on COM2.

* A jumper across pins 5 and 6 resets the hardware when the DCD signal drops on COM1.

* A jumper across pins 7 and 8 resets the hardware when the DCD signal drops on COM2.

To disable reset on loss of DCD or DSR, remove all of the jumpers.

This automatic reset option may only be configured on one COM port at a time. On that COM port, reset on loss of DCD, DSR, or both signals may be selected. Therefore, do not put jumpers simultaneously on pins 1, 2, 3, and 4. Do not put jumpers simultaneously on pins 5, 6, 7, and 8.

Table 2 - 3
Reset on Loss of DCD or DSR

(Switch JP3)

Reset Condition	Shunt Position			
	1-2	3-4	5-6	7-8
Reset when DSR drops on COM1	ON	OFF	OFF	OFF
Reset when DSR drops on COM2	OFF	ON	OFF	OFF
Reset when DCD drops on COM1	OFF	OFF	ON	OFF
Reset when DCD drops on COM2	OFF	OFF	OFF	ON

IDE Controller

The IDE disk controller can be disabled if necessary in the CMOS setup program. This would be necessary if, for example, a SCSI adapter was installed and the SCSI adapter's hard disk was to be used as a boot device. To completely disable the IDE hardware, shunt JP4 position 3-4 must be ON.

*** To recover IRQ 14, all IDE drives must be removed from the 40-pin header cable.**

Figure 2-3, Jumper Block JP4 - IDE Configurations

Serial and Parallel Ports

Two serial and one parallel port are available on the BC 4000. COM1 uses IRQ 4, COM2 uses IRQ 3, and LPT1 uses IRQ 7. If these I/O ports are not needed, their interrupts can be recovered for use by other hardware devices. To disable the ports and recover the interrupts, place a shunt on JP4 positions 1 and 2. Factory default is to enable the ports.

Figure 2-4, Jumper Block JP4 - COMM & LPT Configurations

Mouse

A mouse may optionally be connected to the BC 4000. To enable the mouse interrupt (IRQ 12), place a shunt on jumper block JP5. Factory default is to disable the mouse interrupt.

A.C. Fail Interrupt

The BC 4000 is designed to interface with a power supply and cause an interrupt in the event of an A.C. failure. The interrupt may be configured to occur on IRQ 10 or IRQ 15 using JP1. Placing a shunt on pins 1-2 selects IRQ 15. Placing a shunt on pins 2-3 selects IRQ 10. Factory default selects no A.C. Fail interrupt, leaving both IRQ 10 and IRQ 15 available for other hardware devices.

Figure 2-5, Jumper Block JP1 Configurations.

Jumper Summary

Table 2 - 4
JP1, JP4, JP5 Summary

FUNCTION	JP4		JP1		JP5
	1-2	3-4	1-2	2-3	
Disable COM1, COM2, and LPT1	ON	---	---	---	---
Disable IDE hardware	---	ON	---	---	---
*COM/LPT/IDE enabled	OFF	OFF	---	---	---
A.C. Fail Interrupt on IRQ 10	---	---	OFF	ON	---
A.C. Fail Interrupt on IRQ 15	---	---	ON	OFF	---
*No A.C. Fail Interrupt	---	---	OFF	OFF	---
Mouse on IRQ 12 enabled	---	---	---	---	ON
*Mouse on IRQ 12 disabled	---	---	---	---	

OFF

* Factory default

Installation

Once the hardware options are configured, the BC 4000 should be installed in the bus master slot as follows:

1. Power down the system in which the BC 4000 will be installed.

2. Gain access to the passive backplane. Typically this requires removing the cover from the computer.

3. Seat the BC 4000 into the bus master slot in the backplane (refer to Figure 2-4) The bus master slot is identified by the additional EISA style connector in line with the standard EISA connector.

4. Secure the BC 4000 with a screw.

5. Connect the appropriate cables to the BC 4000 (refer to Figure 1-1).

6. Reassemble the system as necessary (e.g. replace the computer's cover).

7. Apply power to the system.

To verify that the system is functioning properly, connect a monitor to J11 and a keyboard to J10.

After the standard CMOS setup has been configured and DOS is up and running; the EISA configuration utility (CFG) must be executed to set up EISA CMOS memory.

Figure 2-6, Slot Identification.

Optional LPT1 Port

A parallel port may optionally be added to function as LPT1 of the BC 4000. This requires a Cubix LPT1 printed circuit board (PCB) adapter and bracket, a panel opening where the DB-25 connector can be installed, and a 20-conductor ribbon cable.

INSTALLATION

Warning: ***Turn off the power to the system before beginning this procedure.***

1. Install the Cubix LPT1 adapter in a panel opening on the system. Typically, an opening provided for an empty board space is dedicated to the LPT1 connector. In this case, install the bracket next to the BC 4000 board and tighten the screw firmly.

Alternately, if the LPT1 connector is being installed into a Cubix auxiliary junction panel, the bracket provided with the LPT1 adapter should be removed. Unscrew the connector from the bracket and install the adapter into the desired panel opening.

2. Connect one end of the 20conductor ribbon cable to the LPT1 header (J7) on the BC 4000 board. The pin-one side of the ribbon cable is marked with a colored (blue or red) stripe. Pin one on the BC 4000 header is labeled with a triangular arrowhead (Ú). Align the pin-one side of the ribbon cable with pin one on the header.

3. Connect the other end of the ribbon cable to the LPT1 adapter. Pin one on the adapter is labeled with a triangular arrowhead. Align the pin-one side of the ribbon cable with pin one on the adapter.

4. Plug the peripheral device's cable into the DB25 connector.

Figure 2-7, LPT1 Adapter Connected to BC 4000.

Optional COM2 and Mouse

A second serial port may optionally be added to function as COM2 of the BC 4000. A PS/2 mouse input port may also be added. This requires a Cubix printed circuit board (PCB) adapter and bracket, and a single panel opening where the DB-9 and Mini-DIN 6 can be installed. Both the COM2 and the mouse interfaces are provided on the same PCB adapter. To connect COM2 requires a 10-conductor ribbon cable; the mouse port requires a 5-conductor cable.

INSTALLATION

Warning: ***Turn off the power to the system before beginning this procedure.***

1. Install the Cubix PCB adapter in a panel opening on the system. Typically, an opening provided for an empty board space is dedicated to the COM2 and mouse connectors. In this case, install the bracket next to the BC 4000 board requiring the COM2/mouse port, and tighten the screw firmly.

Alternately, if the COM2 and mouse connectors are being installed into a Cubix auxiliary junction panel, the bracket provided with the COM2/mouse adapter should be removed. Unscrew the connectors from the bracket and install the adapter into the desired opening.

2. Connect one end of the 10conductor ribbon cable to the COM2 header (J8) on the BC 4000 board. The pin-one side of the ribbon cable is marked with a colored (blue or red) stripe. Pin one on the BC 4000 header is labeled with a triangular arrowhead (Ú). Align the pin-one side of the ribbon cable with pin one on the header.

3. Connect the opposite end of the 10-conductor cable to the 10-pin header on the Cubix adapter board. Pin one on the adapter is indicated in Figure 2-6. Align the pin-one side of the ribbon cable with pin one of the 10-pin header on the adapter board.

4. Connect one end of the 5-conductor cable to the PS/2 mouse header (J4) on the BC 4000 board. Pin numbers one through five are indicated on the cable connector. Pin one of the BC 4000 header is indicated in Figure 2-6 Align pin one of the cable connector with pin one on the header.

5. Connect the opposite end of the 5-conductor cable to the 5-pin header on the Cubix adapter board. On the adapter board, pin one of the 5-pin header is the closest pin to the edge of the board. Align pin one of the cable connector with pin one on the header.

6. If COM2 is to be used, plug the peripheral device's cable into the DB9 connector.

7. If a mouse if to be used, plug the mouse connector into the Mini-DIN 6.

F Use JP5 to enable the mouse interrupt (IRQ 12). Also check advanced CMOS setup to make sure mouse support is enabled in the BIOS.

Figure 2-8, COM2/Mouse Adapter Connected to BC 4000.

Customer Service Support System

BC 4000
Chapter 3 - Technical Reference

Table of Contents

- System Components
- System Interrupts
- Switches, Connectors and Signals

System Components

EPROM BIOS

An American Megatrends, Inc. (AMI) system BIOS with embedded setup and hard disk setup utilities resides on the board (27C512 EPROM). At boot time, the data can be transferred to 32bit shadow RAM. This option provides increased system performance, since RAM access is more efficient than EPROM access. (Chapter 3 contains the AMI BIOS documentation.)

Video Controller

The BC 4000 contains an extended high resolution VGA graphics controller (Oak Technology OTI077). With 512K of video memory, this controller supports all standard VGA modes and the following extended modes: 640 x 480 with 256 colors; 800 x 600 with 256 colors; and 1024 x 768 with 16 colors. The connector on the board (J13) is an industry standard VGA connector (15pin highdensity DSubminiature).

Keyboard Controller

The BC 4000 has a PS/2 compatible keyboard controller (8042 or 8742) with the AMI keyboard BIOS. The keyboard controller uses IRQ 1 for its interrupts, and requires no DMA channel.

The keyboard connector on the board (J10) is an industry standard PS/2 compatible 6-pin Mini-DIN connector. The keyboard controller also supports a PS/2 compatible mouse port. The mouse cable and connector are available as an optional item. If added to the board, the mouse port uses IRQ 12. JP5 must be ON to enable the PS/2 mouse interrupt to IRQ 12.

Video/Keyboard Multiplexer

The BC 4000 has a header connector (J13) for a Cubix internal video/keyboard multiplexor (MUX). Typically, the MUX is used in installations where QL boards have been integrated into a system with a single monitor and keyboard. Refer to the documentation provided with the multiplexor for more information.

IDE Hard Drive Interface

An IDE hard drive interface is included on the BC 4000 for applications that require a hard disk drive. IDE drives include an AT compatible disk controller. The IDE interface circuit will support one or two IDE drives, connected via the internal 40pin ribbon cable header (J6). The hard disk controller uses IRQ 14 for its interrupt. When adding an IDE drive to the board, use the setup program to select the drive type. See the BIOS documentation for information on selecting IDE drive types. Shunt JP4 position 3-4 must be OFF to enable the IDE hard drive interface.

Floppy Disk Controller

The BC 4000 contains a Western Digital 37C65B floppy disk controller. It supports all PC/AT floppy disk configurations. The board has an internal 34pin ribbon cable header (J5) for cabling to the floppy disk drive. The controller is configured for industry standard singlespeed floppy disk drives, and supports up to two of any combination of 5-1/4 or 3-1/2 inch drives. The BIOS setup program must be configured for the proper drives. The floppy controller uses IRQ 6 for its interrupt and DRQ 2 for its DMA channel.

*** The floppy controller on the BC 4000 board cannot be disabled.**

Serial and Parallel Ports

Two serial ports and a parallel port are available on the BC 4000. One serial port is accessible through a standard DB-9 connector on the rear bracket (J9). The other serial port (COM2) and the parallel port (LPT1) are accessible internally through header connectors (J8 and J7). All ports comply fully with PC/AT interrupt and I/O port standards.

The serial and parallel ports may be disabled by placing a shunt on JP4 positions 1 - 2. This recovers interrupts at IRQ 3, 4, and 7.

External access to the internal I/O connectors (COM2, LPT1, PS/2 mouse) is accomplished through Cubix supplied interface boards. Refer to the sections *Optional LPT1 Port* and *Optional COM2 and Mouse* for more information. Contact the Cubix Sales department to order the serial or parallel port expansion product required to access the mouse, COM2, or LPT1 ports.

Speaker

The BC 4000 has a header connection (J2) for an eight ohm permanent magnet type speaker. The speaker output comes from the output of TIMER 2 through a gate controlled by bit 0 of Port B, which is the standard AT speaker oscillator.

CMOS Battery

The BC 4000 requires no external battery to backup its CMOS memory. Retention of standard and EISA setup information is performed by a Dallas Real Time Ramified clock circuit that has a sealed non-replaceable battery good for 10 years.

LEDs/Reset Switch

Internal header J1 provides an interface for three LEDs and an external reset switch. The LEDs are:

Power LED is illuminated when power is ON

On Battery LED is illuminated when running on battery power (refer to Power Supply Status description)

Hard Disk LED is illuminated during hard disk activity

The external reset switch provides a method of performing a hard reset of the BC 4000. Figure 3-1 describes the wiring information for this interface.

Power Supply Status

The BC 4000 has a power supply status connector (J4) to monitor the condition of the power supply. This connector would connect to a power supply which can provide the data required by the pin out shown below.

1 - Power Off (output)

2 - Low Battery (input)

3 - A.C. Fail (input) - can cause IRQ 10 or 15 as

configured by JP1 positions 1 - 3.

4 - Power Good (input)

The output on pin 1 is to turn the power supply off. This would typically be done when the A.C. has failed and the backup batteries have reached their discharge state. Pin 2 is an input to the BC 4000 and is low when the batteries have discharged. Pin 3 is an input to the BC 4000 and is low when the A.C. to the power supply has failed and the power supply is running off of the batteries. This condition will cause the On Battery LED to illuminate. Pin 4 is an input to the BC 4000 and is raised high by the Power Supply when its D.C. output voltages are stable and within their limits. All of the signals on J4 are TTL compatible.

Memory

All BC 4000 system memory is provided in 72-pin by 36-bit standard 70ns SIMM modules in 4MB or 16MB versions. Memory size configurations range from 4 MB to 64 MB.

ISA Bus Connector

The ISA Bus connectors on the board use the same pinout and signals as all standard PC/AT bus connectors.

System Interrupts

The 16 system hardware interrupts on the BC 4000 are represented in the following table. Interrupts are managed by two standard 8259A Programmable Interrupt Controllers (PICs). Interrupts at IRQ 0 through 7 are located on the main PIC; IRQ 8 through 15 are on the slave PIC.

Table 3 - 1
Hardware IRQ Information

IRQ Description	IRQ Description
0 Timer Click	1 Keyboard
2 Second PIC Controller	3 COM2
4 COM1	5 Available
6 Floppy Disk Controller	7 LPT1
8 Real-Time Clock	9 Redirected IRQ2
10 Available or AC Fail (JP1)	11 Available
12 Available or Mouse (JP5)	13 Math Coprocessor
14 Fixed Disk Controller (JP1)	15 Available or AC Fail

Switches, Connectors and Signals

Table 2 - 4
JP1, JP4, JP5 Summary

FUNCTION	JP4	JP1

JP5

	/ 1-2	/ 3-4	/ 1-2	/ 2-3	
Disable COM1, COM2, and LPT1	ON	---	---	---	---
Disable IDE hardware	---	ON	---	---	---
*COM/LPT/IDE enabled	OFF	OFF	---	---	---
A.C. Fail Interrupt on IRQ 10	---	---	OFF	ON	---
A.C. Fail Interrupt on IRQ 15	---	---	ON	OFF	---
*No A.C. Fail Interrupt	---	---	OFF	OFF	---
Mouse on IRQ 12 enabled	---	---	---	---	ON
*Mouse on IRQ 12 disabled	---	---	---	---	OFF

* Factory default

Table 3 - 3
Switch Settings for Monitors (S1)

Video Mode	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
CGA (with NMI)	ON	ON	ON	ON	OFF	OFF	OFF	*
MDA (with NMI)	OFF	ON	ON	ON	OFF	OFF	OFF	*
MDA (without NMI)	ON	OFF	ON	ON	OFF	OFF	OFF	*
EGA (with NMI)	OFF	OFF	ON	ON	OFF	OFF	OFF	*
EGA (without NMI)	ON	ON	OFF	ON	OFF	OFF	OFF	*
VGA (Color)**	OFF	ON	OFF	ON	OFF	OFF	OFF	*
VGA (Mono)	ON	OFF	OFF	ON	OFF	OFF	OFF	*
8514	OFF	OFF	OFF	ON	OFF	OFF	OFF	*
NEC 2A	ON	ON	ON	OFF	OFF	OFF	OFF	*
NEC / NEC+	OFF	ON	ON	OFF	OFF	OFF	OFF	*
NEC XL	ON	OFF	ON	OFF	OFF	OFF	OFF	*
NEC 3D	OFF	OFF	ON	OFF	OFF	OFF	OFF	*
NEC 4D /5D	ON	ON	OFF	OFF	OFF	OFF	OFF	*
Portrait	OFF	ON	OFF	OFF	OFF	OFF	OFF	*
Reserved	ON	OFF	OFF	OFF	OFF	OFF	OFF	*

Reserved	OFF	OFF	OFF	OFF	OFF	OFF	OFF *

* SW8 is OFF for non-interlaced monitors, and ON for interlaced monitors.

** Factory default is non-interlaced VGA (color).

Table 3 - 4
Reset on Loss of DCD or DSR
(Switch JP3)

Reset Condition	Shunt Position			
	1-2	3-4	5-6	7-8
Reset when DSR drops on COM1	ON	OFF	OFF	OFF
Reset when DSR drops on COM2	OFF	ON	OFF	OFF
Reset when DCD drops on COM1	OFF	OFF	ON	OFF
Reset when DCD drops on COM2	OFF	OFF	OFF	ON

Table 3 - 5
Control Panel Connector J1 (5-Pin Header)

Contains connections for remote IDE drive LED, power on LED, battery on LED, and external reset switch.

Pin #	Description
1	Resistor pull-up for Power on LED
2	ON Battery LED (running on Battery power)
3	Reset Switch (ground to reset computer)
4	IDE Drive LED
5	Ground

Table 3 - 6
Speaker Connector J2 (4-Pin Header)

For wiring to a panel-mounted speaker and keylock switch

Pin #	Description
1	Speaker data
2	N/C (no connection)
3	Ground
4	+5V (speaker power)

Table 3 - 7
Optional Mouse Connector J4 (5-Pin Header)

Pin #	Description
1	DATA
2	N/C (no connection)
3	Ground

4	+5V
5	CLK (Clock)

Table 3 - 8
Floppy Diskette Connector J5 (34-Pin Header)

This 34-pin cable header is pinned-out to use a standard PC/AT style floppy disk cable. The drive should be shunted for single-speed operation (360 RPM).

Pin #	Description	Pin #	Description
1	GROUND	2	SPEED
3	GROUND	4	N/C
5	GROUND	6	N/C
7	GROUND	8	INDEX
9	GROUND	10	MOTOR ON 1
11	GROUND	12	DRIVE SEL 2
13	GROUND	14	DRIVE SEL 1
15	GROUND	16	MOTOR ON 2
17	GROUND	18	DIRECTION
19	GROUND	20	STOP STEP
21	GROUND	22	WRITE DATA
23	GROUND	24	WRITE GATE
25	GROUND	26	TRACK 0
27	GROUND	28	WRITE PROTECT
29	GROUND	30	READ DATA
31	GROUND	32	SIDE SELECT
33	GROUND	34	DISK CHANGE

Table 3 - 9
IDE Interface Connector J6 (40-Pin Header)

Pin	Desc.	Pin	Description
1	RESET	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	N/C	22	GROUND
23	IOW	24	GROUND
25	IOR	26	GROUND
27	N/C	28	BALE
29	N/C	30	GROUND
31	IDINT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	CS5	38	HCS1
39	N/C	40	N/C

Table 3 - 10
Optional Parallel Port, LPT1 J7 (DB25)

A 20-pin ribbon header is provided on the board for

connection
to the optional DB25S parallel port printed circuit board
that
mounts on a rear panel.

Pin #	Description	Pin #	Description
1	GROUND	2	STROBE
3	BUSY	4	SELECT
5	ERROR	6	SLIN
7	INIT	8	AFT
9	PAPER OUT	10	ACKNOWLEDGE
11	DATA 0	12	DATA 1
13	DATA 2	14	DATA 3
15	DATA 4	16	DATA 5
17	DATA 6	18	DATA 7
19	GROUND	20	GROUND

Table 3 - 11
COM Port Connector J9 (DB-9), J8 (10-pin header)

The COM1 port is on the rear bracket of the board on a
DSUB-9P
connector. To enable the optional COM2 port, it must be
cabled
to a Cubix interface board. DO NOT cable connector J9 (COM2)
directly
to a DB-9 or DB-25 connector.

Pin #	Description
1	DCD (Data Carrier Detect)
2	RD (Receive Data)
3	TD (Transmit Data)
4	DTR (Data Terminal Ready)
5	GND (Ground)
6	DSR (Data Set Ready)
7	RTS (Request to Send)
8	CTS (Clear to Send)
9	RI (Ring Indicator)

Table 3 - 12
Video/Keyboard Mux Connector - J3 (14-Pin Header)

This connector contains the video and keyboard signals. In
some
Cubix systems it can be cabled to an internal video/keyboard
multiplexor
board.

1	RED	2	GROUND
3	GREEN	4	GROUND
5	BLUE	6	GROUND
7	HSYNC	8	GROUND
9	VSYNC	10	GROUND
11	KCLK	12	GROUND
13	KDATA	14	+5 (FUSED)

Table 3 - 13
Keyboard Connector J10 (PS/2 compatible 6-pin Mini-DIN)

Pin #	Description

1 DATA
2 N/C (no connection)
3 Ground
4 +5V
5 CLK (Clock)
6 N/C (no connection)

Table 3 - 14
Video Connector J11
(Standard VGA 15-Pin High-Density Female DSUB)

Pin #	Description
1	Red
2	Green
3	Blue
4	N/C (no connection)
5	Ground
6	Ground
7	Ground
8	Ground
9	N/C (no connection)
10	Ground
11	N/C (no connection)
12	N/C (no connection)
13	VSYNC
14	HSYNC
15	N/C (no connection)

Customer Service Support System

BC 4000
Chapter 4 - Memory Configurations

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- Memory Configurations
- DOS Versions and Memory Management
- Video Memory Options
- Memory Configuration Hints

Memory Configurations

The BC 4000 supports from 4 to 64MB of system memory. The minimum configuration supplied by Cubix is 4MB.

Memory below 1MB is divided into two defined sections: Conventional DOS addressable or Transient Program Area (TPA) and Upper Memory.

DOS compatible executable programs load and execute in the TPA. Upper Memory is memory reserved for system BIOS and devices that require an addressable memory window. Video adapters, mass storage device interfaces, network interface cards, and other add-in cards reside in the Upper Memory area. An Expanded Memory page frame as defined by the Lotus-Intel-Microsoft, or LIM, specification can also occupy part of the Upper Memory area.

Memory above 1MB can be utilized by DOS as Extended Memory (XMS), Expanded Memory (EMS), or a combination of both. Extended Memory is compatible with XMS and VCPI standards. Expanded Memory is compatible with LIM 3.2 and 4.0 specifications. To configure memory above 1MB as EMS or XMS memory, an Extended or Expanded Memory Driver must be installed. Cubix does not supply a memory driver with the BC 4000. Extended and Expanded Memory drivers are available in Microsoft DOS 5.x, Novell DR DOS 6.x, and from several third-party vendors.

Use memory below 1MB according to the memory map illustrated in Figure 4-1.

Memory between 640KB and 1MB not required by hardware memory windows or BIOS can be made available to DOS. By configuring these areas as EMS page frames or Upper Memory Blocks, they can be used for loading and executing application software such as TSRs (Terminate and Stay Resident programs) and network drivers.

DOS Versions and Memory Management

Microsoft DOS 3.x and DOS 4.x

MS DOS versions 3.x and 4.x require third party memory managers to utilize memory between 640KB and 1MB.

Microsoft DOS 5.x

MS DOS 5 includes memory management for 80386 class processors to allow memory between 640KB and 1MB to be remapped as Upper Memory Blocks (UMBs). The DOS *LOADHIGH* command can be used to relocate programs such as NetWare's IPX and NETX into available UMBs.

Since the DOS 5.x memory manager runs in Extended Memory above 1MB, the processor must have enough available memory defined as Extended Memory to load the memory manager. The remaining memory can be allocated as Extended or Expanded Memory.

Novell DR DOS 6.x

DR DOS 6.x includes memory management for 80386 class processors and other processors with LIM 4.0 compatible memory systems allowing memory between 640KB and 1MB to be remapped as UMBs. The DOS *HIGHLOAD* command can be used to relocate programs such as NetWare's IPX and NETX into available UMBs.

Video Memory Options

The BC 4000 has a VGA controller built into the board. This controller cannot be disabled; the video BIOS on the card will always occupy the upper memory window at C0000-C7FFF. If the application being executed on the BC 4000 card does not require all of the graphics capabilities of the VGA controller, other Upper Memory areas normally devoted to video may be used as an extension of the DOS TPA.

If graphics applications will not be run on the BC 4000 board, the VGA Graphics Buffer (A0000-AFFFF) can be mapped by the memory manager drivers as an extension of the 640KB of conventional (TPA) DOS memory area. This will increase the TPA to 704KB. If the BC 4000 is to be used for applications that require only CGA Graphics support, the VGA Graphics Buffer (A0000-AFFFF) and the MDA (Monochrome Display Adapter) Text Buffer (B0000-B7FFF) areas of memory may be mapped by the memory manager as an extension of DOS, increasing TPA to 736KB.

VGA memory applications do not require use of the MDA text buffer (B0000-B7FFF). The memory manager can map and use this area as Upper Memory Blocks (UMBs).

* Any application that attempts to use a video buffer that has been remapped by a memory manager will cause the processor to fail. Cubix does not recommend remapping video memory with MS DOS 5.0 or DR DOS 6.0 unless care is taken to restrict the ability of the user to run applications that can access these areas as video memory.

Memory Configuration Hints

1. The memory management drivers provided with MS DOS 5.0 or DR DOS 6.0 require a minimum of 2MB of RAM.

2. Remember to EXCLUDE memory areas which are mapped as memory windows for LAN adapters.

3. In order to form the largest continuous blocks of Upper Memory, set the LAN adapter to use the memory window starting at the end of the VGA BIOS area, at memory location C8000.

For Ethernet set the adapter to use the 16KB of RAM from addresses C8000 to CBFFF.

For IBM Token Ring Adapters use the IBM default settings:

* set the ROM address to 16KB from RAM addresses CC000-CFFFF

* set the 8KB shared RAM address to C8000-C9FFF with an IPX parameter in the AUTOEXEC.BAT file:

IPX o,mem=C800

4. Set the EMS Page Frame address to E0000 to leave the largest possible free block between the LAN adapter memory window and the Page Frame.

Customer Service Support System

BC 4000
Appendix A - Product Specifications

Table of Contents

- Product Specifications

Product Specifications

Processor	
Processor type	Intel 80486DX
Processor speed	33 MHz or 66 MHz
External CPU caching	128 Kbytes
PCXI EISA compatible	Yes
System BIOS	AMI EISA BIOS
Real Time CMOS Clock	
Rate	32.768 KHz
Memory Support	
Total	64 MBytes
Conventional memory area	640 KBytes [0000-9FFF]
High memory area	380 KBytes [A000-FFFF]
Extended memory area [10000-FFFFF]	1-64 MBytes
Access time (RAM speed)	70 nanoseconds
High memory ROM shadowing	Yes
Parity	Yes
Compatible memory SIMMs	
Memory type	(PS/2-type 72-pin) DRAM
Memory size	4 Mbyte/16 Mbyte
Minimum number of SIMMs installed	1
Maximum number of SIMMs installed	4
Video Support	
Video controller location	On-board
Highest mode supported	SVGA with 512 Kbytes
Highest resolution	1024x768 with 16 colors
Maximum colors supported	256

Keyboard/Mouse Support	
Controller compatible	PS/2
Keyboard connector	6-pin Mini-DIN on rear bracket
Mouse connector header	Internal
Communications Ports	
Serial	
Assignment	COM1, COM2
UART type	16C552
Buffering	16 byte
Maximum transmission rate	115.2 Kbps
Connector type	
COM 1	DB9-male on rear bracket
COM 2	Internal header
Parallel	
Assignment	LPT1
Connector type	Internal header
Disk Support	
Floppy controller	
Media size	3.5" or 5.25"
Maximum number of drives	2
IDE Controller	
Media size	3.5" or 5.25"
Maximum number of drives	2
Other Input/Output	
Reset switch	Internal header
Hard drive activity LED	Internal header
Power on LED	Internal header
On battery power LED	Internal header
Power supply status interface	Internal header
Video/keyboard Multiplexor	Internal header
Speaker	Internal header
Communications Processor Characteristics	
Configurable automatic reset DCD/DSR	Upon loss of
Power	
33 MHz Rating	22.20 watts
66 MHz Rating	23.70 watts
Requirements	
+5 VDC (33 MHz)	4.2 amps maximum
+5 VDC (66 MHz)	4.5 amps maximum
+12 VDC	0.05 amps maximum
-12 VDC	0.05 amps maximum
Environmental	
Operating temperature	0 - 400 C
Relative humidity	0 - 80% noncondensing
FCC Compliance	Class A
Optional Equipment	
Line Busy Module	Yes
Warranty	
Parts and labor return-to-manufacturer	1 year

Customer Service Support System

BC 4000
Appendix B - Memory and I/O Map

Table of Contents

- Memory Map
- On Board I/O Map

Memory Map

```
00000  - 9FFFF     System DRAM

A0000  - BFFFF     VGA Video RAM

C0000  - C7FFF     VGA Video BIOS, may be shadowed

C8000  - EFFFF     May be used as shadow RAM for slot BIOS
ROMS

F0000  - FFFFF     System BIOS, may be shadowed

100000 - 3FFFFFF  Extended RAM, to 64MB with 16MB SIMMS
```

On Board I/O Map

```
ISA Ports          Description

0000 - 00FF        Various "AT" functions in ISP
chip
                   and  keyboard controller

01F0 - 01FF        IDE Hard Drive Interface

02F8 - 02FF        COM2

03A0               Power Supply Status Port

03B4 - 03B5        VGA
```

03BC - 03BF	LPT1
03C0 - 03CF	VGA
03D4 - 03D5	VGA
03F0 - 03F7	Floppy/IDE
03F8 - 03FF	COM1
EISA Ports	**Description**
0C00 - 0CFF	Used by EISA Chip Set

Customer Service Support System

BC 4000
Appendix C - Interrupt and DMA Channels

Table of Contents

- Interrupt Channels
- DMA Channels

Interrupt Channels

Interrupt Level	Use
NMI	Parity/VGA
0	Timer
1	Keyboard
2	Cascaded Input for PIC 2
3	COM 2
4	COM 1
5	Not Used
6	Floppy
7	LPT 1
8	Real Time Clock
9	Not Used, redirected to IRQ2
10	May be used by AC Power Fail from Power Supply JP1
11	Not Used
12	May be used by PS/2 Mouse, JP5
13	Numeric Co-Processor
14	IDE Hard Drive
15	May be used by AC Power Fail from Power Supply JP1

DMA Channels

The only DMA channel used by the BC 4000 board is channel 2 for the floppy disk controller. This controller cannot be disabled.