BusLogic

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User's Guide

BusLogic

BT-X10A

IDE Caching Controller

REVISION HISTORY

Revision	Change Activity	Date
A	**Release**	12/17/93

Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operations.

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INTRODUCTION

The BusLogic IDE Caching Controllers, herein referred to as BT-X10A, significantly boost IDE hard drive performance by offering high speed caching to relieve the bottleneck between a high speed I/O bus interface and your slower IDE disk subsystems. Data requests are first directed to the controller's onboard memory (Random Access Memory (RAM)) where the most frequently used data is stored. Hardware delays are reduced since the hard drive (HDD) isn't accessed if the data is already in RAM.

The BT-X10A supports up to four IDE drives. Two controller cards can be installed, for a total per system support of eight drives. Three versions are available including the BT-410A for Video Electronics Standard Association (VESA) platforms, the BT-510A for Industry Standard Architecture (ISA) systems and the BT-910A for Peripheral Component Interconnect (PCI) bus architectures. The BT-410A and BT-510A also include support for floppy drives.

Onboard memory, expandable from 512KB to 16MB, is available through SIMM memory modules.

ONBOARD CONFIGURATION

While designed for "plug-and-play" installation and operation, the BT-X10A also provides tools to further configure the controller and the drives attached to it, including:

- Disk mirroring. This option lets you set up two drives so that both always contain identical information. When enabled, the controller writes to both hard disks at the same time while your system is running. The system sees both drives as one logical drive and the

space available is always the capacity of the smaller of the pair of drives. Its operation is transparent to both the user and operating system. The maximum is two mirrored pairs per controller.

- Linked drives. This feature lets you designate two HDDs as one logical drive whose capacity is the total of both hard drives. The maximum is two linked pairs per controller.

Mirroring and linking are configured using the BT-X10A's onboard menu-driven AutoIDE™ configuration utility. You can also use the AutoIDE to do the following:

- Enable track-remapping for >528MB drive support under DOS environment
- Access power saving and drive support options, cache line size, and other settings for the controller
- Display drive information such as drive model, firmware version, serial number, and so forth
- Perform low level formats
- Initialize/repair mirroring pair drives
- Verify that the mirroring pair has identical data
- Copy and compare disk data from the source disk to the target disk

Power Efficient Operation

The IDE Caching Controller also offers efficient system operation for both the IDE drive(s) and the board itself. When the board is idle, i.e., there is no access activity to the storage subsystem, the clock signal generated by the on-board processor is turned off automatically, forcing the remaining power-consuming components into the sleeping states. The resulting power saving is significant.

An option of the AutoIDE, Motor Off, configures the controller to turn off the IDE drive's motor after a specific period of idle time. Refer to Green Cache Mode in the AutoIDE's Controller Option Select module (Section 4) for details.

Support for 4 Drives

The IDE Caching Controller supports up to four independent drives, i.e., physical drives C:, D:, E:, and F:. Any of these drives can be designated the boot drive. If two controllers are installed, one as primary and the other as secondary, you can control up to eight individual drives. Refer to More Than 2 Drives option in the AutoIDE's Controller Option Select module (Section 4) for details.

Driver Support

The BT-X10A offers driver support for:

- MS-DOS or PC-DOS
- Windows
- OS/2
- NetWare
- SCO UNIX

These drivers also support installation of two BT-X10A controllers and work with a maximum of four drives per controller. Please check the README in the Novell driver diskette for further details. Depending on the product purchased, not all drivers listed are included.

Specifications

Refer to table 1-1 for a summary of the physical and electrical specifications.

Table I-I. Specifications

Performance
Hardware disk mirroring support for all operating systems
Green Cache: power saving support for both controller and drive(s)
Effective disk seek time: < 0.3 msec
Maximum DTR (Disk-to-Cache): 5MB/sec
Maximum DTR (ISA Bus-to-Cache): 5MB/sec
Sustained DTR (CoreTest):
BT-51 OA: 2.6MB/sec
BT-41 OA: 1 9MB/sec (50MHz)
BT-91 OA: 12MB/sec (33MHz)
Cache memory hit ratio: cache memory dependent

Table I-1. Specifications (continued)

Technical
Microprocessor: 80C286 (BT-51 OA, BT-41 OA and BT-91 OA)
Bus standard: 16-bit ISA Bus (BT-510A); 32-bit Bus (VL: BT-41 OA, PCI: BT-91 OA)
Cache DRAM: 80ns (or faster) 256KB/1MB/4MB SIMMs and can be mixed
Flexible cache expandability: from 512KB to 16MB
Maximum I/O bus speed: 12MHz (BT-510A); 25-50MHz (BT-41 OA: same as mother-board clock); 33MHz (BT-910A)
Maximum 4 IDE drives for each controller; maximum two controllers
Maximum 4GB capacity per drive
Maximum floppy drives supported: 2 (for BT-41 OA and BT-51 OA only)
ROM addressing: on-screen selectable

Functional
■ Auto drive parameter scanning make plug-and-play installation possible
■ Compatible with all major operating systems and 32-bit driver support
■ WD-1003 emulation mode support
■ Booting drive can be switched among multiple drives controlled **by your controller**
■ **Track-remapping support** for drive capacity over 528MB under DOS environment
■ Enhanced INT 13 BIOS relocation
■ Track remapping and automatic type table creation
■ Caching algorithms: fully associated LRU, automatic read ahead, deferred write back, and elevated seeking
■ Direct replacement for standard AT Bus interface card without reformatting the drive(s)

REFERENCE DOCUMENTS

To install the BT-X10A you should have the following documents in addition to this installation guide:

- Operating system installation and user's guide
- The system's installation and set-up guide

HARDWARE REQUIREMENTS

While you can install up to two IDE Cache Controllers, the following list assumes you are installing one controller in your host system:

- **One** available 16-bit expansion slot in your host system
- DC power for an internal 3.5" or 5.25" IDE drive
- **An** IDE hard drive
- **One** 40-pin and 34-pin ribbon cable to connect internal IDE and floppy (BT-410A and BT-510A only) drives

SOFTWARE REQUIREMENTS

For full 32-bit addressing with the BT-410A and BT-910A, you will need the enclosed diskette which includes operating system device drivers for installation. No drivers are required for BT-510A installation and use under DOS. However, depending on your configuration of the BT-510A, drivers may be required for other operating systems.

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CONFIGURATION OPTIONS

Installing the IDE Caching Controller involves the following steps:

- Performing optional jumpering
- Installing memory SIMMs for caching
- Installing the board into the host system
- Selecting the correct cables and making the cabling connections
- Making configuration changes to the host system, if needed, so that the system recognizes the new controller and any new drives you may install
- Performing optional controller configuration via the AutoIDE utility

This section describes options that are configured before you can install your controller card, including board jumpering options and memory requirements.

HARDWARE CONFIGURATION OPTIONS

The IDE Caching Controller offers the following hardware configuration options:

- A hard drive LED connector
- A warning beeper if a mirroring error occurs
- INT and I/O Jumpers (for BT-910A only) (JP3)
- Damping resistor bypass in case of hard drive incompatibility

Hard Drive LED Connector (JP1)

The BT-X10A allows you to see hard disk activity via an LED in the front panel of your system. It also flashes diagnostic codes right after power-up. For this option connect the LED cable to JP1. See the board layout illustrations in Section 3 to locate this jumper. Refer to your system's documentation to locate and unplug the LED cable from the connector on the system board.

The following shows the flash frequency of each fatal error condition:

- One short flash — No Cache DRAM installed
- Two short flashes — CPU error
- Three short flashes — SRAM error
- Four short flashes — Timer error

The BT-X10A supports *write buck* mode to achieve the best performance for a caching controller. It only writes modified cache data back to disk when the system is idle, or when a cache read request misses and it becomes necessary to flush the modified cache line buffers to make room for new data. Write back mode results in superior cache performance because it permits the caching controller to combine and sort write operations prior to updating the disk, and because the updating is done in the background when the system is idle or the write time threshold is reached.

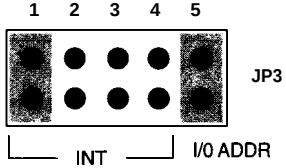
Caution: *Due to the nature of write back, you must be careful when powering down: do not power down the system while this LED is still active. Doing so may result in loss of data as the contents of the cache buffer have not been completely written to the disk.*

Mirroring Beeper (JP2)

JP2 is used to issue a warning beep through a speaker when an error occurs during the disk mirroring process. It can be connected to the speaker in the front panel of your system or to another speaker complying with the same specification as the system's speaker. See the board layout illustrations in Section 3 to locate this connector.

INT &I/O Jumpers (for BT-910A only) (JP3)

Pins 1 through 4 of JP3 are used to select one of the four PCI interrupt channels located at INT A#, B#, C#, or D#. Pin 5 of JP3 specifies the I/O port address, Primary or Secondary of the BT-910A. Note that if the primary port is chosen, the BT-910A will interrupt the host via IRQ14. If the secondary port is selected, it will interrupt the host via IRQ15. Hence the selected PCI interrupt channels, INT A#, B#, C#, or D#must be routed to IRQ14 or IRQ15 accordingly on the motherboard.



Pin 1 selects INT A# (default - installed)
Pin 2 selects INT B#
Pin 3 selects INT C#
Pin 4 selects INT D#
Pin 5 (installed) = Primary (IRQ14)
Pin 5 (removed) = Secondary (IRQ15)

Figure 2-1. JP3 Interrupt and I/O Selector

Since different motherboards may have different jumper arrays corresponding to INT A# — D#, check the motherboard manual before selecting the desired option. Based upon the status of BT-910A's Controller I/O Port, choose the INT option that maps to the desired IDE IRQ Channel in the jumper array for your motherboard.

Pin 1	Pin 2	Pin 3	Pin 4	INT ?#
1	0	0	0	INT A# •
0	1	0	0	INT B#
0	0	1	0	**INT C#**
0	**0**	**0**	1	INT D#

1 = jumper installed 0 = jumper removed * = default

Note that the jumper setting for Pin 1-4/ JP3 should match the INT Selection in the AutoIDE's Controller Option Select module.

Pin 5	IDE IRQ Channel	Controller I/O Port	Port Address
0 *	14	Primary	1F0 - 1F7
1	15	Secondary	170 - 177
0 = jumper installed		1 = jumper removed	* = default

Pin 5/JP3 selects the board's I/O port. When two controllers are installed, use this option to indicate which card is the primary and which serves as the secondary controller. Note that the jumper setting for Pin 5/JP3 should match the value for the Controller I/O Port option in the AutoIDE's Controller Option Select module.

Damping Resistor Bypass Jumpers (JDRO and JDR1)

JDRO and JDR1 are used to short (place a connector over the jumper) the resistors associated with the first and secondary IDE bus, respectively. These two jumpers are used to avoid possible hard drive (HDD) incompatibility due to different noise filter implementations in assorted HDDs. The default setting, jumper removed, is suitable for most HDDs.

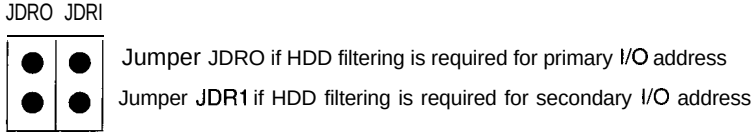


Figure 2-2. JDRO and JDR1 Jumpering

CACHE DRAM INSTALLATION

The BT-X10A uses Dynamic Random Access Memory (DRAM) in the form of SIMMs for its cache operation. You must install at least one pair of SIMMs for caching.

The BT-X10A has four SIMM sockets, arranged in two separate banks. You must install 256KB/1MB/4MB *fast page* mode SIMMs, with a minimum rated access of 80ns or faster. These can be mixed in any combination, however, two SIMMs installed in the same bank must be the same size and speed. **Bank0 must be installed with DRAM for proper operation** and Bank1 is optional.

SIMM specification:	256KB/1MB/4MB **fast** page *mode* **80ns** or faster
Bank0:	(256KB x 2)/(1MB x 2) /(4MB x 2)
Bank1 :	(OMB x 2)/(256KB x 2)/(1MB x 2)/(4MB x 2)

3

INSTALLATION

This section describes unpacking guidelines, installation tools, controller installation, related configuration requirements and troubleshooting for first-time power up.

UNPACKING AND INSPECTION

Before handling the BT-X10A, take precautions to avoid damage from electrostatic discharge: either use a grounding strap, or, touch your computer on a metal part to discharge static electricity before handling the board. Always hold the board by the edges, even after static electricity is discharged.

Remove the BT-X10A from its protective envelope. Check that your shipment is complete with cables, documentation and diskette. Then verify that no physical damage occurred during shipping by inspecting the board for bent pins, loose parts, broken traces, and chipped or broken connectors.

INSTALLATION TOOLS

The following items may be needed to assist with installing the card into your system:

- Your host system hardware manuals
- Hard disk drive(s) manuals
- Floppy disk drive(s) manuals
- Small screwdriver
- Small needle-nosed pliers

- Cabling appropriate to your installation (see below):
  - + A 34-pin flat cable to attach the BT-410A or the BT-510A to a floppy drive
  - + A 40-pin data/control cable to attach the BT-X10A to an IDE drive
- SIMMs (see *Cache DRAM Installation* in Section 2)

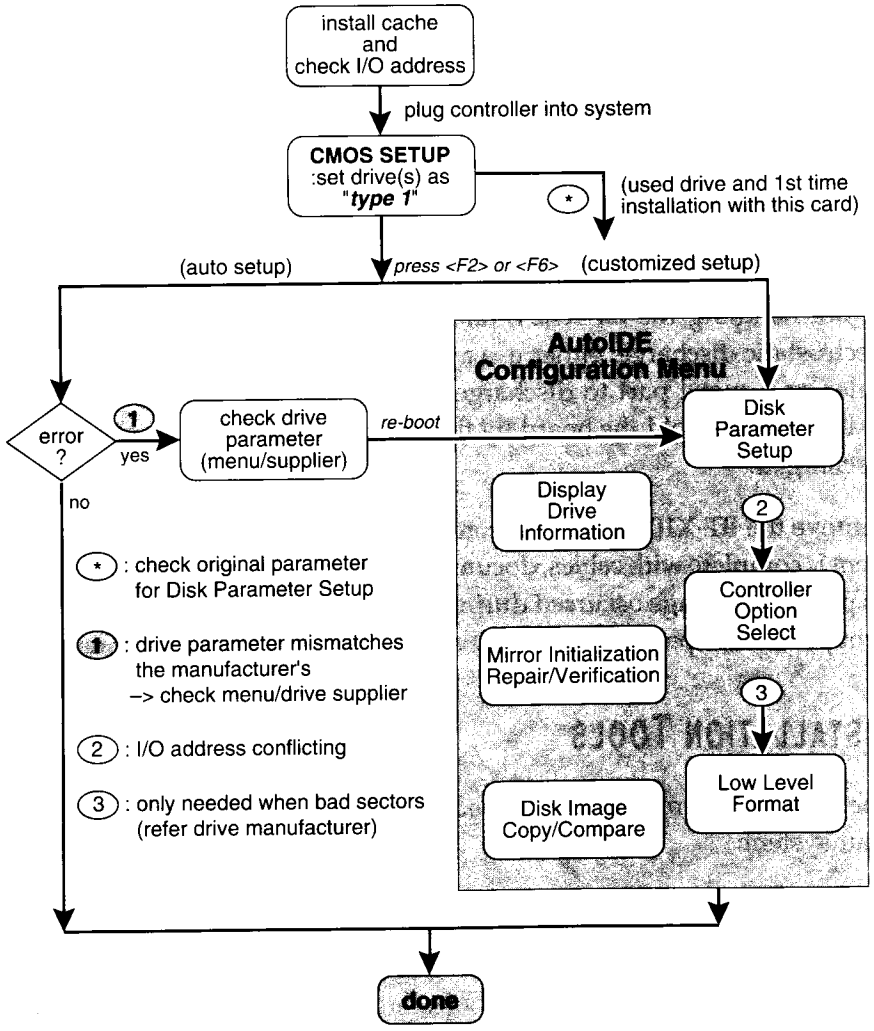


Figure 3-1. Quick Installation Reference

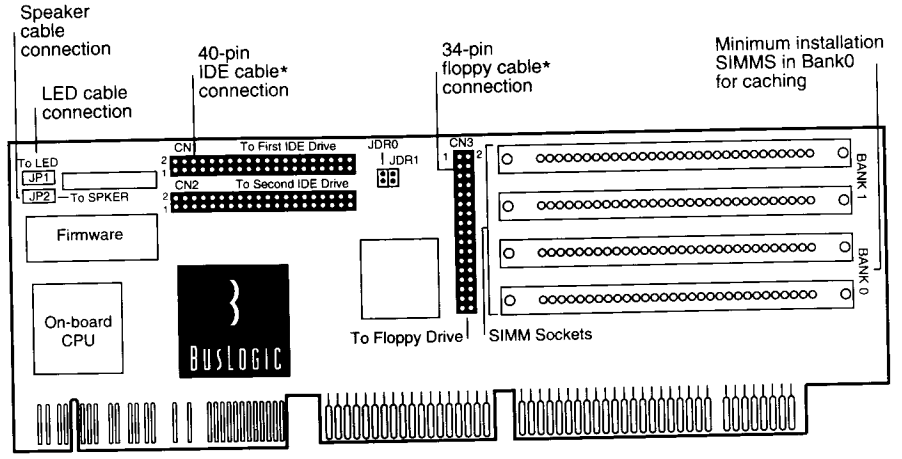


Figure 3-2. Model BT-410A Caching Controller

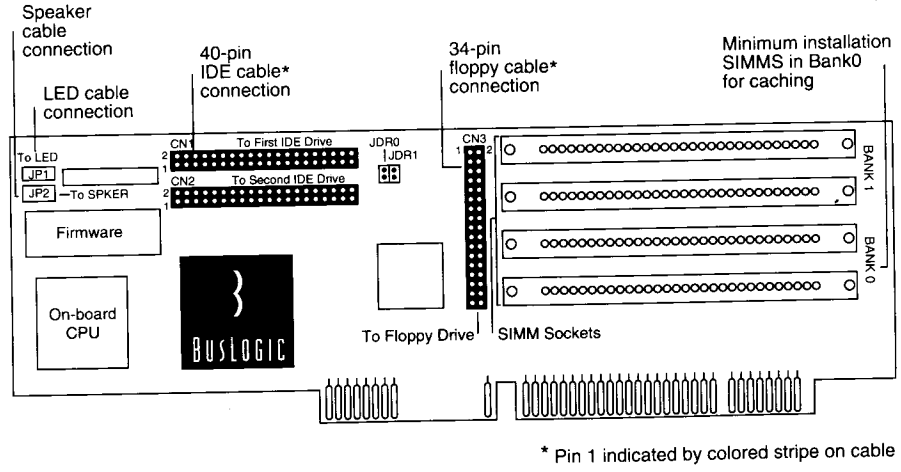


Figure 3-3. Model BT-510A Caching Controller

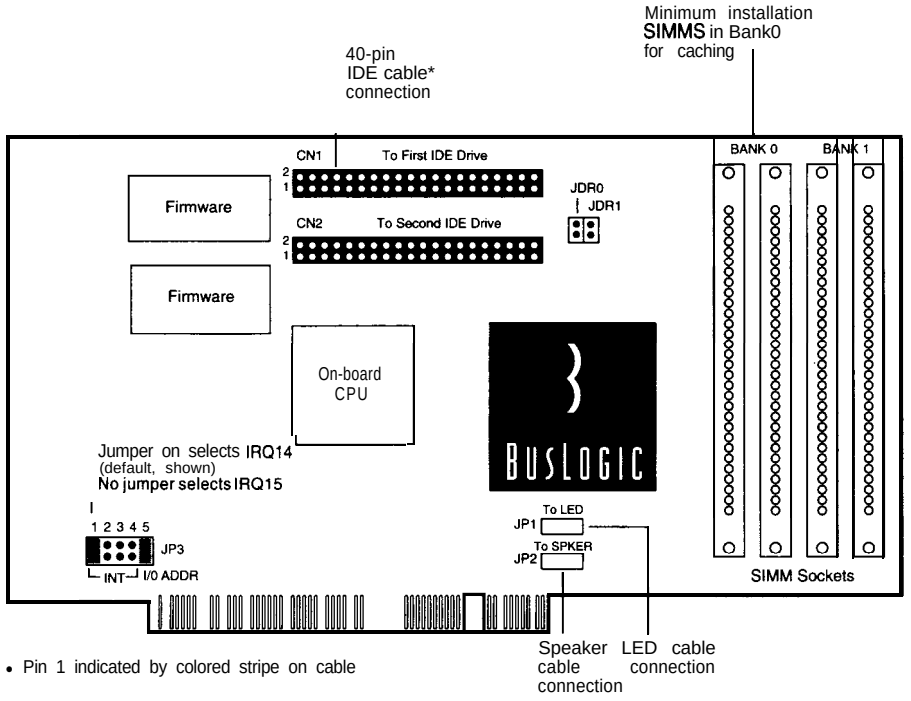


Figure 3-4. Model BT-910A Caching Controller

PRE-INSTALLATION NOTES

If you are upgrading an existing IDE hard drive subsystem, it is advisable to do a complete file-by-file (as opposed to image) backup of your data to removable media.

The BT-X10A requires a specific bus slot, depending on which model you purchased, and, for most installations, can be treated as a direct replacement for an IDE hard bus controller (or "paddleboard"). If another IDE bus controller is to coexist with the BT-X10A, then these two controllers must be set as primary and secondary, respectively (refer to the AutoIDE's Controller I/O Port module description in Section 4). Also, only one of the two controllers can enable its floppy; the other one must be disabled or removed. If another IDE adapter is installed, you have to set the BT-X10A's ROM address prior to that of the IDE adapter.

MODEL BT-X10A INSTALLATION

Before you install the controller card, install the SIMMs for cache memory. For the BT-910A, set JP3 to select the correct interrupt and I/O port address values for this card. See Section 2 for details on these hardware configuration options.

1. Power down the host system.

2. Referring to the host system owner's manual, open the case to gain access to the motherboard and expansion slots. If the computer has been on, wait a few minutes until the power supply case has cooled down inside the computer. If the power supply case is cold, touch it to discharge any static electricity that may be on your clothes or body. If a disk drive controller board is installed, remove all connecting cables to the board and then lift it out of the host computer.

3. Remove the mounting screw and the existing bracket from the rear panel behind the slot that has been selected for insertion of the BT-X10A.

4. Press the BT-X10A downward into the selected slot, align the mounting bracket, and reinstall the mounting screw.

Caution: *Make sure that the board is properly seated in the slot.*

---

5. *BT-410A/BT-510A Only:* Connect the 34-pin flat cable to CN3 by aligning its colored edge (usually red) with Pin 1 of CN3. Connect the other end to the floppy disk drive.

   All Models: If you are attaching a single new or used IDE drive to the BT-X10A, connect the drive to the IDE BUS1 connector, CN1, on the BT-X10A using either an existing or the supplied 40-pin data/control cable.

   If you are attaching two or more IDE drives to the BT-X10A, see the following rules before continuing. Also refer to the advanced installation instructions in Section 4 for further details regarding mirroring and linking configurations.

- Two drives can be connected to each channel
- If mirroring is desired, each drive must be on a *separate* channel
- If linking is desired, each drive must be on the same channel

Note: After physical installation, you must turn on mirroring and linking via the AutoIDE's Disk Parameter Setup module (Section 4).

7. Insert the four-pin header connector from the drive activity LED on the front panel of the host to connector JP1 on the BT-X10A. In most cases, this connector is reversible and may be plugged into JP1 in either direction. See your system user's guide for more information.
8. Insert the connector from the system speaker to connector JP2 on the BT-X10A.
9. Verify that all connections are secure.
10. Reattach and close the cover of the host computer as described in the system owner's manual.
11. Before powering up the system, read "CMOS Updates for New IDE Drives" (below) to determine if you need to update your system's CMOS configuration.

CMOS Updates for New IDE Drives

If you are installing one or more new IDE drives, update your system's CMOS so that it can recognize the new devices as follows:

- If you are installing a single new IDE drive for the first time, it is necessary to configure Drive C: in the system CMOS Setup to type 1. This enables the system to detect the BT-X10A, where the actual drive parameter tables are stored.
- When two drives linked or mirrored as a pair are seen as a logical drive, set Drive C: to type 1 for proper operation.
- If two individual drives or link/mirror pairs are installed, you have to set both Drive C: and D: to type 1.
- If more than two individual drives are installed, or more than two link/mirror pairs are installed, the drive types of Drive C: and D: will be ignored and handled by the controller. Refer to More than 2 Drives option in the Controller Option Select module for details.

The following summarizes CMOS configuration. Note that a link/mirror pair is treated as a single drive.

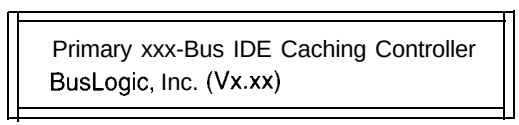
# of Drive(s)	System CMOS/Drive Type (Drive C:,D:)	More_Than_2_Drives Support (*)
1	1, Non-installed	Disabled
2	1, 1	Disabled
3	X, X	Enabled
4	X, X	Enabled

X = don't care * = See "Controller Option Select" module

If necessary, refer to your motherboard or system manual for further instructions on configuring the system CMOS. Also, refer to Appendix A, "AT Hard Drive Types," for a list of drive types to ensure that you've correctly configured the CMOS Setup Drive Table for your drive type. If you are upgrading an existing IDE drive subsystem, the values previously stored in the system CMOS are unlikely to require modification.

System Power Up

For most single new or used IDE drive installations, no additional steps are necessary to ensure proper operation of the BT-X10A with your disk subsystem. Power up the system and ensure that the system POST (Power On Self-Test) is functioning properly. The BT-X10A should display its own POST test and messages immediately below and after the system POST test. A sample screen is depicted below.



Press F2 or F6 to enter AutoIDE configuration utility.
4096K bytes of CACHE DRAM installed

ROM Address Conflicts

If the BT-X10A POST test and messages do not appear, there may be a ROM address or timing conflict between the BT-X10A and other adapter cards in the system. Re-check the ROM address set for the BT-X10A (see the ROM BIOS Address option on the Controller Option Select display) against the ROM address of any other adapter cards in the system for potential conflicts. If a conflict exists, adjust the ROM address of other card(s). Otherwise, turn the power off, pull out the other card(s), and then power up the system and enter the AutoIDE configuration menu to select a proper location to avoid the conflict.

If the system contains a 16-bit VGA adapter with a Fast Address Decode option, disable that feature. Due to its wider address decoding range, this feature might cause some potential conflicts with the BT-X10A or any other cards implemented with 8-bit memory mapped I/O.

Drive Parameters

For most single new or used IDE drive installations, there is generally no need to access the AutoIDE configuration utility to ensure proper operation of the BT-X10A with your IDE drive. The BT-X10A obtains the correct drive parameters directly from the drive itself, by automatically issuing an IDE Identify Drive command. If you are upgrading a single existing IDE drive subsystem with the BT-X10A, the drive will function exactly as before. If you are installing a new IDE drive, the drive is now ready for operating system installation; refer to your operating system manual for further instructions.

Note: IDE drives arefactoy low-levelformatted. It is unnecessa y and inadvisable to low-level format a new IDE *drive.*

Some IDE drives either do not respond correctly to the IDE Identity Drive command, or respond with the physical parameters, rather than the manufacturer's recommended translation parameters. In such cases, the BT-X10A will issue an error message similar to the one shown below.

```
=ERROR=
IDE BUS1 drive 0: Bad drive or drive parameter error!
Get the correct parameter from drive manufacturer & enter
AutoIDE configuration menu to reconfigure the system.
```

If you see this message, use AutoIDE to manually enter the correct drive parameters in the Disk Parameter Setup module. Refer to your drive manual for the correct parameters for a new IDE drive. If you are upgrading an existing used IDE drive subsystem, the drive parameters previously stored in the system CMOS will be correct.

Once you have entered the correct drive parameters using the Disk Parameter Setup module (Section 4), press **<Esc>** and save the updated parameters. The system will reboot and the new parameters will be checked by the BT-X10A to ensure they are correct. If correct, a used IDE drive will function exactly as before, while a new IDE drive is now ready for operating system installation. If an error message is still displayed, you must verify and re-enter the correct drive parameters.

4

THE AUTOIDE UTILITY

The AutoIDE utility is the BT-X10A's setup and configuration program. It gives you control over drive arrangements and cache operations. The program is stored in an onboard EPROM and EEPROM which allows you to save your own preferences as power-on defaults.

You can access the AutoIDE upon power up or system reset, when the following message appears on screen:

```
Primary XXX-Bus IDE Cache Controller
BusLogic, Inc. (Vx.xx)

Press F2 or F6 to enter AutoIDE configuration utility.
4096K bytes of CACHE DRAM installed
```

Press [F2] or [F6] to access the AutoIDE main menu, illustrated below.

```
Select the function for operation

Disk Parameter Setup
Controller Option Select
Display Drive Information
Low Level Format
Mirror Initialization or Repair
Mirror Drive Verification
Disk Image Copy
Disk Image Compare
```

Use the following keystrokes for moving to and selecting menu options:

Up (↑) arrow key **Down (↓) arrow key**	Use to move cursor up and down to select menu options.
F1	On-line help
F10	Exit

DISK PARAMETER SETUP

This module allows you to install, link and mirror drives. It is divided into three functional feature blocks, as depicted below, which control, respectively, physical drive information, logical drive information, and installed drive information.

Disk Parameter Setup

	Cylinders	Heads	Sectors	Capacity
IDE BUS1 Drive 0 [DO]	683	16	38	202 MB
IDE BUS1 Drive 1 [D2]	0	0	0	OMB
IDE BUS2 Drive 0 [DI]	2108	4	49	201 MB
IDE BUS2 Drive 1 [D3]	0	0	0	OMB

Attribute		Cylinders	Heads	Sectors	Trk-Remap	Capacity
Drive C	[DO]	683	16	38	Disabled	202 MB
Drive D	[DI]	952	7	62	Disabled	201 MB
Drive E	[D2]	0	0	0	Disabled	OMB
Drive F	[D3]	0	0	0	Disabled	OMB

IDE BUS1 Drive 0 — Maxtor 7213 AT
IDE BUS1 Drive 1 —
IDE BUS2 Drive 0 -ALPS ELECTRIC Co., LTD. DR312C
IDE BUS2 Drive 1 —

Physical Drive Information

The first block displays the parameters (cylinders, heads and sectors) for each physical IDE drive connected to the BT-X10A. In the example, two drives, with capacity of 202MB and 201MB, are separately connected to IDE BUS1 and IDE BUS2.

	Cylinders	Heads	Sectors	Capacity
IDE BUS1 Drive 0 [DO]	683	16	38	202 MB
IDE BUS1 Drive 1 [D2]	0	0	0	OMB
IDE BUS2 Drive 0 [D1]	2108	4	49	201 MB
IDE BUS2 Drive 1 [D3]	0	0	0	OMB

Capacity = (Cylinders) x (Heads) x (Sectors) x 512 Bytes

These parameters are normally read from the IDE drive and automatically updated without user intervention. However, if an IDE drive fails to respond to the IDE Identify Drive request issued by the BT-X10A, you may need to manually enter the correct parameters based on the manufacturer's recommendations.

[DO] is short for IDE BUS1 Drive0 and [D2] is for Drivel. As for drives connected to IDE BUS2, [D1] is short for Drive 0 and [D3] is for Drivel. These short names will correspond to the next block of this module for further settings, such as linking or mirroring.

Logical Drive Information

The second feature block of this module displays the parameters of the four logical drives units supported by the BT-X10A and presented to the operating system. The logical drive here may be an individual drive, linking pair of two drives or mirroring pair of two drives.

The following block shows two individual drives installed:

Attribute	Cylinders	Heads	Sectors	Trk-Remap	Capacity
Drive C [DO]	683	16	38	Disabled	202 MB
Drive D [D1]	952	7	62	Disabled	201 MB
Drive E [D2]	0	0	0	Disabled	OMB
Drive F [D3]	0	0	0	Disabled	OMB

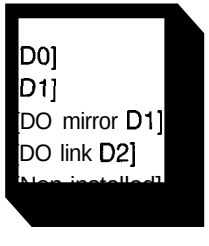
Note: Drive C, D, E, and F shown in this block are for ordering purpose only and not related to system's drive ordering. For example, if a 201MB *drive is installed on the IDE BUS1 Drivel, i.e., [D2], this block will display [D2] as Drive E. But from the system, it sees [D2] as Drive D.*

Also note that if the drive's cylinder number shown in the top block is greater than 1024, the controller can be set to translate the parameters into a format that allows for proper operation (see section on Track Remapping).

Setting Attributes

Initially, [DO] to [D3] shown in this column correspond to those of upper block.

Use this portion of the Disk Parameter Setup module to configure for Linking or Mirroring. You must first set one of the pair to [Non-installed] to access the Link / Mirror option for the other drive. When you've set one of the drives to non-installed, you will have access to a list of attributes similar to the one shown below:



The following full screen shows [DO] and [D1] are mirrored as a pair. The linking case is similar.

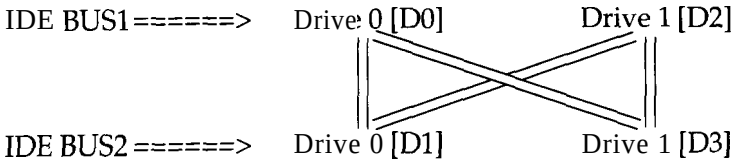
Disk Parameter Setup

	Cylinders	Heads	Sectors	Capacity
IDE BUS1 Drive 0 [DO]	683	16	38	202 MB
IDE BUS1 Drive 1 [D2]	0	0	0	OMB
IDE BUS2 Drive 0 [D1]	2108	4	49	201 MB
IDE BUS2 Drive 1 [D3]	0	0	0	OMB

Attribute	Cylinders	Heads	Sectors	Trk-Remap	Capacity
Drive C [DO mirror D1]	952	7	62	Disabled	201 MB
Drive D [Non-installed]	0	0	0	Disabled	OMB
Drive E [D2]	0	0	0	Disabled	OMB
Drive F [D3]	0	0	0	Disabled	OMB

IDE BUS1 Drive 0	— Maxtor 7213 AT
IDE BUS1 Drive 1	—
IDE BUS2 Drive 0	-ALPS ELECTRIC Co., LTD. DR312C
IDE BUS2 Drive 1	—

To select the proper attribute for Mirroring, set one of the drives to [Non-installed], in this case [D1], and then set the other drive to [Dn mirror Dn], in this case [DO mirror D1]. The capacity shown in this block will be the smaller of the two. To optimize the performance of dual channel design, the mirroring function requires you to work with two drives connected to two individual buses, i.e., IDE BUS1 and IDE BUS2. You cannot do mirroring for two linking pairs on the two buses, either. Four mirrored pairs are possible from the physical drive point of view:



Linking configuration is similar to Mirroring, except that Linking requires that the two drives be on the same bus, either IDE BUS1 or IDE BUS2. So there are two possible linking pairs for each controller. The capacity shown in this block will be the summation of the two linking drives.

To properly set the attribute, you can boot from a different drive each time. For example, you have two drives installed with different operating systems and will work with them from time to time. If you work with DOS at the beginning, the setting may look like this:

	Attribute		System
DRIVE C	[D0]	DOS drive	C: ==> Boot Drive
DRIVE D	[D1]	(no disk)	
DRIVE E	[D2]	SCO UNIX drive	D:
DRIVE F	[D3]	(no disk)	

If you work with SCO UNIX next time, the setting may change like the following. If you're not able to change to the desired options, you can try to set the attribute(s) to [Non-installed] for some of them. This allows more options for the drive you want to work with.

	Attribute		System
DRIVE C	[D2]	SCO UNIX drive	C: ==> Boot Drive
DRIVE D	[D0]	DOS drive	D:
DRIVE E	[D1]	(no disk)	
DRIVE F	[D3]	(no disk)	

If more than two drives, link / mirror pair treated as one, are installed, you have to enable the More Than 2 Drives option of the Controller Option Select module.

Note: Once you have set the drive attributes for mirroring, you must initialize mirroring using the AutoIDE's Mirror Initialization or Repair module described later in this section.

Track-Remap

This Track-Remapping function is disabled by default and should be enabled only when the capacity of the drive exceeds 528MB.

Note: The INT13 BIOS Selection option in the Controller Option Select module has to be set to Enhanced INT13 (Shadowed or not).

If installing a previously configured drive,

(1) maintain drive type as 1

Caution: If drive type is not set to 1, all data on drive will be destroyed

(2) and drive cylinder number is >1024, Track Remapping should be disabled or perform a backup of the device before remapping.

installed Drive Information

The bottom portion of the Disk Parameter Setup screen indicates the physical bus connection of drive(s) controlled by the BT-X10A. The following shows two drives connected to IDE BUS1 and IDE BUS2, respectively.

IDE BUS1 Drive 0 — Maxtor 7213 AT
IDE BUS1 Drive 1 —
IDE BUS2 Drive 0 — ALPS ELECTRIC Co., LTD. DR312C
IDE BUS2 Drive 1 —

CONTROLLER OPTION SELECT

The Controller Option Select screen gives you access to the advanced features supported by the BT-X10A:

Controller Option Select

Cache Line Size	0.5K	Default
More Than 2 Drives	Disabled	Default
INT13 BIOS Selection	Enhanced INT13 Shadowed	Default
Cache Function	Enabled	Default
Controller I/O Port	Primary	Default
Floppy Controller	Enabled	Default
ROM BIOS Address	C800H	Default
Green Cache Mode	Disabled	Default

Cache Line Size

You can set the cache line size to one of the following:

0.5K (default)
1K
2K
4K
8K

While the default suits most applications, you can select other options for your specific needs. For example, you may want to choose 4K for NetWare system if the block size of its file system is also 4KB.

More Than 2 Drives

The More Than 2 Drives option allows support of up to eight logical drives-an individual drive, linking pair or mirroring pair-under DOS 5.0 and above, Windows and NetWare. *Where two BT-X10As are installed, enable this option on the one serving as the seconda y controller to gain access to its drives.*

Also note that:

- The INT13 BIOS Selection option on this screen has to be set to Enhanced INT13 (Shadowed or not).
- To support the more than two drive function for other operating systems, you have to install their respective drivers.

INT13 BIOS Selection

INT 13 BIOS allows you to select the INT 13 handler, a DOS software interrupt used to control hard disk I/O (read/write operations). Three options exist: Enhanced INT13 shadowed to system RAM (default), Enhanced INT13 and Mainboard INT13.

Enhanced INT13 Shadowed. This option takes that portion of the controller's ROM which normally handles INT 13, and remaps it to conventional memory (0-640KB), where it occupies 1KB (639KB-640KB). This option is provided, and enabled by default, to ensure compatibility with some early versions of **BIOS,** which may otherwise experience timing problems with the BT-X10A (and IDE drives generally).

Enhanced INT13: It functions like the previous option except it instructs the controller to handle INT 13 from its ROM address in reserved memory and does not occupy 1KB from the system memory.

Mainboard BIOS INT13: This option assigns the handling of INT 13 to **the** system BIOS instead of the controller BIOS. Some versions of BIOS also support the remapping to conventional memory of the INT 13 BIOS handling routines; consult your system manual for details.

Note: Enhanced INT13 (Shadowed or not) option must be set to work with (1) More than 2 drives environment and (2) DOS partition greater than 528MB per drive with Trk-Remap option enabled.

Cache Function

This function allows you to set the cache as Enabled or Disabled. The cache is Enabled by default, but you may find it necessary to temporarily disable the cache (e.g., when installing a new operating system or hardware). When cache status is disabled, data transfer requests and commands are passed directly to the drive itself.

Controller I/O Port

There are two options for the controller I/O port:

Primary => port address (1F0-1F7) —> *default*
Secondary => port address (170-177)

The *Seconda y* option is useful when another IDE card is installed in the same system. Remember to enable the More Than 2 Drives option to gain access to the drive(s) controlled by the secondary controller. You are allowed to put two BT-X10A controllers in the system and thus can control up to eight individual drives. **(For** operating systems other than DOS, device drivers are needed.)

Note: For BT-910A, be sure the setting for Pin-5/JP3 is same as theoption set here.

Floppy Controller (BT-410A and BT-510A only)

This option lets you Enabled/Disabled the floppy controller. Note that only one floppy controller can be enabled in the system.

ROM BIOS Address

There are six ROM BIOS address options:

C800H (default)	D400H
CCOOH	D800H
DOOOH	DCOOH

Select the desired option by moving the cursor (using the Up and Down Arrow keys) to the desired option and pressing <Enter>.

When there is an I/O ROM address conflict between or among add-on cards installed in the system, you have to switch the ROM addresses on those cards to different locations. One way is to adjust the other card's ROM address to avoid conflict. The other way is to pull out the other card(s) first, install this module, and then plug back the other card(s) for system operation. Also, note that the BT-X10A's ROM address always precedes that of other host adapter(s), if available.

Green Cache Mode (Power Saving Mode)

If enabled, the BT-X10A will start to monitor the access activities to the storage subsystem. If the duration of the Idle state exceeds the time limit defined in this mode, the BT-X10A will then turn the drive(s) and controller itself into Motor Off and Sleeping modes, respectively, in order to save power. Eight options are available:

Disabled (default)	5 minutes
1/2 minute	10 minutes
1 minute	15 minutes
3 minutes	30 minutes

DISPLAY DRIVE INFORMATION

This screen shows information about the physical drives attached to the BT-X10A. Note that the information that's displayed differs from drive to drive.

A sample screen is shown below. Press the Up and Down Arrow keys to move from one Drive View to another:

IDE BUS1 Drive 0

Drive model	Maxtor 7213 AT
Firmware revision	5ADF1750
Serial #	B10F4JBS
Cylinders	683
Heads	16
Sectors	38
Buffer type	dual port multiple sector with look ahead
PIO timing	Mode 0 : 600 ns cycle time
Read write multiple	32 sectors per interrupt

Switch to another screen to view the information of the other drive:

IDE BUS2 Drive 0

Drive model	ALPS ELECTRIC Co., LTD. DR312C
Firmware revision	FS01DO1
Serial #	
Cylinders	2108
Heads	4
Sectors	49
Buffer type	dual port multiple sector with look ahead
PIO timing	Mode 0 : 600 ns cycle time
Read write multiple..	Not supported

Low Level Format

An IDE drive is formatted and ready for operating system installation when shipped by the manufacturer. Under normal circumstances, it is unnecessary and inadvisable to low level format an IDE drive. In the event that a low level format seems necessary (e.g., multiple bad sectors), contact your dealer or drive manufacturer before proceeding. Some IDE drive manufacturers build low level format routines into the drive itself, and supply special model-specific software programs for this purpose.

Warning: *Performing a low-level format causes all information and data on the drive to be lost.*

If you choose to execute a low level format from the AutoIDE, enter the manufacturer's recommended drive parameters or obtain the parameters from the Display Drive Information screen. IDE drives normally support l-to-l, or non-interleaved, operation.

Note: *Linked or mirrored drives will be formatted together.*

A sample screen is depicted below. Select the desired option by moving the cursor (using the Up and Down Arrow keys) to the desired option and pressing <Enter>.

```
Select a drive for low level format
IDE BUS1 Drive0 Maxtor 7213AT
IDE BUS2 Drive0 ALPS ELECTRIC Co., LTD. DR312C
```

Mirror Initialization or Repair

The Mirror Initialization or Repair module initializes mirroring for a pair of drives once the attribute for these drives has been set using the Drive Parameter Setup module (This module is not available unless the mirroring attribute has been set). When initialized, the system creates and maintains an exact duplicate of the source drive. This screen is also used when you need to repair a drive in a mirror pair and restore the data once one of the mirror-pair drives is in trouble.

```
Select the mirror drive for initialization or repair

                                                    Status
IDE BUS1 Drive0 —  Maxtor 7213AT                    U
IDE BUS2 Drive0 — ALPS ELECTRIC Co., LTD. DR312C    U
```

The Status column indicates the status of a mirror pair. Drive status could be any one of the following:

- U: Un-Initialized Drive (before mirror initialization is done)
- 0: Drive OK (once mirror initialization or repair is completed)
- D: Drive Damaged (any one of the mirror pair is crashed)

The mirror initialization always duplicates the source disk to the target disk. You can designate the source and target drives by pressing <Space Bar>.

```
Select the mirror drive for initialization or repair

                                                    Status
IDE BUS1 Drive0 — Maxtor 7213AT                     U       Source
IDE BUS2 Drive0 — ALPS ELECTRIC Co., LTD. DR312C    U       Target
```

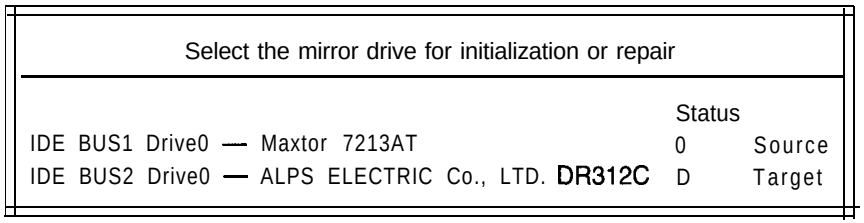
After the Mirror Initialization is completed, Status should display 0 for both mirroring drives, which signifies they are ready to work as a mirror pair.

```
Select the mirror drive for initialization or repair

                                                    Status
IDE BUS1 Drive0 — Maxtor 7213AT                     0       Source
IDE BUS2 Drive0 — ALPS ELECTRIC Co., LTD. DR312C    0       Target
```

If one of the drives in the mirror pair is malfunctioning or crashed, the mirroring beeper will start to issue alarms (if JP2 is properly connected). Check for a bad cable connection, a bad drive, a bad power supply, etc., if

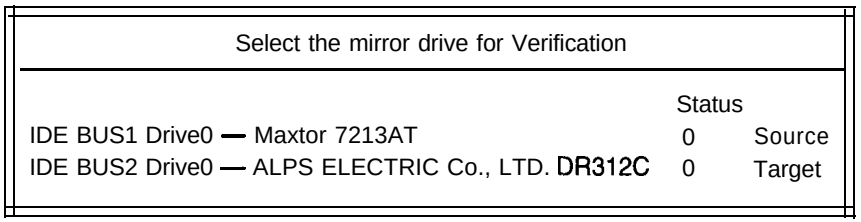
you see a mirroring problem. All of these could cause inconsistency between the two drives. Refer to this screen to check which drive is damaged.



To restore the mirror pair after the problem has been resolved, you must set the drive marked as D to Target and the one marked as 0 to Source. The beeping alarm will stop right after the mirror repair is completed.

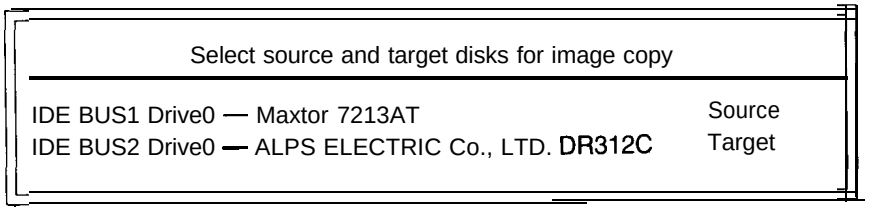
Mirror Drive Verification

This module performs a disk comparison between the two drives of the same mirror pair. You **may** need tore-do the mirror initialization if incorrect data is found in one of the drives. This module is not available unless the mirroring attribute has been set.



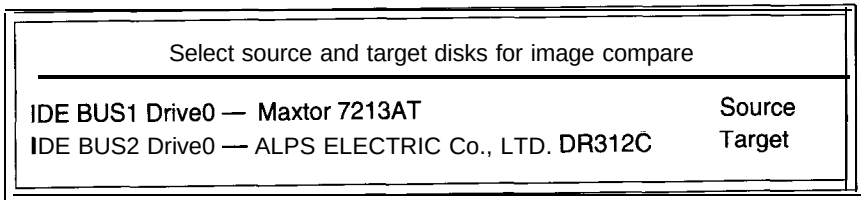
Disk Image Copy

This module copies the data from the source disk to the target disk on a drive-to-drive basis. Select the desired drive using the Up and Down Arrow keys and press <Enter> to execute the copy.



Disk Image Compare

This module compares the data of the source disk with that of the target disk on a drive-to-drive basis. Select the desired drive using the Up and Down Arrow keys and press <Enter> to execute the compare.



5

DRIVE® INSTALLATIONS

You may need drivers to gain 32-bit power when running under operating systems, such as DOS, Windows, OS/2, Novell, and UNIX. Depending on the product purchased, not all drivers listed are included. These software drivers are stored on two diskettes, except the DOS driver which resides in the BT-X10A's ROM (refer to INT13 BIOS Selection option of Controller Option Select module). Before installing, please browse the "README" directory of the Novell driver diskette for specific driver installation procedures. Note that the UNIX driver diskette is UNIX formatted and cannot be read from the DOS environment.

The following are driver installation instructions for some of the operating systems supported by your controller. Please also refer to the README file on the driver diskette for other driver installation instructions and updated information.

WINDOWS 3.1X

Windows 3.1 must be installed in the system before you can install this driver.

To install this driver:

1. Execute the file \WINDRV\SETUP.EXE from the floppy drive containing the BusLogic driver diskette, or
2. Enter Windows and run the same file \WINDRV\SETUP.EXE

To remove this driver:

During the driver installation, the original SYSTEM.INI under your Windows directory will be renamed as SYSTEM.001. Rename SYSTEM.001 back to SYSTEM.INI, and the driver is removed.

NETWARE 4.0X

The subdirectory IDENV40X.DSK, contains the NETWARE V4.0X device driver. The following describes the key procedures during driver installation:

After seeing a message block showing "Scanning for available drivers . .." during the installation, you'll find a list of default supported drivers.

Press **<Ins>** key to install the driver, IDENV40.DSK, from drive A:.

Press **<F3>** key to specify the path: >A:\NETWARE.40. Select **IDENV40.DSK** and press <Enter> to load this driver.

Press **<Return>** again to set the I/O port address and IRQ.

NETWARE 3.1X

The subdirectory IDENV31X.DSK, contains the NETWARE V3.1X device driver. The installation procedures are the same for NETWARE V3.1 below, except the driver loaded here is IDENV31X.DSK.

NETWARE 3.1

The subdirectory IDENV31.DSK, contains the NETWARE V3.1 device driver. The installation procedures follow:

For one card installation

1. Install the BT-X10A:
   - A) Remove other add-on cards that may conflict with BT-X10A's ROM space
   - B) Select this card as primary
   - C) Select the ROM space for the BT-X10A
   - D) Enable the floppy diskette
2. Plug another add-on card if necessary
3. Boot DOS
4. Copy the BusLogic NETWARE driver, IDENW31X.DSK, from the BusLogic driver diskette to either the NETWARE boot floppy or the NETWARE subdirectory on your hard drive
5. Load NETWARE. When the NETWARE server prompt ":" appears
6. Load IDENV31
7. Using the NETWARE Install utility, save the NCF files to reflect your new configuration.

Where duplexing is required:

1. Install the secondary BT-X10A first:
   - A) Remove other add-on cards that may conflict with BT-X10A's ROM space
   - B) Select this card as secondary
   - C) Select the ROM space for the BT-X10A
   - D) Disable the floppy diskette
2. Install the primary BT-X10A:
   - A) Select this card as primary
   - B) Select the ROM space for the BT-X10A
   - C) Enable the floppy diskette
3. Plug another add-on card if necessary
4. Boot DOS
5. Copy the BusLogic NETWARE driver, IDENW31X.DSK, from the BusLogic driver diskette to either the NETWARE boot floppy or the NETWARE subdirectory on your hard drive
6. Load NETWARE. When the NETWARE server prompt ":" appears
7. Load IDENV31
8. Using the NETWARE Install utility, save the NCF files to reflect your new configuration.

NETWARE 2.XX

This diskette is also labeled as DSK_DRV_003 and two files IDENV215.DSK and IDENV215.OBJ in the root directory are used as the hard disk device driver for NETWARE V2.15. Follow the NETWARE V2.15's installation guide to install the server.

OS/2 V2.X

To install this driver:

1. Insert the BusLogic driver diskette into the floppy drive
2. Under OS/2 V2.X, install the driver by keying the following command:

   [C:\] **ddinstal**

3. Set the source drive letter to reflect the floppy drive containing the driver diskette

   This command copies the file, OS2_32.ADD, from the driver diskette to C:\OS2 directory and replaces the file IBM1S506.ADD in it. The old IBM1S506.ADD will be re-named as IBM1S506.1, which also resides in the C:\OS2 directory.

4. Re-boot the system

To remove the driver:

1. Copy the file, IBM1S506.1, to replace the file, IBM1S506.ADD. Both files are in the same directory, C:\OS2:

   [C:\OS2] COPY IBM1S506.1IBM1S506.ADD

2. Re-boot the system.

UNIX

For installation in some UNIX environments, cache must be disabled. Cache must be disabled on the BT-X10A before you install the SCO UNIX operating system. For further details, refer to the README file supplied with the product and the UNIX operating system documentation.

A

AT HARD DRIVE TYPES

The first fifteen drive types were defined by IBM in the original AT. Since then, additional types have been defined, so the table in your machine may vary.

In the following table, these abbreviations are used:

TYP	Drive type number
Cyl	Number of cylinders
Hds	Number of heads
Cmp	Pre-compensation
Zon	Landing zone
Sec	Number of sectors
Mb	Approximate number of megabytes

Typ	Cyl	Hds	Cmp	Zon	Sec	Mb
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	32
4	940	8	512	940	17	64
5	940	6	512	940	17	48
6	615	4	-1	615	17	20
7	462	8	256	511	17	30
8	733	5	-1	733	17	30
9	900	15	-1	901	17	110
10	820	3	-1	820	17	20
11	855	5	-1	855	17	35
12	855	7	-1	855	17	50
13	306	8	128	319	17	20
14	733	7	-1	733	17	40
15	0	0	0	0	0	0

Typ	Cyl	Hds	Cmp	Zon	Sec	Mb
16	612	4	0	663	17	20
17	977	5	300	977	17	40
18	977	7	-1	977	17	56
19	1024	7	512	1023	17	60
20	733	5	300	732	17	30
21	733	7	300	733	17	42
22	733	5	300	733	17	30
23	306	4	0	336	17	10
24	925	7	0	925	17	53
25	925	9	0	925	17	70
26	754	7	0	754	17	43
27	754	11	0	754	17	68
28	699	7	0	699	17	40
29	823	10	0	823	17	68
30	918	7	0	918	17	53
31	1024	11	0	1024	17	93
32	1024	15	0	1024	17	127
33	1024	5	0	1024	17	42
34	612	2	0	611	17	10
35	1024	9	0	1024	17	76
36	1024	8	0	1024	17	68
37	615	8	0	615	17	40
38	987	3	0	987	17	24
39	987	7	0	987	17	57
40	820	6	0	820	17	40
41	977	4	0	977	17	32
42	981	4	0	981	17	32
43	830	7	0	830	17	48
44	830	10	0	830	17	68
45	612	4	305	663	17	20
46	306	4	-1	340	17	10
47	612	4	-1	670	17	20
48	698	7	300	732	17	40
49	976	5	488	977	17	40
50	306	4	0	340	17	10
51	611	4	306	663	17	20
52	732	7	300	732	17	42
53	1023	5	-1	1023	17	42
54	306	2	-1	305	17	5
55	1024	8	512	1024	17	68

B

ERROR MESSAGES AND GENERAL TROUBLESHOOTING TIPS

Error codes may be generated at various stages in the Model BT-X10A's BIOS initialization procedure. If an error occurs, the BIOS will display a message accompanied by one of several error codes, which are listed below.

Code Message	Description
1 Controller Failure!	Extendedcommandenabled
2 Controller Failure!	Query controller information
3 Cache Operation Failure!	Write back cache to drive and flush cache
4 Cache Operation Failure!	Disable cache
5 Cache Operation Failure!	Write cache DRAM
6 Cache Operation Failure!	Read cache DRAM
7 Controller Failure!	Query controller information error during DRAM test
8 Cache RAM Error at Bank 0	DRAM error at bank 0
9 Cache RAM Error at Bank 1	DRAM error at bank 1
10 Cache RAM Error at Bank 2	DRAM error at bank 2
11 Cache RAM Error at Bank 3	DRAM error at bank 3
12 No Cache RAM Installed!	No DRAM installed
13 Controller Failure!	Read EEPROM
14 Controller Failure!	Write EEPROM
15 Controller EPROM Checksum Error!	Controller EPROM checksum error

On powering up the system, if the Model BT-X10A issues the message Error Code = 1 with no further details, one of four possibilities exists:

- Controller is not functional
- No Cache DRAM is installed
- TAG SRAM test failure
- Parity error on cache DRAM

Power off the system, wait a few moments and then power the system back on. Some versions of BIOS may issue a HDD Controller Failure message if no cache DRAM is installed.

General Troubleshooting Tips

Most controller errors are traceable to external factors, such as conflicts with other installed cards, bad or incorrectly configured drives, loose cables or other installation errors.

When a problem occurs in your system, you can always try to verify the possible causes by changing various components in your system, such as I/O card, motherboard, DRAM SIMM, or CPU. The following are general guidelines for some specific error conditions.

1. The LED connected to JP1 flashes some diagnostics right after power-up. The following shows the flash frequency of each fatal error condition:
   - One short flash: No Cache DRAM installed
   - Two short flashes: CPU error
   - Three short flashes: SRAM error
   - Four short flashes: Timer error
2. No BIOS message from BT-X10A, i.e., <Press F2 or F6 . ..>, appears on the screen:
   - ROM address conflicting with other I/O card(s). Check the ROM addresses of all the I/O cards and make sure there are no conflicts.
   - VGA card with "Fast Address Decode" option enabled. This may cause all I/O cards that employ 8-bit ROM BIOS, BT-X10A included, not to be recognized. Disable this option, if available.
3. Missing operating system:
   - Could be the parameters scanned by the BT-X10A, directly from the drive itself, differ from drive supplier's. Enter the CUSTOMIZED CONFIGURATION module of AutoIDE and key in the parameters provided by drive supplier manually.
4. System hangs after running for a while:
   - ROM BIOS might be "shadowed" by motherboard. Check the setup of your motherboard and disable the "shadow" option on BT-X10A's ROM address.
   - Cabling (error condition varies). Could try DIAGNOSTIC module of AutoIDE to check if the cabling is O.K.
5. FDC error:
   - Could be more than one FDC enabled: make sure only one FDC is enabled.
6. Cannot access HDD:
   - Check if the HDD type in your system's CMOS is set to "1."
7. Cannot recognize the HDD's parameters or cannot save them correctly:
   - Try to place the jumper cap over JDRO, i.e., short, if the HDD is connected to the FIRST IDE BUS. If connected to SECOND IDE BUS, then short JDR1.
8. Possible incompatible conditions for default option (CTRL BIOS moved to RAM) of INT 13 BIOS:
   - The default option gains the optimal performance. Due to its nature of occupying 1KB (639KB-640KB), some software programs

may issue false alarms, such as virus-protection software. The above problems can be avoided by choosing another option "Motherboard BIOS."

- Due to the same nature of 1KB occupancy, the default option may have a conflict when executing the OS/2. Since the OS/2 would only employ its disk I/O routines, the above problem can also be avoided by choosing another option "Motherboard BIOS" without degrading any performance.
- Since the CTRL BIOS options are for DOS (Windows) and not related to UNIX, it is recommended that you choose the "Motherboard BIOS" to operate under these environments.

9. Not able to run with Windows 32-bit driver:

- Change the INT13 BIOS/Customized Configuration option to "Motherboard BIOS" and install the Windows 32-bit driver during setup.

PRODUCT SUPPORT RECORD

The information on this page should be compiled and provided to your supplier in writing to obtain technical support assistance. This will enable your supplier to respond more rapidly and more appropriately to your problem.

About **BusLogic** Product:
BusLogic Product No: _____
Serial Number: _____
Date of Purchase: _____
Firmware Version Number: _____
BIOS Version Number: _____

Purchased From:
Company: _____
Address: _____
_____

Purchased By:
Name/Title: _____
Company: _____
Address: _____
_____
Telephone #: _____

About System Hardware Configuration:
System Manufacturer: _____
System Model and Speed: _____
_____
System BIOS Manufacturer: _____
Memory in System: _____
Hard Drives on System: _____

About System Software Configuration:
Operating System/Version: _____
Application Program/Version: _____

Detailed Description of Problem: _____
_____
_____
_____
_____
_____

STANDARD WARRANTY

BusLogic warrants that subject to the terms of this policy the Products shall be free from defects due to faulty material or workmanship on the part of BusLogic for a period of one year from the date of delivery.

This warranty shall not apply if the Products have been subject to misuse by Customer or any other party; if any material alteration, addition, amendment, or modification shall have been carried out without the prior written consent of BusLogic; failure to install or operate the Products in accordance to BusLogic's Product reference manual; or failure caused by improper or inadequate maintenance of users.

BusLogic will make good by repair or at its option by replacement any Products which become defective within the warranty period. Repairs will be warranted for 90 days. Products or parts replaced under this provision shall become the property of BusLogic.

BEFORE RETURNING A PRODUCT FOR REPAIR, BUYER MUST REQUEST A RETURN MATERIAL AUTHORIZATION (RMA) NUMBER FROM BUSLOGIC.

All Products under warranty returned to BusLogic for repair shall be returned to Customer at BusLogic's expense. Shipping costs for all Products returned to BusLogic for repair which are out of the warranty period shall be at Customer's expense both to and from BusLogic.

Customer is expressly prohibited from issuing Debit Memos for material returned under the provisions of this warranty.

BusLogic shall notify Customer in the event that the Products returned for repair are not, in BusLogic's sole opinion, within this Warranty condition and, unless disposition instructions are given for such Products within thirty (30) days of such notification, the Products will be returned to Customer freight collect.

EXCEPT FOR THE ABOVE EXPRESS LIMITED WARRANTY, BUSLOGIC MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AND BUSLOGIC SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The total liability of BusLogic for any claim or damage arising out of this Agreement, and whether in contract or in tort, shall not exceed the price of the individual Product(s) whose defect or damage is the basis of the claim.

IN NO EVENT SHALL BUSLOGIC BE LIABLE FOR ANY LOSS OF PROFITS OF FOR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES.

No action against BusLogic for breach of the warranty shall be commenced more than one (1) year after the accrual of the cause of action.

Customer also agrees to perform its duties and responsibilities under BusLogic's Warranty Policy, which shall be updated from time to time.

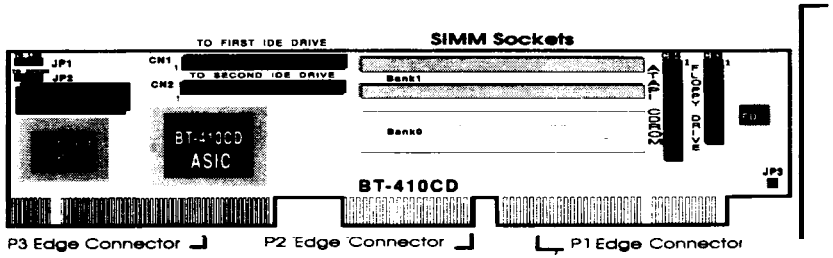
Addendum

The **KT-X10A** family of IDE Caching Controllers now supports attachment of up to two (2) ATAPI compatible devices in addition to supporting up to four (4) hard disk drives. Other functionality of the controllers remain the same.

Connector CN4 (refer to Board Diagram) is used to attach ATAPI compliant devices such as CD-ROM and tape drives using a standard **40-pin** AT data cable.

If you install two Xl OA Cache Controller in a single system, then you ***cannot*** use the ATAPI interface on either board. This is due to the fact that each board requires a primary or secondary port address. Jumper JP3 is used to control this. With JP3 installed, the secondary port address **170h** is used for the ATAPI connector. You must disable jumper JP3 (remove) if you install two **X10A** cache controllers in a single system.

JP3 **Installed**	**JP3 Removed**
ATAPI Supported	**Disable ATAPI Use second cache controller**



BT-41 OCD Board Diagram

The device driver diskette contains a Windows-based CD-ROM utility for audio and **PhotoCD's**. Please refer to the README.CD file found in the **<CD_APPS>** directory of the driver diskette for installation instructions.

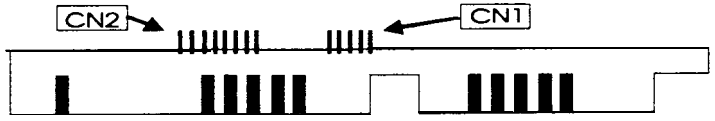
Tested ATAPI CD-ROM Drives:

Acer CD625A	Mitsumi CRMC-FXOO **1DE/FX400**
NEC **MultiSpin_2Vi/CDR-260R**	Philips CR-940
Sony **CDU55E**	Wearnes CDD- 120

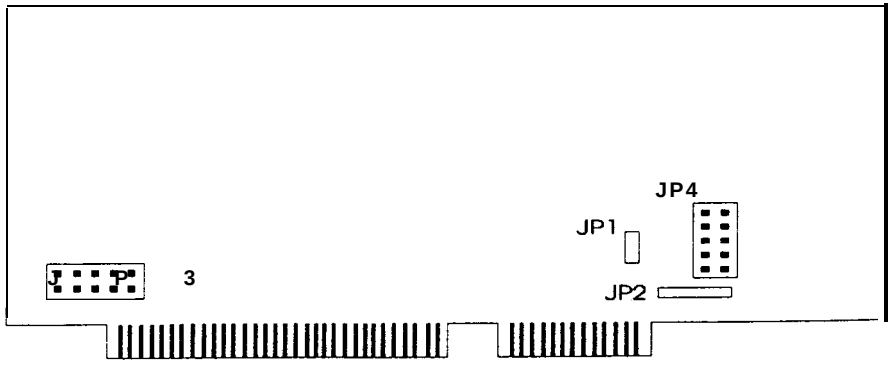
Addendum

BusLogic supplies an interrupt bridge paddle board with the BT-9 1 OA to accommodate **PCI** systems that can not route the IDE interrupt **(INT** 14 or INT 15) to a **PCI** slot. In most cases the BT-910A can be installed in your **PCI** system without the interrupt bridge paddle board. Please refer to **BT-**X 1 OA User's Guide chapter 2 for installation instructions. If your system does not boot after installing the BT-9 1 **0A,** follow these instructions to install the interrupt bridge paddle board and restart your system.

- Remove the BT-9 1 OA from your system.
- Remove the jumper on **JP3-1**.
- **Connect CN1** on the interrupt bridge paddle board to JP4 on the **BT-9** 1 OA using the ribbon cable supplied (see diagram below)
- Reinstall the BT-9 **10A** in a **PCI** slot.
- Insert the interrupt bridge board in the ISA or EISA slot nearest the **PCI** slot containing your BT-910A.



INTERRUPT BRIDGE PADDLE BOARD



BT-910A