Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Change Activity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Release</td>
<td>4/1/94</td>
</tr>
</tbody>
</table>

Compliance Statements
This device complies with Part 15 of the FCC Rules. 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 BT-440C/445C VESA Host Adapter is an intelligent VL-Bus to SCSI bus master host adapter based on a BusLogic-designed, MultiMaster™ ASIC technology. It provides a high-performance interconnection between the Video Electronics Standards Association’s (VESA) bus and up to seven Small Computer System Interface (SCSI) peripheral devices. The BT-440C/445C offers device driver support for major industry standard operating systems.

BusLogic host adapters offer exceptionally high product reliability due to reduced component count and lower power consumption. Minimized command overhead results in faster command execution. Adapter BIOS supports up to 8 GBytes capacity per disk.

The BT-440C is the same as the BT-445C, but without the floppy connector. For the remainder of this manual, BT-445C refers to both models except as noted.

Hardware Requirements

Your VESA computer needs:

- One available expansion VL slot for each BT-445C being installed
- At least one 3.5” floppy drive
- DC power for an internal 3.5” SCSI drive or an external subsystem

You’ll need the following cables:

- A 50-pin cable with a high density connector to connect the BT-445C to external devices
Software Requirements

You need the following software:
- Software for hard drive set-up to perform partitioning and high-level formatting
- Operating system software for hard drives being installed
- Device drivers as described below

Hard Drive Setup

BusLogic provides a low-level format utility as part of onboard adapter configuration (see the AutoSCSI™ description in Section 3). You can use this utility if your hard drive has not been previously formatted or requires a low-level format as indicated by error conditions.

In addition, you need partitioning and high-level formatting tools which are used to prepare the hard drive for operating system installation. Your operating system software may incorporate these high-level format and partitioning functions as part of its operating system installation or may offer them as separate utilities. For example, DOS provides FORMAT and FDISK in its utilities suite.

Supported Operating Systems

BusLogic has embedded driver support in the kernel of the following operating systems:
- NetWare
- Windows NT
- Interactive UNIX
- Vines
- SCOUNIX
- UNIXWare
- Solaris (for x86)

The BT-445C offers device drivers for the following operating systems:
- PC-DOS or MS-DOS
- IBM OS/2 or MS-OS/2
- NextStep

Device Driver Needs

Device drivers are needed to allow devices attached to the adapter to be recognized by and operate with the operating system. In some cases, the operating system has embedded or built-in support for basic hard drive configurations. This means you can install up to a specific number of hard drives without having to install additional device driver software.

If you are installing other types of devices, such as a tape backup device or a scanner, you will need to install device drivers to support those devices. These drivers either come with the operating system, are packaged with the device, or are available from third-party vendors.
Reference Documents

You should have the following documents on hand during installation:

- The installation and set-up guide for your computer
- The installation guide for your SCSI peripherals (e.g., hard drive, CD-ROM or tape drive)
- Operating system installation and user’s guide
- Installation guide for BusLogic or third-party device drivers (if applicable)

Specifications

Dimensions: 9.5"L x 3.25"W x 0.5"H

Electrical:
- Operating Voltage: 5±0.25V
- Operating Current: .5A Max.
- Max. Ripple/Noise: 100 mV

Environmental:
- Temperature: 0°C to 60°C (32°F to 140°F)
- Relative Humidity: 10% to 95% non-condensing
- Altitude: 0 to 10,000 ft. operating, 0 to 15,000 ft. non-operating

Interface Connections:
- SCSI internal: 50-pin double-row connector
- SCSI External: 50-pin high density shielded SCSI connector
- Floppy: 34-pin AT-compatible ribbon style (BT-44SC only)
- To/From System: IBM PC/AT standard 36-pin, 62-pin and the VL-Bus 116-pin edge connector
- MTBF: 90,000 hours

Installation Checklist

Host adapter installation involves the following steps:

1. Unpacking the host adapter and opening up the host system for adapter installation.

2. Setting the SCSI ID for all devices being connected to the host adapter. Each device must have a unique ID.

3. Terminating SCSI devices. Be sure that only two terminators are enabled, one at either end of the SCSI chain.

4. Configuring the board switch settings.

5. Installing the adapter.

6. Updating your host system CMOS.

7. Configuring optional adapter operating parameters: customizing adapter operation for your environment.
   a. Testing the adapter-to-motherboard communication.

9. Low-level formatting the hard drive (if needed).

10. Partitioning the hard drive and installing the operating system onto the hard drive into the newly-created partition(s).

11. Installing the device drivers onto the hard drive so that the host adapter can operate with the hard drive’s operating system and attached peripheral devices.
Unpacking

Before handling the BT-445C, 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 board 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.

Warranty Information

If damage to the board has occurred, return it in the protective envelope and original packaging with this manual to your BusLogic board supplier. The shipping agent should also be notified if the unit has been damaged during shipment. The BusLogic warranty conditions are given in the back of this manual.

Installation Tools

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

- Small screwdriver
- Small needle-nosed pliers
- Host system hardware manuals and manuals for the peripherals being installed.
- Cables for attaching SCSI peripherals to the adapter as described in Section 1.

Powering Down the System

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

Setting the SCSI Device ID

Each SCSI device is assigned a unique SCSI ID ranging from 0 through 7. Your BusLogic adapter is by default set to SCSI ID 7.

Most SCSI peripheral devices are shipped with a preassigned SCSI ID number. A SCSI ID switch is usually located on the back panel of such devices. It may be in the form of a jumper or a switch whose setting indicates the SCSI ID. If you need to change the SCSI ID for the other peripheral devices, refer to the instructions in the owner’s manual for the device. To change your adapter SCSI ID use the Host Adapter SCSI ID option on the AutoSCSI’s Configuration Menu (Section 3, “Configure Adapter”).

Note: BIOS looks for the boot drive by scanning devices according to their SCSI ID, starting at SCSI ID 0. If your boot drive is at a higher number than another drive, BIOS will boot from the other drive. In this case, you need to change the SCSI ID of the desired boot drive to a lower value.

Terminating SCSI Devices

The first and last SCSI devices connected together on a SCSI bus must have terminators installed or enabled. Terminators, which can be connected to either SCSI devices or SCSI cables, are required for reliable operation of the SCSI bus.

If more than two SCSI devices are connected in a SCSI daisy chain, remove or disable the terminator resistor pack on the middle device(s). See Figure 2-1 for the possible configurations of terminators in a SCSI system.

If the BT-445C is not being installed at either end of the SCSI bus, disable its terminators (it is factory shipped with terminators enabled) by using the Adapter SCSI Terminators ON option on the AutoSCSI Configuration Menu (Section 3, “Configure Adapter”).
Configuring Switch Settings

Before installing the adapter, you must check the adapter switch configuration to verify that the factory-shipped settings for BIOS Address and Port Address are correct for your system.

<table>
<thead>
<tr>
<th>SW</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>floppy controller</td>
</tr>
<tr>
<td>7, 6, 5</td>
<td>BIOS address</td>
</tr>
<tr>
<td>4</td>
<td>local bus clock speed</td>
</tr>
<tr>
<td>3, 2, 1</td>
<td>I/O port address</td>
</tr>
</tbody>
</table>

To change the Port Address, set Switches 3, 2 and 1 to the desired address as shown in the table below:

<table>
<thead>
<tr>
<th>SW 3</th>
<th>SW 2</th>
<th>SW 1</th>
<th>Port Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>330 (default)</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>334</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>230</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>234</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>130</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>134</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

(X=Don’t Care)

To change the BIOS Address, set Switches 7, 6 and 5 to the desired address as shown in the following table:

<table>
<thead>
<tr>
<th>SW 7</th>
<th>SW 6</th>
<th>SW 5</th>
<th>BIOS Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>DC000 (default)</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>08000</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>D4000</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>D0000</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>cc000</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>C8000</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>X</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

(X=Don’t Care)
Installing the Adapter

1. To install the adapter, remove the mounting screw and the existing bracket from the rear panel behind the selected 32-bit VL slot.

2. Press the BT-445C downward into the selected 32-bit VL slot, align the mounting bracket, and reinstall the mounting screw.

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

3. Connect the 50-pin SCSI cable to the adapter's single-ended SCSI connector, J3, attaching the other end to the SCSI device. Place the connector cable around the power supply and over any other boards. Depending on the configuration of your computer, other types of cables could be used.

Before plugging in cable connectors, check that the "▼" mark molded on the connector or the colored stripe on the cable (indicating the location of Pin 1) matches Pin 1 of the connector on the BT-445C board.

4. If connecting to a floppy drive, insert the 34-pin floppy cable from the floppy drive into the floppy connector (J2)(BT-445C only).
5. Insert the four-pin header connector from the drive activity LED on the front panel of the host to connector J1 on the BT-445C. This connector is reversible and may be plugged into J1 in either direction.

![LED Cable installation Detail](image)

6. Verify that all connections are secure.

7. Reattach and close the cover of the host computer as described in the system owner's manual.

### Updating System CMOS

1. Once hardware installation is complete and the host computer is reassembled, power up the system.

2. Run SETUP and configure the host CMOS RAM options. Set the drive type option for SCSI drive to No Hard Drive Installed.

3. Reset the system to activate your SETUP changes.

### Adapter Configuration

This section describes:

- How to use the host adapter configuration utility. Host adapter configuration is optional. You may skip this section and proceed to Section 4.
- A diagnostics test that checks adapter/motherboard connectivity

#### Resource Parameter Configuration

For most installations, the adapter will operate successfully with its factory-default configuration. It may need to be changed if resource conflicts occur. When further configuration is required, use the AutoSCSI™ Utility described below.

### The AutoSCSI Utility

Every BT-445C comes with an onboard configuration utility, AutoSCSI, which resides in Read Only Memory (ROM). AutoSCSI is a menu-based tool for configuring BusLogic SCSI host adapters. You can use AutoSCSI to set or change SCSI and BIOS-related parameter configuration. In addition to its simplified configuration, AutoSCSI offers diagnostics and disk utilities.

Note: While previous generation BusLogic adapters installed in the host system are detected and appear in AutoSCSI screens, they cannot be configured using this utility.
AutoSCSI is available when the system is first powered up and at every system reset. The system prompts you to press Ctrl-B at the prompt that follows the system startup banner. For example:

BusLogic Inc.
Intelligent Bus Master SCSI Host Adapter
(C) Copyright 1993, 1994 BIOS Version 4.80

BusLogic SCSI Host Adapter Firmware Version X.XX
Press <CTRL-B> to Enter AutoSCSI

When invoked, the AutoSCSI menu appears. Use the following keystrokes for moving to and selecting menu options:

- **Up (↑) arrow key**: Move up
- **Down (↓) arrow key**: Move down
- **Left (←) arrow key**: Move left
- **Right (→) arrow key**: Move right
- **<ENTER> key**: Use to select an option. Where the option is either Yes or No, press <ENTER> to toggle to the desired selection.
- **<ESC> key**: Use to exit the current display.
- **<F1> key**: Use to select Help screens.

Note that the currently-selected adapter's I/O port address (when multiple adapters are installed) is always displayed at the bottom of the screen inside the angle brackets (<<<....>>>). For example:

<<< Current Adapter at IO Port 334h>>>

Reboot Upon Exiting AutoSCSI

When you exit AutoSCSI after making configuration changes, the system prompts you to reset your system:

Press Ctrl+Alt+Del to Reboot

The reboot allows changes to configuration to become operational.

Using the AutoSCSI Configuration Menu

The Configuration Menu allows you to configure your host adapter, or a selected adapter, if more than one is installed in your system.

**Auto Config All Adapters**

This option automatically configures all adapter SCSI and BIOS-related parameters to factory-default values. When you invoke the Auto Config option, the following dialog box is displayed:

Configure all Adapters?

- **Yes**
- **No**

Use the Up and Down arrow keys to move to the desired selection and press <ENTER>. Select Yes to configure all adapters. Select No to cancel the option.

**Summary of Configuration**

Selecting the Summary of Configuration option allows you to see a read-only display of current configuration for all installed adapters.

- **Adapter I/O Port**: This field shows the base address of the registers the host uses to communicate with the host adapter.
- **Adapter Type**: This field identifies the model of the BusLogic host adapter.
- **BIOS Address**: This field displays the SCSI host adapter BIOS starting address in host memory.
Interrupt Channel. This field shows the hardware interrupt line (IRQ) number that the adapter uses to generate interrupts to the host. The adapter issues an interrupt whenever it requests attention from the host. You may use the Configure Adapter screen option to change the IRQ value.

DMA Channel. This field shows the DMA channel setting used by the adapter card for data transfers between the adapter and system memory. This value applies to ISA platform adapters. For other adapter types, a DMA channel may have to be specified where DMA emulation is required, depending on the device driver. To change it, use the Configure Adapter screen option.

DMA Xfer Rate. This field does not apply to this product.

Adapter ID. This field displays the SCSI ID for the adapter on the SCSI bus. There are eight SCSI IDs (0-7) on a SCSI bus. You may use the Configure Adapter screen option to change the adapter SCSI ID value.

SCSI Parity On. This field indicates whether parity on the SCSI bus is detected by the adapter or not. You may use the Configure Adapter option to turn the SCSI parity detection on or off.

Adapter Term. On. This field indicates whether adapter SCSI termination is turned on or not. SCSI devices are daisy-chained together and a terminator is required at each end of the chain. Should the selected adapter be at the beginning or end of the SCSI chain, this value must be set to On. You may use the Configure Adapter screen option to set or change this value.

DOS Space >1GB. This field displays whether this option is turned on or off. How this value is set depends on DOS size requirements and the boot requirements of other operating systems. See the detailed description of this option under Advanced Configuration later in this section.

Firmware Revision. This field shows the host adapter's onboard firmware revision level.

* BIOS Revision. This field displays the revision level of the onboard BIOS.

Select Adapter

Where multiple adapters are installed, use this option to select the adapter to be configured. When you select this option, you will see a display like the following listing all the adapters in the system:

```
* 330
  334
  134
```

Select the desired adapter by using the Up or Down arrow keys. Note that the current adapter is indicated by an asterisk. It is also always displayed at the bottom of the screen.

Configure Adapter

The Configure Adapter screen lets you customize key parameters in adapter card operation. When you select this option, a display like the following appears:

```
Host Adapter Interrupt Channel (IRQ)  11
ISA DMA Channel Emulation            None
DMA Transfer Rate (MB/SEC)           N/A
Host Adapter SCSI ID                 7
SCSI Parity ON                       Yes
Host Adapter SCSI Terminators ON      Yes
```
To change a value for any of the options, first move to the desired parameter using the Up and Down arrow keys and press <ENTER>. A pop-up menu listing possible values for this parameter appears. An asterisk (*) in the option display indicates the current value for that parameter. Choose a new value from the pop-up list and press <ENTER>. If you make any configuration changes, before you leave the Configuration Menu, AutoSCSI prompts:

```
SAVE CHANGES?
Yes
No
```

When you select Yes, any configuration changes you have made are stored in Electrically Erasable Programmable Read Only Memory (EEPROM) and are recalled upon system reset.

If you enter No, your changes are canceled.

Host Adapter Interrupt Channel (IRQ). The system automatically configures an IRQ value for the adapter. Use this option to change the value where an IRQ conflict occurs. When one adapter is installed, the default setting is 11.

```
9
  10
  11
  12
  13
  14
  15
```

ISA DMA Channel Emulation. Use this option to change the DMA channel. While only ISA platform host adapters actually use the DMA channel for system memory data transfers, a channel selection may be needed where ISA DMA emulation is required to support older versions of device drivers developed for the ISA bus. The default setting is None.

```
None
  * 5
  6
  7
```

Data Transfer Rate. Not applicable to this product.

Host Adapter SCSI ID. Use this option to change the adapter's SCSI ID on the SCSI bus. This is important with regard to the booting device. BIOS scans for the boot device starting from SCSI ID 0. Be sure that the desired boot drive has a lower value SCSI ID than other drives and the host adapter. The default SCSI ID for the host adapter is 7.

```
0
  1
  2
  3
  4
  5
  6
  7
```

SCSI Parity ON. This setting allows you to enable or disable parity checking detection by the adapter on the SCSI bus. Select Yes to enable or No to disable parity checking detection. Press <ENTER> to toggle between selections. There are 8 bits of data plus one bit of parity on a standard SCSI bus. The default setting is Yes to enable parity checking detection.
Host Adapter SCSI Terminators On. This setting allows you to enable or disable host adapter SCSI termination. Only terminators on devices at both ends of the SCSI chain should be turned on. Select Yes to enable or No to disable termination. Press <ENTER> to toggle between selections. The default setting is Yes to enable SCSI termination.

Configure Device

Configure Device options let you configure common SCSI and BIOS-related options. When selected, the following appears:

<table>
<thead>
<tr>
<th>SCSI Device ID</th>
<th>#0</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable Sync Negotiation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>HA</td>
</tr>
<tr>
<td>Enable Disconnection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>HA</td>
</tr>
<tr>
<td>BIOS Sends Start Unit Command</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>HA</td>
</tr>
<tr>
<td>Ignore in BIOS Scan</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>HA</td>
</tr>
</tbody>
</table>

The host adapter, indicated as HA, is not a target device and, therefore, cannot be configured from this table. All options are either Yes or No. Use the Up and Down arrow keys to move to the desired option. Press <ENTER> to toggle between selections. If you make any configuration changes, before you leave the Configuration Menu, AutoSCSI prompts:

![SAVE CHANGES?
Yes
No](image)

When you select Yes, any configuration changes you have made are stored in EEPROM. If you enter No, your changes are canceled.

Enable Sync Negotiation. Use this option to enable or disable the synchronous data transfer negotiation between the host adapter and each SCSI device connected to the SCSI bus. The SCSI protocol determines the REQ/ACK offset and the data transfer rate for synchronous data transfers between an initiator and a target on the SCSI bus. BusLogic host adapters are capable of up to 10 MBytes/sec SCSI data transfers. However, the actual data transfer rate is determined by the SCSI target device if the device has a transfer rate lower than that of the adapter.

This option is offered because some classes of SCSI devices do not support synchronous data transfer. An attempt to perform this negotiation protocol may result in an unpredictable response from the SCSI device. Check your SCSI device manual before enabling this option.

Select Yes to allow the adapter to initiate synchronous negotiation; select No to allow the target device to initiate synchronous negotiation. The default is Yes.

Enable Disconnection. Use this option to enable or disable SCSI disconnection on each target device. This option allows a SCSI device to disconnection itself when the device is not ready for data transfer. When multiple devices are connected to the same SCSI bus, SCSI disconnection allows SCSI devices to perform seek operations in parallel and thus improve overall SCSI bus performance. The default is Yes.

BIOS Sends Start Unit Command. This option allows you to identify the SCSI devices whose motor spin up is sequentially controlled by BIOS at power-up. This prevents all drives from spinning up at the same time. This feature is only effective if BIOS is enabled. The default is No.

Ignore in BIOS Scan. This option lets you exclude selected drives from BIOS scan and registration. This feature is useful when you want to exclude, for example, a removable device, from BIOS Int 13H support. Use this option if you want to allow BIOS to boot from something other than the default target. For example, to have BIOS boot from SCSI ID 3, exclude SCSI ID 0, 1 and 2. This feature is only effective if BIOS is enabled. The default is No.
Advanced Options

Advanced Options allow you to configure advanced BIOS-related options. When selected, the following appears:

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Adapter BIOS Enabled</td>
<td>Yes</td>
</tr>
<tr>
<td>Host Adapter BIOS Uses INT 19h for System Boot</td>
<td>Yes</td>
</tr>
<tr>
<td>Host Adapter BIOS Supports DOS Space &gt;1GB</td>
<td>No</td>
</tr>
<tr>
<td>BIOS Supports Removable Disk as Fixed Disk</td>
<td>No</td>
</tr>
<tr>
<td>BIOS Supports for &gt;2 Drives (DOS 5.0 or Above)</td>
<td>Yes</td>
</tr>
<tr>
<td>Support Immediate Return on Seek Command</td>
<td>Yes</td>
</tr>
<tr>
<td>Support Floptical Drive</td>
<td>No</td>
</tr>
<tr>
<td>Enable SCSI Bus Reset</td>
<td>Yes</td>
</tr>
<tr>
<td>Reserved RAM for BIOS access (segment: Offset) 0:</td>
<td>200</td>
</tr>
<tr>
<td>Enable VESA burst write</td>
<td>No</td>
</tr>
<tr>
<td>Enable VESA burst read</td>
<td>No</td>
</tr>
</tbody>
</table>

All options are either Yes or No. Use the Up and Down arrow keys to move to the desired option. Press <ENTER> to toggle between selections. If you make any configuration changes, before you leave the Configuration Menu, AutoSCSI prompts:

SAVE CHANGES?

Yes
No

When you select Yes, any configuration changes you have made are stored in EEPROM. If you enter No, your changes are canceled.

Host Adapter BIOS Enabled. This read-only field displays whether BIOS is enabled or disabled for the selected host adapter. If multiple adapters are installed, only one may have BIOS enabled. The exception is the new BIOS (Version 4.8 or later) which allows multiple adapters to operate with BIOS enabled as long as the BIOS addresses do not overlap.

Host Adapter BIOS Uses INT 19 for System Boot. This option allows you to include or exclude the adapter onboard BIOS in the DOS boot process. This option is irrelevant if an IDE drive is present in the system as DOS will boot from IDE. If no IDE drive is present and this option is enabled, the adapter's onboard BIOS will redirect INT 19H to itself to boot from a SCSI boot drive. If this option is not enabled, the motherboard BIOS can only boot from a floppy drive or an IDE device. Select Yes to enable or No to disable this option. The default is Yes.

Host Adapter BIOS Supports DOS Space >1GB. This option enables the adapter onboard BIOS to support up to 8 Gigabytes of DOS disk space per drive. In a DOS environment, Interrupt 13H calls are routed through the BusLogic host adapter’s ROM BIOS. The onboard BIOS intercepts INT 13H calls and dispatches a command to the adapter for all host-to-SCSI disk accesses. When this option is enabled, the adapter BIOS can access up to 8 GBytes per disk. If not, it can only access the first GByte even if the formatted disk capacity is greater than 1 GByte.

This 1 GByte restriction does not apply to other operating systems, such as Windows NT, NetWare, UNIX, or OS/2, if the operating system can boot without accessing >1 GByte. If the operating system's bootable image resides below 1 GByte then it can boot via Interrupt 13H. Once any of these operating systems are booted, the disk accesses are not routed through Interrupt 13H and the operating system can access the entire disk space even if the >1 GByte option is not turned on.

Under SCO UNIX 3.2.2 and older, the >1 GByte option must be turned off because the operating system itself has a 1 GByte limitation. Otherwise, disk images may be corrupted when the 1 GByte boundary is exceeded. For SCO UNIX 3.2.4 and later versions the operating system does not impose the 1 GByte limit, and this option can be turned on or off accordingly.

The > 1 GByte support must be turned on under the following two conditions: (1) the combined space of all the DOS partitions exceeds 1 GByte or (2) >1 GByte disk accesses are required to boot the operating system.

Selecting Yes enables this option; selecting No disables it.

Before selecting Yes to enable this option, back up all files on those drives that have a capacity greater than 1 GByte. Upon enabling the option, you must reformat all drives with the greater than 1 GByte capacity and reinstall all the files. The default is No.
BIOS Supports Removable Disks as Fixed Disks. This option enables the adapter BIOS to register removable disks as fixed disks and access them via Interrupt 13H. Enabling this option forces a limitation on the removable disk: when adapter BIOS supports removable disks, DOS will not be able to handle media change. DOS cannot dynamically change partition information after it registers the disk partitions during power-up, even if the adapter BIOS reports a media change. If the device must be removable, disable this option and use a DOS driver (such as BusLogic’s DOS Manager) to access removable disks.

Selecting Yes enables this option; selecting No disables it. The default is No.

BIOS Supports > 2 Drives (DOS 5.0 or Above). Use this option when running DOS 5.0 or higher to allow BIOS to support more than two hard disk or removable drives on the SCSI bus. During power-up BIOS scans and registers devices, starting from target ID 0 on the SCSI bus. If this option is disabled, BIOS scans only the first two SCSI devices. If this option is enabled, BIOS will scan and register devices up to the highest target ID number on the SCSI bus. During scanning, BIOS skips IDs that do not have a target device present.

Selecting Yes enables this option; selecting No disables it. The default is Yes.

Supports Immediate Return on Seek Command. Enabling this option allows BIOS to return completion status immediately without executing the seek operation. This option enhances performance for the application that uses this BIOS function. Selecting Yes enables this option; selecting No disables it. The default is Yes.

Supports Floptical Drives. When this option is enabled BIOS registers and controls floptical devices. Disable this option if you have application software, such as Corel software, to control floptical devices. Selecting Yes enables this option; selecting No disables it. The default is No.

Enable SCSI Bus Reset. When this option is enabled, the adapter asserts a SCSI bus reset signal upon detecting a hard reset. Where more than one adapter card is connected to the same SCSI bus as multiple initiators, you can use this option to specify only one adapter card to reset the SCSI bus when a hard reset is detected; turn off this option on all but the desired adapter to avoid multiple SCSI bus resets when a hard reset is detected. Selecting Yes enables this option; selecting No disables it. The default is No.

Reserved RAM for BIOS Access (Segment: Offset) 0. Use this option to allocate system memory for BIOS parameter storage. This option lets you specify a conflict-free location for BIOS’ 8-byte memory block. The following options appear when this item is selected:

- 200
- 220
- 240
- 300
- 320
- 340
- 4D8

Select the desired value and press <RETURN>. The default is 200.

Enable VESA burst write. Enable this option (and the Enable VESA burst read option) if the motherboard supports burst mode transfers to and from host memory. The default is No.

Enable VESA burst read. Enable this option (and the Enable VESA burst write option) if the motherboard supports burst mode transfers to and from host memory. The default is No.

Testing Adapter Connectivity

Use the DMA Test on I/O Port option on the AutoSCSI Diagnostics Menu to test the adapter’s connectivity to the motherboard. This test writes and reads data between the adapter and the motherboard.

Using the AutoSCSI DMA Test on I/O Port Option

This option tests the integrity of the adapter’s address and data path during bus master operation. It writes data from the selected adapter’s local memory to system memory, then reads the data back and verifies its integrity. This test destroys system memory locations from 6000:0 through 9000:FFFF. This test continues until you press <ESC> to abort.
Upon selecting this option, you will see a display of I/O port addresses for installed BusLogic adapters. Use the Up and Down arrow keys to move to the desired adapter port address and press <ENTER> to start the test.

You will see a display similar to the following during testing:

```
Testing DMA in memory range (Segment:Offset)
Performing Walking 1's and 0's on 6000H:4740H
Test Loop:  2
```

The display has a counter indicating the memory locations as they are being tested and the number of test loops completed. If the test fails, AutoSCSI shows the failing address value. For example:

```
DMA test failed at the above address.
```

In the case of a failure, refer to your host adapter hardware set up instructions. A failure most likely indicates that there is a problem in the configuration between the host system and the adapter.

---

**Hard Drive Setup**

This section shows the steps to set up a hard drive to operate with the host adapter:

- Formatting the disk
- Partitioning/installing an operating system onto the disk
- Installing device drivers

### Formatting the Hard Drive

Use the **Format Disk** option on the AutoSCSI Utilities Menu to low-level format your SCSI hard disk drive. Because most off-the-shelf hard drives are factory formatted, it is unlikely that you need to perform this procedure. If, however, you have an un-formatted disk, or if you are experiencing problems with your hard drive that indicate the need for a low-level format, use this option.

Once formatting is complete, run the **Verify Disk** option on the Utilities Menu to check the results of the format. Both options are described in the following section.

**Warning:** The format will erase all data on your disk drives. Before formatting make sure **that** all necessary data is backed up on another drive.
Using the AutoSCSI Utilities Menu

The Utilities Menu offers disk format and verification of SCSI disk devices connected to a selected adapter.

When a Utilities Menu option is invoked the first time, BIOS scans and registers all SCSI devices connected to the selected adapter and displays the following message:

```
II
Scanning all SCSI devices...
```

Once the scan is complete, the utility displays a list of attached SCSI devices. For example:

```
SCSI ID 0: MAXTOR 7080SCS
SCSI ID 1: NO DEVICE
SCSI ID 2: NO DEVICE
SCSI ID 3: NO DEVICE
SCSI ID 4: NO DEVICE
SCSI ID 5: NO DEVICE
SCSI ID 6: NO DEVICE
SCSI ID 7: BusLogic BT-445C
```

Select the desired device and press <ENTER>. When you have selected the Format Disk or the Verify Disk option, the following is displayed for confirmation:

```
CONFIRM
Yes
No
```

Select Yes to start the operation for the selected device or No to cancel it.

Format Disk

The Format Disk option performs a low-level disk format operation on a selected disk device. This low-level format destroys all data including any directories.

**Caution:** Before invoking this option, be sure to back up the device being formatted as formatting will destroy all data on it.

During formatting, you will see a display like the following:

```
Formatting...Please wait for completion.
```

The duration of the format depends on the size of the drive. If an error occurs, AutoSCSI will report that the format failed. If a failure occurs, refer to troubleshooting guidelines in the manuals for your drive. The format process cannot be stopped once it has started.

Once the format is complete and no errors have occurred, AutoSCSI displays:

```
Operation successful. Press any key to continue.
```

Press any key to return to the previous menu.
Verify Disk

The Verify Disk option scans the media of a selected device. Use this utility to verify that your hard drive is operable. During the course of the scan, you will see a display such as the following:

Verifying...Please wait for completion.

The duration depends on the size of the drive. If an error occurs, AutoSCSI will report that the verification failed. If a failure occurs, refer to troubleshooting guidelines in the manuals for your drive. Press <ESC> to stop the verification process.

Once completed and no errors have occurred, AutoSCSI displays:

Operation successful. Press any key to continue.

Press any key to return to the previous menu.

SCSI Device Information

The SCSI Device Information option lets you display information about a specified device. When you select this option, it displays a list of attached SCSI devices. Select the desired device and press <ENTER>. For example:

<table>
<thead>
<tr>
<th>Vendor ID</th>
<th>MAXTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product ID</td>
<td>7080SCS</td>
</tr>
<tr>
<td>Firmware Version</td>
<td>2974</td>
</tr>
<tr>
<td>ANSI Version</td>
<td>SCSI-1</td>
</tr>
<tr>
<td>Synchronous Mode</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Negotiated Offset</td>
<td>N/A</td>
</tr>
<tr>
<td>Transfer Period</td>
<td>N/A</td>
</tr>
<tr>
<td>SCSI Linking</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Command Queuing</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Disconnection</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Device Capacity (MB)</td>
<td>80</td>
</tr>
<tr>
<td>Sector Size (Byte)</td>
<td>512</td>
</tr>
</tbody>
</table>

Refer to the manuals for your device for further information about the contents in this display.

Tip: Once you have installed your device drivers, you can bring up this display to verify that driver installation is successful.

Setting Up the Hard Drive

You will need to take the following steps to configure your hard drive for operation:

- Create a partition on the drive for your operating system and high-level formatting the drive.
- Install the operating system.

These procedures differ depending on the operating system you are installing. Refer to your operating system documentation for details.

Installing Device Drivers

See the BusLogic SCSI Adapter Driver Software Installation Guide or third-party documentation for device driver installation details.

When you install the device drivers available from BusLogic, you will have support for:

- Up to four BusLogic host adapters
- Up to seven SCSI peripheral devices (hard drives, etc.)
- Connectivity to SCSI tape drives, magneto optical (MO) disk drives and CD-ROM drives and other devices. Any additional drivers required for operating these devices are included with the device.
Troubleshooting

If you experience a problem with adapter operation when all the installation steps are completed, check for the following:

Check that the installation procedures were followed correctly.

- Be sure all connectors are firmly seated.
- Check the orientation of the SCSI cable. Be sure that Pin 1 on the cable matches Pin 1 on the adapter/SCSI device connector.
- Check that the adapter and attached devices have unique SCSI IDs.
- Be sure that the SCSI ID for the boot hard drive is lower than any other drive. BIOS determines the boot drive by scanning SCSI devices starting from 0. If the boot drive number is higher than the other drive, change it to a lower value.
- Be sure that you’ve followed termination rules and that you’ve used AutoSCSI to disable termination if the board is in the middle of the SCSI chain.
- Check that you have correctly set the hard drive to not installed in your system SETUP file.

Verify host adapter configuration.

- Check that your configuration switch settings do not conflict with other attached devices.
- Be sure that your VESA VL-Bus clock speed setting (SW4) matches your system specification.
The system automatically assigns an IRQ value to the board. While there may be no conflicts among BusLogic adapters, there could be a conflict with third-party cards in the system. Verify that each card has a unique IRQ assignment.

If you have changed adapter SCSI or BIOS-related parameters via AutoSCSI, use the Auto Configure All Adapters option on the AutoSCSI Configuration Menu to return the board to factory set defaults (see Section 3). Check that you have selected operating parameters that do not conflict with those of other installed adapters before re-entering your changes.

Verify hard drive configuration.

If necessary, repeat the steps to format, partition and install the operating system on the hard drive. Be sure to back up the drive before proceeding.

Check device driver compatibility.

Check that you have installed no more devices than your operating system or driver can handle. For example, pre-DOS 5.0 versions of DOS can handle only two hard drives. To handle more devices, you must install additional drivers.

Be sure that you have installed drivers appropriate for each installed device. For example, you cannot operate a CD-ROM device without installing a CD-ROM driver for it.

Be sure you have compatible device driver software installed.

BT-445C Switch Settings

The following is the switch setting description from the BT-445C board.

<table>
<thead>
<tr>
<th>0</th>
<th>Floppy</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>BIOS ADDRESS</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>I/O PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ENABLED</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>DC000</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>330</td>
</tr>
<tr>
<td>OFF</td>
<td>DISABLED</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>D8000</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>334</td>
</tr>
<tr>
<td>ON</td>
<td>&gt; 33 MHz</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>D0000</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>230</td>
</tr>
<tr>
<td>OFF</td>
<td>≤ 33 MHz</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>CC000</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>134</td>
</tr>
</tbody>
</table>

(X=Don't Care)

Figure A-I. BT-445C Switch Setting Description
BusLogic Customer Service

- **BusLogic's** Technical Support Hot Line can be reached at 408-492-9090 Monday through Friday from 8:00 AM to 5:00 PM PST. Please complete the Product Support Record on the back of this page before calling.

- **BusLogic's** Technical Support Bulletin Board System (BBS) is available 24 hours a day, seven days a week. It provides information on software updates and new releases, technical bulletins, and other information. You may also leave your questions which will be answered within 24 hours.

  The BBS can be reached at 408-492-1984. To access the system all you need is a modem and communications software of your choice. Set your system to 9600 baud, 8 data bits, 1 stop bit and 0 parity bits. Once connected, logon with your name and a password of your choosing.

- FAX requests will be answered within 24 hours. Send your FAX requests to 408-492-9118. Please include a completed Product Support Record (on the back of this page).

- To order **BusLogic** software or additional manuals, call 408-492-9090.
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.

**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 #:** __________________________

**Fax #:** __________________________

**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:** __________________________

__________________________

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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 OR 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.