Installation Guide

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BT-445S
Fast SCSI Adapter for
VL-Bus Systems

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REVISION HISTORY

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TRADEMARKS

TABLE OF CONTENTS

Appendix A: Internal Diagnostics

List of Figures

List of Tables

1

INTRODUCTION

VL-Bus

- 32-bit bus master DMA data transfers of up to 40 MBytes/sec

- Built-in drivers for UNIX™ and XENIX™, as well as optional drivers available for NetWare™, OS/2, and DOS

- Scatter-gather data transfers that permit non-contiguous memory storage and retrieval

SCSI Peripherals

- Up to 10 MBytes/sec synchronous and up to 7 MBytes/sec asynchronous SCSI data transfers

- Support of the single-ended SCSI interface with active termination

- SCSI-2 command set compatibility

- Both an internal and an external 50-pin SCSI connector (SCSI-2 connector for the external connector)

- Wide range of SCSI hard drives, and other SCSI peripherals supported

ASIC Technology

- Bus master ASIC designed by BusLogic

- High-performance advanced SCSI controller ASIC

- 16-bit microprocessor that reduces the host's CPU overhead

- Floppy controller chip for any combination of up to two 3.5" or 5.25" drives

- Reduced component count that yields greater reliability
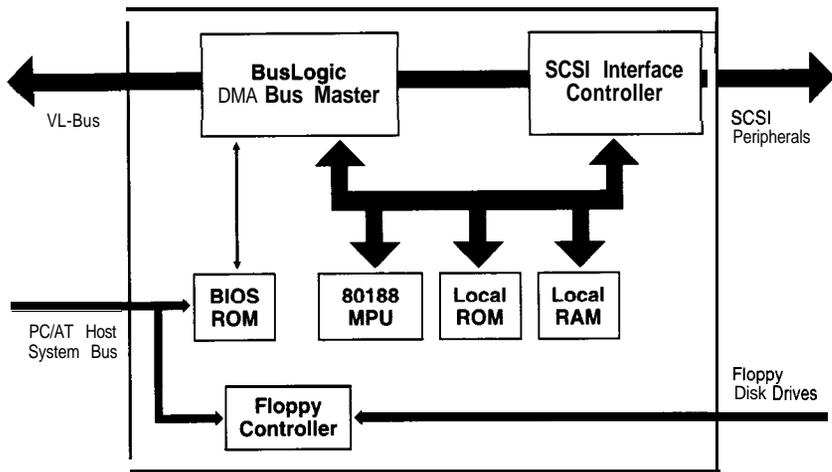
Figure I-1. The BT-445S Block Diagram

BT-445S Advantages

Unique Features	Benefit
■ BusLogic-designed universal bus master ASIC provides the highest level of integration in the industry	■ Exceptionally high product reliability due to reduced component count and lower power consumption
■ BusLogic's ASIC allows common architecture for a family of SCSI host adapter products across the popular industry standard buses: ISA, EISA, Micro Channel™, and VL-Bus	■ Allows easy feature enhancements and device driver support for all industry standard buses
■ High-speed, 80188™ on-board microprocessor	■ Higher performance due to minimized command overhead and faster command execution

BT-445S Advantages, Continued

Unique Features	Benefit
■ Fast single-ended SCSI support with active termination	■ Higher SCSI data transfer rate and higher data reliability. Allows flexible system integration with complete driver/software transparency
■ Small form factor	■ Easier system integration
■ Complete device driver support for all the popular operating systems: DOS, UNIX, XENIX, NetWare, OS/2, etc.	■ Provides turn-key solution for system integration

PRODUCT OVERVIEW

The BusLogic BT-445S host adapter is an intelligent VL-Bus to SCSI bus master host adapter product based on a BusLogic-designed, universal ASIC technology. It provides a high-performance interconnection between the Video Electronics Standards Association's (VESA) local bus, the VL-Bus, and Small Computer System Interface (SCSI) peripheral devices. It is designed for multitasking operating systems such as UNIX, XENIX, NetWare, OS/2, as well as DOS. UNIX and XENIX both contain built-in driver support for the BT-445S. Software drivers for NetWare, OS/2, and DOS are also available as optional items.

As Figure l-l indicates, the BusLogic-designed bus master controller ASIC, the SCSI interface controller, and a 16-bit microprocessor (MPU) provide higher speed, lower power consumption, fewer parts, and higher reliability.

Host Interface

As Figure l-2 indicates, the BT-445S uses BusLogic's high-speed bus master interface chip to provide VL-Bus bus master DMA operation. Bus master DMA reduces the number of interrupts generated per I/O command thus enhancing system performance. This interface chip contains a 128-byte FIFO to burst 32-bit wide data up to 40 MBytes/sec on the VL-Bus. Selectable interrupt and I/O address ranges are available.
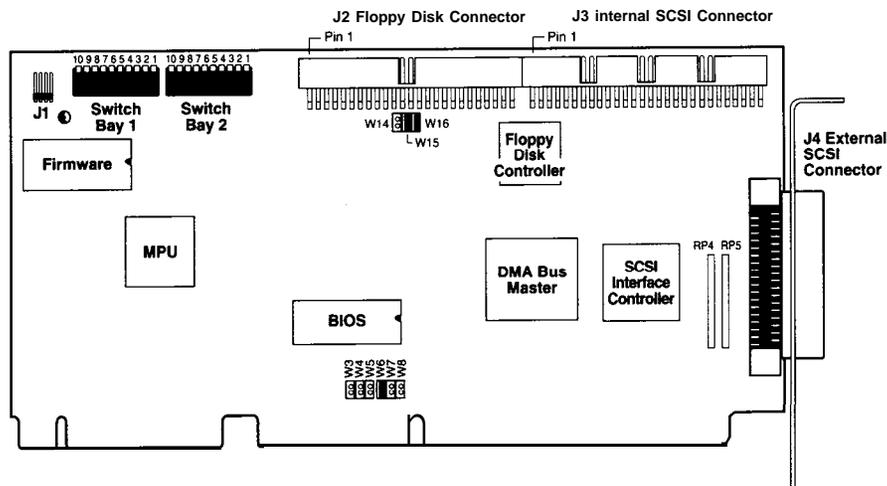
Figure 1-2. The BT-445S Host Adapter Board

SCSI Interface

Up to 10 MBytes/sec synchronous and 7 MBytes/sec asynchronous SCSI data transfers are supported by the SCSI interface controller. This chip reduces protocol overhead by performing common SCSI algorithms or sequences in response to any single SCSI-2 host command. SCSI-2 interface specifications for termination power and fusing (with blown-fuse indication) are implemented. The board has both an internal and an external 50-pin connector for flexibility in attaching SCSI devices to the system.

Microprocessor

An 80188 16-bit MPU is used to supply the speed for low command overhead. This MPU coordinates all activity on the BT-445S under the direction of the board's firmware, including initialization, command decoding, interrupt generation, and control of the data flow among the board's components.

Floppy Controller

The floppy disk controller is fully IBM register set compatible. All combinations of up to two 3.5" and/or 5.25" devices are supported.

Multitasking Operation

For operating systems such as UNIX, NetWare, and OS/2, the mailbox protocol of the BT-445S provides true multitasking operation. Through the use of a mailbox structure, the BT-445S can support up to 255 tasks with minimum host processor intervention. On-board firmware controls all of the SCSI activity that a task requires, including the Arbitration, Selection, Disconnection, Reconnection, and command completion status. This same mailbox protocol supports both initiator and target mode operation permitting high speed host-to-host communication and scatter-gather data transfers.

DOS Support

An on-board ROM BIOS enables single-tasking DOS operation; however, bus master DMA is still used to improve the data transfer performance. A storage capacity of up to 8 GBytes per disk is supported by the BIOS.

SPECIFICATIONS

Refer to Table l-l for a summary of the physical and electrical specifications.

Table I-I. Specifications

Electrical	
Operating Voltage	5±0.25V
Operating Current	1 .0A
Max. Ripple/Noise	100 mV

Environmental	
Temperature	0°C to 60°C
Relative Humidity	10% to 95% non-condensing
Altitude	0 to 10,000 ft. operating
	0 to 15,000 ft. non-operating
Dimensions	9.6" x 4.8

Interface Connections	
SCSI Internal	50-pin double-row connector
SCSI External	50-pin shielded SCSI-2 connector
Floppy Internal	34-pin AT-compatible ribbon style
To/From System	IBM PC/AT standard 36-pin, 62-pin and the VL-Bus 11 6-pin edge connectors

MTBF	90,000 hours

REFERENCE DOCUMENTS

To install the BT-445S in a VL-Bus system, you should have the following documentation:

- VL-Bus system installation and set-up guide
- Operating system installation and user's guide
- IBM's PC/AT technical reference manual (optional)
- Installation guide for BusLogic device drivers (if required).

HARDWARE AND SOFTWARE REQUIREMENTS

The BT-445S can be installed in a VL-Bus system. To install the BT-445S successfully, you must have the following hardware and software.

Hardware

To install the BT-445S, you must have a VL-Bus system with the following hardware:

- One or more 3.5" or 5.25" floppy drives
- One available VL-Bus slot
- DC power for an internal 3.5" or 5.25" SCSI drive or an external subsystem with the corresponding SCSI-2,50-pin external cable
- One Common Command Set (CCS) SCSI-2 compatible device
- One 50-pin, flat ribbon cable to connect internal SCSI devices to the BT-445S.

Software

For installation in a DOS environment, you will need:

- PC-DOS" or MS-DOS™ with the SETUP, FDISK, and FORMAT programs
- BusLogic DOS SCSI Software Manager (if required).

For installation in an OS/2, Novell NetWare 286 or 386 environment, you will need the appropriate BusLogic device driver for your operating system.

Drivers for INTERACTIVE UNIX, SCO UNIX, and XENIX are included with the operating system.

2

UNPACKING AND INSTALLATION

This section describes how to unpack, to inspect, to configure, and to install the BT-445S in a VL-Bus system. It also describes how to initialize the software for operation in DOS systems.

UNPACKING AND INSPECTION

Before handling the BT-445S, please take the necessary electro-static discharge precautions. Touch your computer on a metal part to discharge static electricity before handling the board. The board should always be held by the edges after static electricity is discharged.

While practicing appropriate anti-static precautions, remove the BT-445S from its protective envelope. 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, available from any authorized dealer, may be needed to assist with the installation of the BT-445S for your VL-Bus system:

- VL-Bus system technical manuals
- Hard disk drive(s) manuals
- Floppy disk drive(s) manuals
- PC/AT DOS diskette(s)
- **SETUP, FDISK,** and **FORMAT** programs

- Small screwdriver

- Small needle-nosed pliers.

CONFIGURATION INSTRUCTIONS

The BT-445S must be configured for use by performing the following actions:

- Setting on-board switches and jumpers

- Configuring SCSI devices

- Verifying that the terminators are installed correctly

- Placing the BT-445S board into the VL-Bus slot and

- Cabling the on-board connector to a SCSI target.

BT-445S SWITCH AND JUMPER SETTINGS

The BT-445S operates with most VL-Bus systems with the factory set jumpers and switches in the switch bays. The BT-445S's switch bay settings and jumpers will need to be changed if conflicting port assignments or memory allocation is encountered. The locations of these switches and jumpers for the BT-445S are shown in Figure l-2.

The default settings for switches and jumpers for the BT-445S as shipped from the factory are listed in Tables 2-1 through 2-6. For a summary of these switches and jumpers, refer to Table 2-7 and 2-8.

Before installing the BusLogic host adapter board, verify that the switch settings and jumpers have been set according to the target system's operating requirements.

Warning: Change the switches and jumpers before installing the BusLogic board *info the VL-Bus sysfem. Make sure fhaf you areproperlygrounded beforedoingso.*

Host Adapter SCSI ID

There are eight SCSI IDs (O-7) on a SCSI bus. SCSI ID 7 has the highest priority. Each initiator or target on a SCSI bus must be assigned a unique SCSI ID.

Switch Bay l's Switches 1, 2, and 3 set the BT-445S SCSI address (in binary). Because the BT-445S is an initiator on the SCSI bus dispatching host commands to all SCSI targets on the bus, the default SCSI ID is 7. Note that the BT-445S's on-board BIOS requires that your SCSI drives be configured for SCSI ID 0 and 1. This requirement is important only if you intend to boot your system from the BT-445S. Complete settings of Switches 1, 2, and 3, and the resulting SCSI ID are provided in Table 2-l. *The as-shipped (default) SCSI ID is 7.*

Table 2-1. The Host Adapter SCSI ID Setting

Switch 1 2 3	SCSI ID
0 0 0	0
1 0 0	1
0 1 0	2
1 1 0	3
0 0 1	4
1 0 1	5
0 1 1	6
1 1 1	7, Default
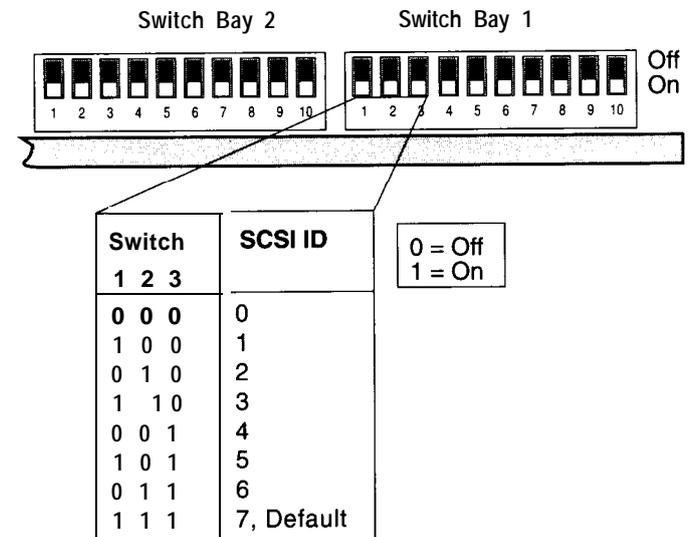
SCSI Parity

There are 8 bits of data plus one bit of parity on a standard SCSI bus. Switch Bay l's Switch 4 lets you enable or disable parity on the SCSI bus. By *default, Switch 4 is* ON, *enabling parity.*

Disk Drive Capacity

DOS Disk Space > 1 GBytes. In the DOS environment, when the BT-445S's on-board BIOS is enabled to service interrupt 13H for SCSI disk accesses, the BIOS intercepts host interrupt 13H calls and dispatches commands to the BT-445S to access the SCSI devices. If the overall DOS disk space is to exceed 1 GBytes, this option has to be enabled. When this option is enabled, the BT-445S BIOS allows DOS to access up to 8 GBytes per disk. Otherwise, DOS can only access the first 1 GBytes even if the formatted disk capacity is greater than 1 GBytes.

For most operating systems other than DOS, for example, NetWare, UNIX, and OS/2, the 1 GByte limitation exists only during the boot process when interrupt 13H is used. Once booted, these operating systems can access the entire disk space without the 1 GByte limitation.

Therefore it is recommended that this option be enabled only if greater than 1 GBytes of disk space is needed under DOS. For all other operating systems, as long as the bootable image resides below the 1 GByte range, this option can be disabled without losing the accessibility of the entire drive.

Switch Bay l's Switch 5 is used to enable or disable this > 1 GByte DOS support. To enable >1 GByte DOS support, set Switch 5 to **0** *(OFF). By default Switch 5 is ON which disables the > 1 GByte support.*

Note: Before this option is changed, you must backup fhe entire disk image on fhose drives that have greater than 1 GBytes of capacity. After the option is changed, **you** *must then reformat all those greater than 1 GByte drives and reinstall all the files.*

Adapter Initiate Synchronous Negotiation

The SCSI protocol allows synchronous negotiation to determine the REQ/ACK offset and the data transfer rate for synchronous transfers between an initiator and a target on the SCSI bus. The actual data transfer rate is determined by the lower of the rates between the initiator and the target. Because the BT-445S is capable of up to 10 MBytes/sec SCSI data transfers, the actual data transfer rate is determined by the SCSI drive if the drive has a data transfer rate lower than or equal to 10 MBytes/sec. Switch Bay l's Switch 6 is used to enable or disable synchronous negotiation initiation by

the BT-445S. *By default Switch 6 is* ON *which disables synchronous negotiation initiation by the BT-445S.*

This default mode assumes that a SCSI target device connected to the BT-445S will initiate the synchronous negotiation. Some target devices require that they initiate the synchronous negotiation. Such devices may fail to respond to commands from the BT-445S if a synchronous negotiation occurs unexpectedly. Conversely, other target devices may expect an initiator to begin the synchronous negotiation sequence. If this class of SCSI target devices is connected to the BT-445S, Switch 6 may set to **OFF** to allow the host adapter board to initiate the negotiation for a synchronous data transfer with a selected SCSI target device.

Maximum Synchronous Data Rate Allowed

The SCSI controller chip on the BT-445S has the capability of supporting SCSI data rates of up to 10 MBytes/sec.

Switch Bay l's Switch 7 determines the maximum SCSI data transfer rates. The default setting is ON which supports up to 5 MBytes/sec. If Switch 7 is **OFF,** it allows you to transfer data up to 10 MBytes/sec.

Note the following two points: (1) in order to achieve a 10 MBytes/sec transfer rate, this option and the Adapter Initiate Synchronous Negotiation option must both be enabled, and (2) some older SCSI drives that can only support a data rate of up to 5 MBytes/sec may misinform the BT-445S during the negotiation that it can transfer data above 5 MBytes/sec. When the BT-445S is connected to such drives, the 5 MBytes/sec option must be used. Otherwise, it will cause data transfer failure. The *default setting is the 5 MBytes/sec option.*

VL-Bus Clock Speed

The **BT-445S** supports various VL-Bus clock speeds. Switches 8, 9 and 10 of Switch Bay 1 define the VL-Bus clock speed which is the same as the host CPU clock speed. For a complete list of the settings of Switches 8, 9 and 10, refer to Table 2-2. All other combinations are reserved. *The* default setting *is 33, 40* MHz.

Table 2-2. The VL-Bus Clock Speed

Switch Bay 2   Switch Bay 1

Switch 8 9 10	CPU Clock
1 1 0	20 MHz
0 1 0	25 MHz
1 1 1	33, 40 MHz
1 0 1	50 MHz
0 1 0	DX2/50 MHz
1 1 1	DX2/66 MHz

0 = Off
1 = On

Host I/O Port Address

The host communicates with the **BT-445S** via the **BT-445S's** three I/O registers. Switch Bay 2's Switches 1, 2, and 3 allow you to define the base I/O address of these three registers within the host I/O map. Note that each board within the same VL-Bus system must have its own unique I/O register addresses to prevent hardware conflicts. The *default starting address is* 330H.

Table 2-3. The Host I/O Port Address

Switch Bay 2   Switch Bay 1

Switch 1 2 3	I/O ADDRESS FUNCTION
0'0 0	Reserved
1 0 0	134h-137h
0 1 0	234h-237h
1 1 0	334h-337h
0 0 1	Reserved
1 0 1	130h-133h
0 1 1	230h-233h
1 1 1	330h-333h, Default

0 = Off
1 = On

Host BIOS (16K Bytes) Address

The BIOS address resides within the host memory map and is executed by the host even though it is physically located on the **BT-445S.** The BIOS intercepts host interrupt 13H and then dispatches a command to the **BT-445S** for all host to SCSI disk accesses under the DOS environment. Switch Bay 2's Switches 4 and 5 select the starting address of a 16K Byte memory slot within the host memory space for the BIOS.

If more than one host adapter is installed within the same VL-Bus system, only one can have the BIOS enabled. The BIOS on each additional host adapter must be disabled. Refer to Table 2-4 for a complete list of these switch settings. *The default setting is ODCOOOH.*

Table 2-4. The BT-445S Host BIOS Address

Switch Bay 2   Switch Bay 1
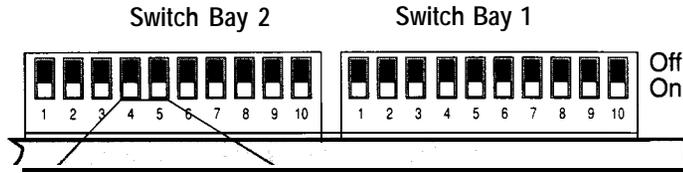
| Switch | BIOS |
4 5	ADDRESS
0 0	0C8000h
1 0	Disable
0 1	0D8000h
1 1	0DC000h, Default

0 = Off
1 = On

Host Interrupt Request

The BT-445S generates a hardware interrupt to the host whenever an interrupt condition exists. Switch Bay 2's Switches 6-8 select the host AT interrupt channel. Refer to Table 2-5 for a complete listing of these switch settings. By default, Channel 11 is selected.

Table 2-5. The Host Interrupt Request

Switch Bay 2   Switch Bay 1

| Switch | CHANNEL |
6 7 8	
0 0 0	Reserved
1 0 0	Reserved
0 1 0	15
1 1 0	14
0 0 1	12
1 0 1	9
0 1 1	10
1 1 1	11, Default

0 = Off
1 = On

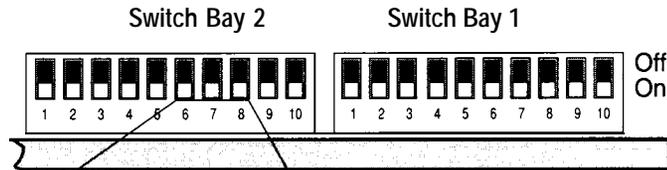In addition to setting the switch bay for the correct interrupt, make sure that you also set Jumpers W3-W8, as described within the next paragraph.

Jumpers W3-W8 set the Host Interrupt Channel. To configure the Host Interrupt Channel properly, check that the corresponding switches in Switch Bay 2 (6,7,8) match the jumper settings shown in Table 2-6. Only one jumper must be shorted (installed) for proper operation.

Table 2-6. The BT-445S W3-W8 Jumpers

Jumper	Host Interrupt Channel
w3	15
w4	14
w5	12
W6	11, Default
w7	10
W8	9

Switch Bay 2's Switches 9 and 10 are reserved.

Floppy Subsystem

W14, W15, and W16 allow you to configure the floppy subsystem. With W15 and W16 removed, the floppy disk controller will not respond to read or write requests from the host. In this case W14 becomes a don't care.

If W15 and W16 are installed, the floppy disk controller is enabled, and will respond to read or write requests from the host. In this case W14 is used to select the primary or secondary floppy disk address. When W14 is removed, the primary floppy disk address of 3FX is selected. When W14 is installed, the secondary floppy disk address of 37X is selected. *The default is to have the floppy disk controller enabled at the prima y address (W15 and W1 6 installed and W14 removed).*

SUMMARY OF THE BT-445S SWITCH AND JUMPER SETTINGS

Table 2-7 and Table 2-8 summarize the BT-445S switch and jumper settings, respectively. In Table 2-7, 0 represents off and 1 represents on. In Table 2-8, 0 represents open and 1 represents closed.

Table 2-7. Summary of the BT-445S Switch Settings

	Switch Bay	Switch #	BT-445S
Host Adapter SCSI ID	1	1,2,3=000	0
		100	1
		010	2
		110	3
		001	4
		101	5
		011	6
		111	7, Default
SCSI Parity	1	4=0	Disable
		4=1	Enable, Default
DOS Disk Space > 1 GByte	1	5=0	Enable
		5=1	Disable, Default
Adapter Initiate Synchronous Negotiation	1	6=0	Enable
		6=1	Disable, Default
Maximum Synchronous Data Rate	1	7=0	10 MBytes/sec
		7=1	5.0 MBytes/sec, Default
VL-Bus Clock Speed (Local CPU Speed)	1	8,9,10=110	CPU 20 MHz
		010	CPU 25 MHz
		111	CPU 33, 40 MHz, Default
		101	CPU 50 MHz
		010	DX2/ 50 MHz
		111	DX2/66 MHz
		All other combinations are reserved.	

Table 2-7. Summary of the BT-445S Switch Settings (Continued)

	Switch Bay	Switch #	BT-445S
Host I/O Port Address	2	1,2,3=000	Reserved
		100	134H-137H
		010	234H-237H
		110	334H-337H
		001	Reserved
		101	130H-133H
		011	230H-233H
		111	330H-333H, Default
Host BIOS (16K Byte) Address	2	4,5=00	0C8000H
		10	Disable
		01	0D8000H
		11	ODCOOOH, Default
Host Interrupt Request	2	6,7,8=000	Reserved
		100	Reserved
		010	15
		110	14
		001	12
		101	9
		011	10
		111	11, Default
Reserved	2	9	Reserved
Reserved	2	10	Reserved

Table 2-8. Summary of the BT-445S Jumper Settings

	Jumper #	**BT-445S**
Host Interrupt Channel	W3	15
	w4	14
	w5	12
	W6	11, Default
	W7	10
	W8	9
Floppy Subsystem	W14, W15, **W16=X**00	Disable Floppy
	011	Primary Floppy (**3FX**), Default
	111	Secondary Floppy (37X)

INSTALLING THE BT-445S

Complete the following steps to install the BT-445S in a VL-Bus slot and to connect it to other devices.

1. Remove power from the VL-Bus system.

2. Referring to the VL-Bus 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 controller drive board has been 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 VL-Bus slot that has been selected for insertion of the BT-445S. The slot closest to the disk drives is the best choice.

4. If the BT-445S will be installed in a VL-Bus system which is not at either end of the SCSI bus, terminators RI'4 and RI'5 must be removed. RP4 and RI'5 are 110 ohm resistor packs.

   The BT-445S is shipped with terminators installed. For more information on device termination, refer to the next heading, "Host Adapter Integration".

Card Cage Slot Guides
BusLogic BT-445S Host Adapter PCB
50-Pin SCSI Drive Cable
Drive On LED
Power Supply
SCSI Drive
Rear of VL-Bus System
Floppy Disk Drive

Front of VL-Bus System

5. Press the BT-445S downward into the selected VL-Bus slot, align the mounting bracket, and reinstall the mounting screw.

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

---

6. Connect the large 50-pin connector within the VL-Bus system to the single-ended SCSI connector, J3. 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. See the heading "Cabling Requirements" later in this manual for details.

7. If the floppy controller on the BT-445S will be used, connect the smaller 34-pin connector from the floppy disk drive to the J2 connector marked **Floppy.** Make sure the ribbon cable is installed correctly. The dark stripe on the cable indicates where Pin #1 is connected.

8. Insert the four-pin header connector from the drive activity LED on the front panel of the VL-Bus system to connector J1 on the BT-445S. This connector is reversible and may be plugged into J1 in either direction.

34-Pin Floppy Connector
BusLogic BT-445S Host Adapter PCB
Connect 50-Pin SCSI Drive Cable to J3 on PCB
Rear of VL-Bus System

Front of VL-Bus System
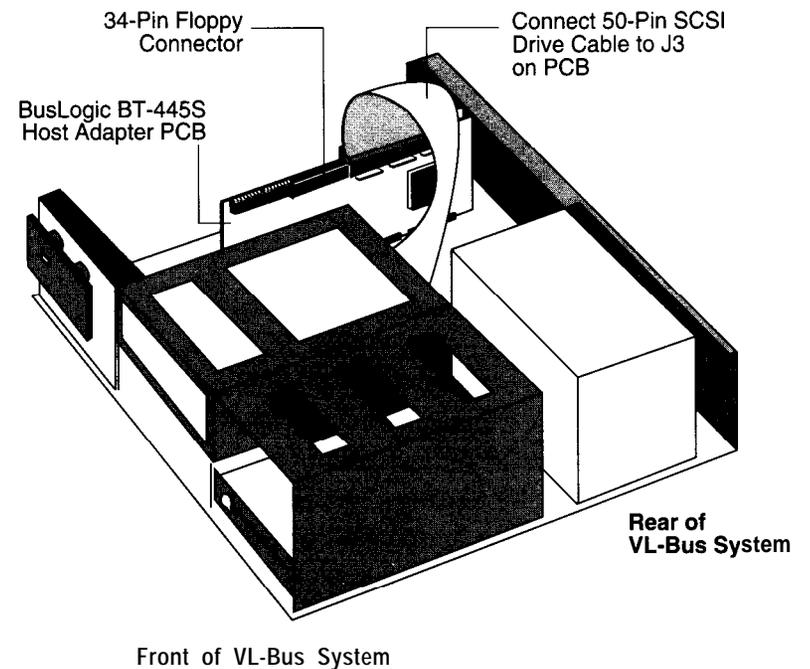
9. Verify that all connections are secure.

10. Reattach and close the cover of the VL-Bus system as described in the system owner's manual.

HOST ADAPTER INTEGRATION

This section describes device termination, cabling requirements, and SCSI device ID selection.

Device Termination

SCSI devices are daisy chained together with a common cable. All SCSI devices operate on common signals and both ends of the cable are terminated with hardware terminators. Terminators, which can be connected to either SCSI devices or SCSI cables, are required to make data transfers on the SCSI bus reliadle.

Devices connected to SCSI chains must have the correct number of terminators for proper operation and to prevent damage to the SCSI chip on the BT-445S. There can be no more than two terminators in a chain of SCSI devices-one at each end of the physical chain. Thus if more than two SCSI devices are connected in a SCSI daisy chain, the middle device(s) in the control cable must have the terminator resistor packs on the device(s) removed. See Figure 2-1 for possible configurations of terminators in a SCSI system.
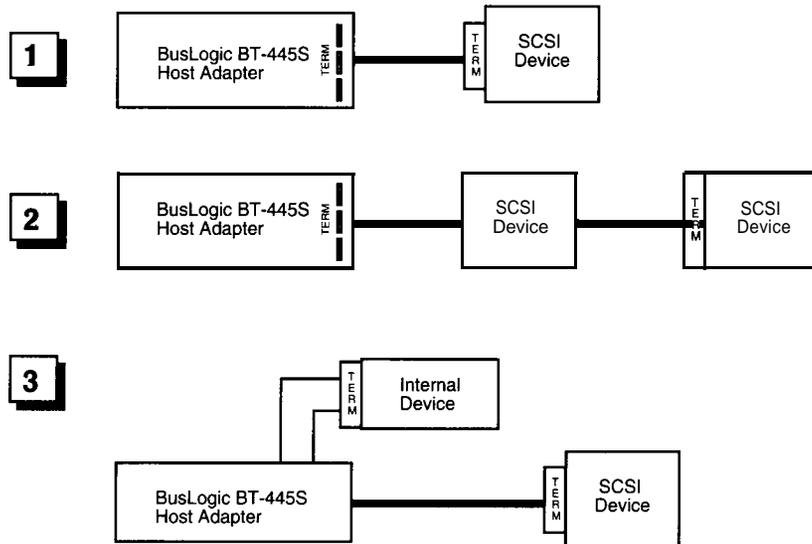
Figure 2-1. SCSI Terminator Configurations

Cabling Requirements

Selecting the proper SCSI cable for a particular system configuration is of great importance. If two or more SCSI devices are configured in a SCSI daisy chain, the devices must be connected by a .%-conductor, daisy-chain cable.

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-445S.

SCSI Device ID Selection

The SCSI ID is a number between 0 and 7 assigned to any SCSI device. The SCSI ID number is used by the computer to communicate with the devices connected to it. All SCSI devices must have a unique SCSI number to identify it on the SCSI chain. When two or more SCSI devices communicate, a SCSI device is usually fixed as either an initiator or a target; however, some devices are capable of performing either role. Devices with higher ID numbers have a higher priority in communicating with the computer.

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. Change the SCSI ID of other peripheral devices only as recommended in the owner's manual. Refer to the earlier heading "BT-445S Switch and Jumper Settings" for information on setting the SCSI ID number of the BT-445S.

HARD DISK INITIALIZATION

This section describes the system set up, initialization, partitioning and formatting of hard disk drives used with the BT-445S. These procedures will erase all data on your disk drives. Before following these procedures make sure that all necessary data is backed up on another drive.

Set-up, Initialization, and Partitioning Procedure

To perform set up, initialization, and partitioning, proceed as follows:

1. After plugging in and connecting the BT-445S (see the previous parts of this section), apply power to the VL-Bus system.

2. Insert the system diagnostic diskette in the drive, or execute the host's internal diagnostic/set-up program. See your particular system's installation instructions.

3. In accordance with the menu that appears on the system monitor, run **SETUP** and configure the host CMOS RAM options. Set the hard disk option for SCSI drive to **No Hard Drive Installed.**

The following Steps 4 through 8 may not be necessary if your SCSI hard disk drive has already been formatted.

4. Reboot the VL-Bus system and insert the DOS diskette containing the **DEBUG** program.

5. After the DOS prompt, type the following for low-level format:

   debug <RETURN>

   The system responds with the "**-**" prompt.

   A) Type **g=dc00:6 <RETURN> if** the host BIOS address is set for this; otherwise, enter the correct BIOS address.

6. Perform the following steps on your screen monitor to configure and perform a low-level format on attached devices:

A) The SCSI Fixed Disk Format utility appears on the screen. Enter **1** to view the attached devices and then press **<RETURN>.**

```
SCSI Fixed Disk Format Utility

1.   Show all installed drives
2.  Select  next  drive
3.   Format current drive
4.   Verify current drive
5.   Quit (exit to DOS)


Enter  Your  Option: _
```
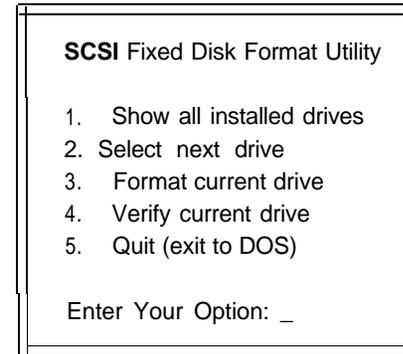
B) A list of all attached drives appears under the option prompt. Press the **2** key until the drive to be formatted is the current drive.

C) Press 3 **<RETURN>** to format the drive. The following prompt appears:

```
All data on this drive will be lost!
 Proceed  with  low level  formatting? (Y/N) _
```
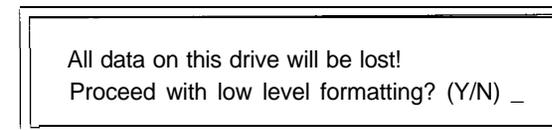
   Enter **Y** to proceed with low-level formatting and follow the instructions as they appear on the screen.

D) The system will format the SCSI drive selected. When the format is completed, press any key to go back to the main menu shown in the preceding Step 6A. Enter **4** to verify the drive and then press **<RETURN>.** The following prompt appears.

```
All data on this drive will be verified.
and bad data areas will be reassigned.
Proceed with low level verification? (Y/N)__
```
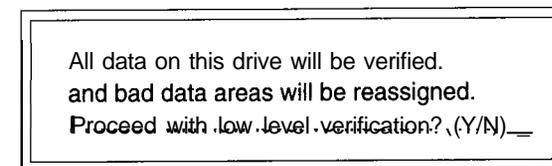
   Enter **Y** to proceed with verification.

E) When the verification is finished, press any key to go back to the main menu shown in the preceding Step 6A. To exit to DOS, type:

5 <RETURN>

The following Steps 7 and 8 may not be necessary if the operating system to be installed is not DOS.

7. Run the DOS FDISK program to partition the disk for the number of cylinders to be used by DOS. The following steps are recommended for users who are not familiar with the DOS FDISK program. See your DOS manual for information on the FDISK command.

A) Enter **fdisk <RETURN>.** The following menu appears.

```
FDISK   Options

Current Fixed Disk Drive: C

Choose one of the following:

 1. Create DOS Partition
 2. Change active Partition
 3. Delete DOS Partition
 4. Display Partition information

Enter Choice: [I]
```

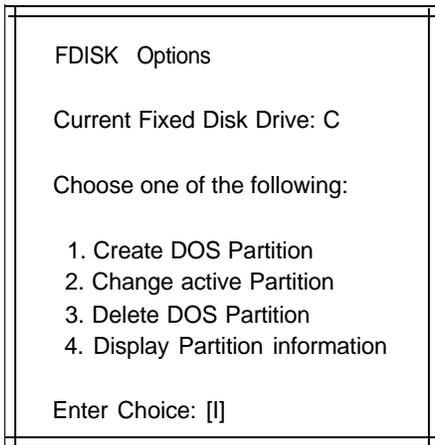**B)** Enter **1 <RETURN> to create** a DOS partition. The following menu appears.

```
Create DOS Partition

Current Fixed Disk Drive: C

Choose one of the following:
   1. Create Primary DOS Partition
   2. Create Extended DOS Partition

Enter Choice: [1]
```
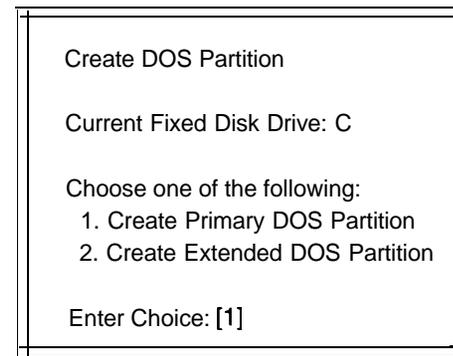
C) Enter **1 <RETURN>** to create a primary DOS partition. The next menu appears.

```
Create Primary DOS Partition

Current Fixed Disk Drive: C

Choose one of the following:

Do you wish to use the maximum size
for a DOS partition and make the DOS
partition active (Y/N)………………..?  [Y]
```
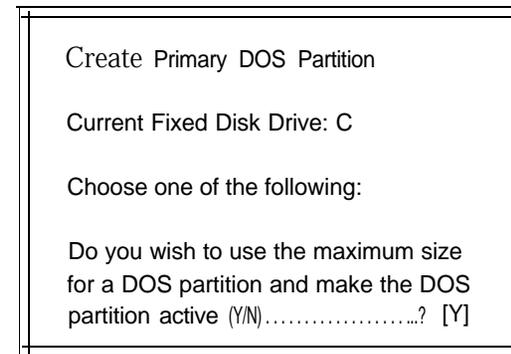
D) Enter **Y <RETURN> to create a** primary DOS drive partition with the maximum size. The following prompt appears.

```
System will now restart

Insert DOS diskette in drive A:
Press any key when ready . . .
```
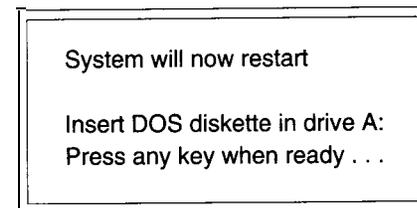
When the partitioning has been completed (indicated by another prompt), press any key to return to DOS.

8. Install DOS by running the FORMAT program as instructed by DOS normal installation procedures. The next steps are recommended for operators who are not familiar with the DOS FORMAT program.

A) Run the FORMAT program by typing:

format c:/s/v <RETURN>

B) The system displays the following format warning:

```
WARNING: ALL  DATA  ON  NON-REMOVABLE  DISK
DRIVE C: WILL BE LOST!

Proceed with Format (Y/N)?
```

C) Type **Y <RETURN>.**

D) When the format has been completed, the following prompt appears.

```
Format complete
System transferred
Volume label ( 11 characters, ENTER for name )?
```

E) Enter any legal file name to label the volume just created. Refer to your system operator's manual for more details on the DOS format procedures.

This concludes the BT-445S hardware and software installation procedures.

WARRANTY INFORMATION

If damage to the board has occurred, return it in the protective envelope 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.

A

INTERNAL DIAGNOSTICS

When power is first applied to the BT-445S, an on-board diagnostic routine is run to verify that the major functional components of the board are operating correctly. The bus master chip, the SCSI controller chip, the firmware PROM, the local RAM and internal data buses are tested. Results of the tests are indicated by an LED on the board.

The LED will first turn on when power is applied. If the diagnostics find no malfunctions, the LED will then go off. In normal operation, the LED will be illuminated when command or SCSI bus activity occurs on the board.

If an error is detected by the diagnostics, the LED will repeatedly flash a specific number of times, with a long pause between flashes, to indicate the board function which failed. This will continue until the board is powered down or reset. Failure interpretation from the number of flashes is as follows:

Number of LED Flashes	Interpretation of Failure
Always On	BT-445S is not operating or terminators are missing.
1	Firmware ROM checksum failure
2	Local RAM test failure
3	SCSI controller chip or SCSI interface failure
4	Internal data bus failure
5	internal address bus failure
6	Bus master chip failure
7	SCSI drive type mismatch'
Constantly Flashing	Fuse blown

*This error message is only applicable to the differential SCSI host adapters when single-ended SCSI drives are connected to the differential SCSI bus.

CLASS B EQUIPMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different than that to which the receiver is connected
- Consult the dealer or an experienced radio or television technician for help

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by BusLogic Inc. may void the user's authority to operate the equipment.

Cables

External connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

MODIFICATIONS TO PRODUCT DESIGN

The material in this manual is for information only and is subject to change without prior notice to its users. BusLogic Inc. reserves the right to make changes in the product design without notice to its users.

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.