Installation Guide

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BusLogic

BT-640A
SCSI Adapter for
Micro Channel Systems

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BusLogic

REVISION HISTORY

Revision	Change Activity	Date
A1	Preliminary	01/30/91
A	Release	10/25/91
B	Release	02/17/92
C	Release	08/17/92

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TRADEMARKS

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INTRODUCTION

Micro Channel Host 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 permit non-contiguous memory storage and retrieval

SCSI Peripherals

- 5 MBytes/sec data transfers to both asynchronous and synchronous devices
- SCSI-2 command set compatibility
- Both internal and external 50-pin SCSI connectors
- Wide range of SCSI hard drives, and other SCSI peripherals sup ported
- On-board power connector that provides power to SCSI peripherals

ASIC Technology

- Bus master ASIC designed by BusLogic
- High-performance advanced SCSI controller ASIC
- 16-bit 80188 microprocessor that reduces the host's CPU overhead
- Reduced component count that yields greater reliability
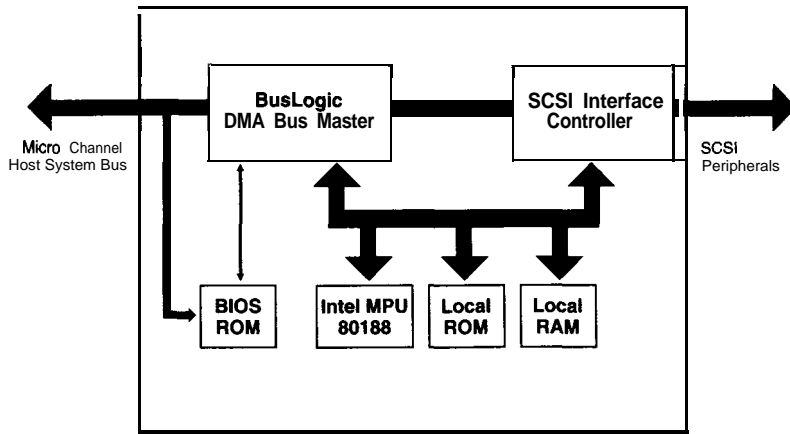
Figure I-1. The BT-640A Block Diagram

BT-640A ADVANTAGES

Unique Features

- BusLogic-designed universal bus master ASK provides the highest level of integration in the industry

- BusLogic's ASIC allows common architecture for a familyof SCSI host adapter products across such popular industry standard buses as Micro Channel™, ISA, and EISA

- High-speed, 8 MHz 80188 on-board microprocessor

Benefit

- Exceptionally high product reliability due to reduced component count and lower power consumption

- Allows easy feature enhancements and device driver support for all industry standard buses

- High performance due to minimized command overhead and faster command execution

BT-640A ADVANTAGES, CONTINUED

Unique Features

- On-board power connector

- Complete device driver support for all the popular operating systems: DOS, UNIX, XENIX, NetWare, OS/2, etc.

Benefit

- Provides power to SCSI peripherals

- Provides turn-key solution for s ys tem integration

PRODUCT OVERVIEW

The BusLogic BT-640A host adapter is an intelligent Micro Channel to SCSI bus master host adapter product based on a BusLogic-designed, universal ASIC technology. It provides a high-performance interconnection between the Micro Channel bus and Small Computer System Interface (SCSI) peripheral devices. It is designed for multitasking operating systems such as UNIX, XENIX, NetWare, and OS/2. UNIX and XENIX both contain built-in driver support for the BT-640A. Software drivers for NetWare, OS/2, and DOS are also available as optional items.

As Figure 1-1 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 1-2 indicates, the BT-640A uses a BusLogic's high-speed bus master interface chip to provide 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 Micro Channel bus. Selectable interrupt and arbitration levels and I/O address ranges are available.
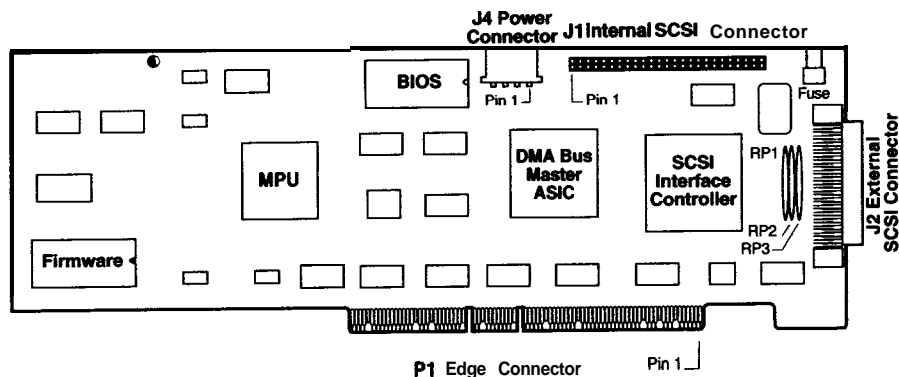
Figure 1-2. The BT-640A Host Adapter Board

SCSI Interface

Both asynchronous and synchronous operations can occur at data rates of up to 5 MBytes/sec using an advanced SCSI controller ASIC. 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 internal and external 50-pin connectors for flexibility in attaching SCSI devices to the system.

Microprocessor

An Intel 80188 16-bit MPU is used to supply the speed for low command overhead. This MPU coordinates all activity on the BT-640A under the direction of the board's firmware, including initialization, command decoding, interrupt generation, and control of the data flow among the boards components.

Multitasking Operation

For operating systems such as UNIX, NetWare, and OS/2, the mailbox protocol of the BT-640A provides true multitasking operation. Through the use of a mailbox structure, the BT-640A 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 1-1 for a summary of the physical and electrical specifications.

Table I-1. Specifications

Electrical

Operating Voltage	5±0.25V
Operating Current	1 .OA
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	3.5" x 11.5"

Interface Connections

SCSI Internal	50-pin double-row connector
SCSI External	50-pin shielded SCSI-2 connector
To/From System	Micro Channel 16-bit and 32-bit edge connector

MTBF	**90,000** hours

REFERENCE DOCUMENTS

To install the BT-640A in your Micro Channel computer, you should have the following documentation:

- BusLogic's Micro Channel SCSI Host Adapter BT-640A
  Data Sheet
- Micro Channel installation and set-up guide
- Operating system installation and user's guide
- Micro Channel computer technical reference manual (optional)
- Installation guide for third-party device drivers (optional)
- Small Computer System Interface, ANSI X3.131-1986 American
  National Standards (optional).

HARDWARE AND SOFTWARE REQUIREMENTS

The BT-640A can be installed in any Micro Channel compatible computer. To install the BT-640A successfully you must have the following hardware and software.

Hardware

To install the BT-640A, you must have a Micro Channel computer system with the following hardware:

- One available Micro Channel 16-bit or 32-bit expansion slot
- DC power for an internal 3.5" or 5.25" SCSI drive or an external subsystem with the corresponding D-shell, 50-pin external cable
- One Common Command Set (CCS) SCSI-2 compatible disk drive
- One 50-pin, flat ribbon cable to connect internal SCSI devices to the BT-640A.

Software

To install the BT-640A, you will need the enclosed Micro Channel configuration diskette and the included or third-party device drivers for any of the following operating systems:

- **PC-DOS** or MSDOS
- IBM OS/2 or MS-OS/2
- Interactive UNIX or SCO UNIX/XENIX "GT" version, or
- Novell NetWare 286/386.

2

UNPACKING AND INSTALLATION

This section describes how to unpack, to inspect, to configure, and to install the BusLogic BT-640A host adapter. Additionally this section describes how to initialize the software and how to set the BT-640A's options for its operation in Micro Channel-compatible systems. Figure 1-2 shows the BT-640A.

UNPACKING AND INSPECTION

Before handling the BT-640A, 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 even after static electricity is discharged.

While practicing appropriate anti-static precautions remove the BT-640A 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-640A for your system:

- Micro Channel technical manuals
- Hard disk drive(s) manuals
- Micro Channel MS-DOS diskette(s)
- Micro Channel system reference diskette
- **SETUP, FDISK,** and **FORMAT** programs

- Small screwdriver
- Small needle-nosed pliers.

CONFIGURATION INSTRUCTIONS

The BT-640A must be configured for use by performing the following actions:

- Configuring SCSI devices
- Verifying that the terminators are installed correctly
- Placing the BT-640A into the Micro Channel computer slot
- Setting host adapter software options and
- Cabling the on-board connector to a SCSI target.

HOST ADAPTER INTEGRATION

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 reliable.

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-640A. 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.
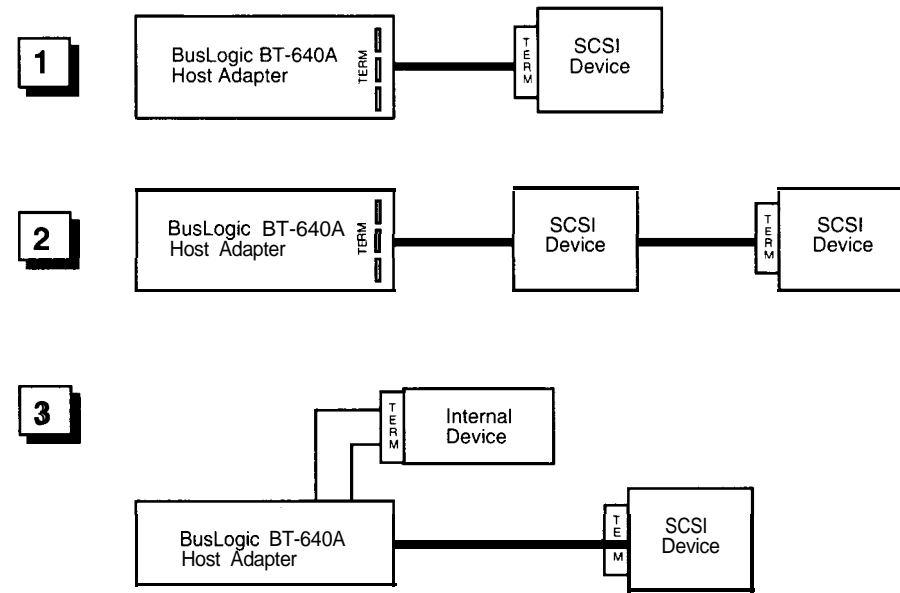
Figure 2-1. SCSI Terminator Configurations

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 50-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-640A.

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 heading "Micro Channel Configuration Settings" later in this section for procedures on how to set the SCSI ID number of the BT-640A.

Disk Drive Power Connector

A 4-pin disk drive power connector (J4) is located at the top edge of the BT-640A board next to the SCSI connector J1. This connector provides standard +12V and +5V power to disk drives.

INSTALLING THE BT-640A

This section describes how to install the BT-640A in a 16-bit or 32-bit slot inside the Micro Channel host system and how to connect it to other devices. Install the BT-640A in your computer by performing the following steps:

1. Remove power from the host system.

2. Refer 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 controller drive board has been installed, remove all connecting cables to the board and then lift it out of the host computer.

3. Loosen the mounting screw and the existing bracket from the rear panel behind the 16-bit or 32-bit slot that has been selected for insertion of the BT-640A. The Micro Channel slot closest to the internal hard drive(s) is the best choice.
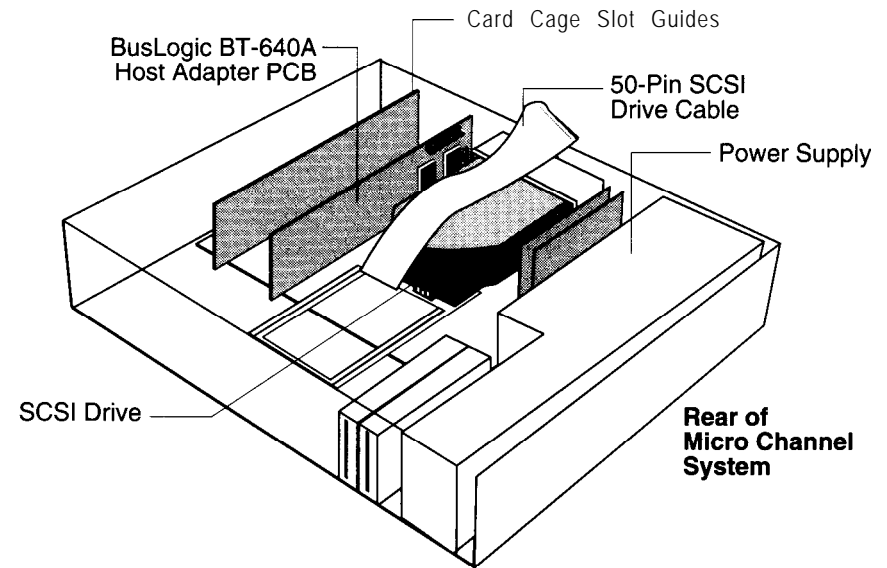
Front of Micro Channel System

4. If the BT-640A will be installed in a host which is not at either end of the SCSI bus, terminators RP1, RP2, and RP3 on the board will need to be removed. See the preceding heading, "Host Adapter Integration," in this section for more information regarding device termination. The BT-640A is shipped with terminators installed.

5. Press the BT-640A downward into the selected 16-bit or 32-bit 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 host computer to the single-ended SCSI connector, J1. 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," earlier in this section for details.

BusLogic BT-640A --
Host Adapter PCB

Connect 50-Pin SCSI
Drive Cable to J1
on PCB

Rear of
Micro Channel
System
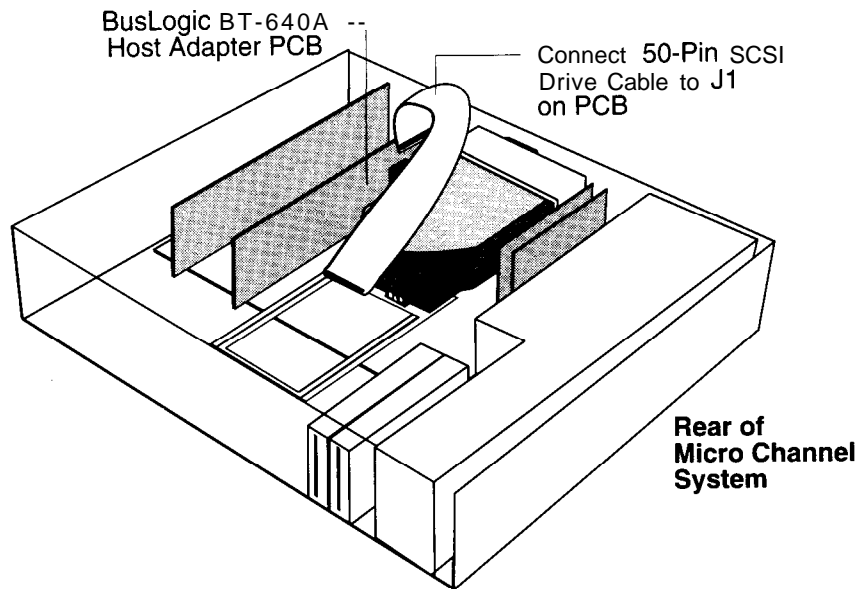
Front of Micro Channel System

7. Verify that all connections are secure.

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

MICRO CHANNEL CONFIGURATION SETTINGS

The BT-640A fully supports the Micro Channel automatic configuration facility and is operational with most computers using the default settings in the BT-640A configuration diskette supplied with the board. The host adapter configuration options will need to be changed if conflicting port assignments or memory allocation is encountered. Every BusLogic Micro Channel controller comes with a floppy diskette which contains the BusLogic configuration file (@0708.ADF).

Before starting, perform the following steps:

1. Prepare a back-up copy of the system reference diskette provided with your host computer.

2. Place the back-up system reference diskette in the floppy drive and then reboot your system by pressing the **CONTROL, ALTERNATE,** and **DELETE** keys simultaneously.

3. After the boot is completed, the system's main menu will appear. Select the Copy on Option Diskette command and follow the instructions to copy the @0708.ADF file from the BusLogic-supplied diskette.

4. When the main menu reappears, select the Set Configuration command. Select the Change Configuration command and then follow the directions on your screen to select the BT-640A.

The default settings for configuration options as shown on the screen are illustrated in Figure 2-2. Move the cursor to the field desired, press the **F5** or **F6** keys to scroll through the selections for each option and then leave the field to select the option desired.

```
Slot 5 - BusLogic BT-640A Micro Channel to SCSI Host Adapter (v1.O)
    BIOS Address ............................................................ [DC0000h]
    I/O Port Address ............................................... [330h]
    Arbitration Level ..............................................[Level_5]
    Arbitration Fairness .........................................[On]
    Interrupt Request................................................. [Int_15]
    Slot Data Width . . ........................................... [16]
    Adapter SCSI Bus ID......................................[ID_7]
    Adapter Initiate Sync Negotiations .....................[On]
    Adapter SCSI Parity Checking .........................[On]
    Disk > 1 GB and not SCO UNIX .......................[Off]
```

Figure 2-2. Configuration Settings

Note: For details on greater than 1 GB drive support, refer to the heading, "Disk Drive Capacity," later in this section.

Before operating the BT-640A, verify that the configuration settings have been set according to the target system's operating requirements. The following paragraphs describe the settings for each configuration option.

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-640A. The BIOS intercepts host interrupt 13H and then dispatches a command to the BT-640A for all host to SCSI disk accesses under the DOS environment. This setting allows you to 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 Micro Channel host system, only one can have the BIOS enabled. The BIOS on each additional host adapter must be disabled. The *default* setting for this option *is DC0000H.*

Host BIOS (16K Bytes) Address

```
(•)DC0000h - default
( )D80000h
( )D40000h
( )D00000h
( )CC0000h
( )C80000h
( )Disabled BIOS
```

Host I/O Port Address. The host communicates with the BT-640A via the BT-640A's three I/O registers. (Refer to the *BT-640A Technical* Reference Manual for more details on these registers.) This setting lets you define the base I/O address of these three registers within the host I/O map. Note that each board within the same Micro Channel host system must have its unique I/O register addresses to prevent hardware conflicts. *The* default *starting address is* 330H.

Host Adapter Configuration
Host I/O Port Address

```
(•)330h - default
( )334h
( )234h
( )134h
( )230h
( )130h
```

Arbitration Level. In order for the BT-640A to become a bus master on the Micro Channel bus, it must make a request to start a bus arbitration. Once a request is made, the arbitration cycle is initiated by the central arbiter of the system as soon as the present bus master releases the bus. Among all of the participating arbiters, the one with the highest priority will win control of the channel. This option allows the user to define the arbitration level for the BT-640A. Arbitration level 0 has the highest priority and level 7 has the lowest priority. *The* default *setting is level 5.*

```
Level _ 5 - default
Level _ 6
Level _ 7
Level _ 4
Level _ 3
Level _ 1
Level _ 0
```

Arbitration Fairness. In order for the lower priority arbiters to gain control of the channel, the Micro Channel has an arbitration fairness feature. If the arbitration fairness feature is turned off, the arbitrating device that owns the channel may immediately participate in the next arbitration cycle as soon as it releases the channel. If the arbitration fairness feature is turned on, it will not participate in any arbitration cycle until all other requesting devices have been serviced. This option allows you to set the arbitration fairness on or off. *The default setting is fairness on.*

Host Interrupt Request. The BT-640A generates a hardware interrupt to the host whenever an interrupt condition exists. (Refer to the description of

the Interrupt Register in the *BT-640A Technical* Reference *Manual* for details on this register.) You can use this setting to specify the hardware interrupt line on the Micro Channel bus that the BT-640A should use to generate interrupts to the host.

Each selected hardware line is level triggered. Level-triggered interrupts assert interrupts low. Level-triggered interrupts allow multiple boards to share the same hardware interrupt line on the Micro Channel bus. Note that unless the device drivers have the capability of handling shared interrupts, each board in the Micro Channel host system must be assigned a unique hardware interrupt line to prevent conflicts. The default *setting for this option is Channel 15.*

Host Interrupt Request

```
(•)Int_15 - default
( )Int_14
( )Int_12
( )Int_11
( )Int_10
( )Int_ 9
```

Slot Data Width. The data width on the Micro Channel slots can be either 16- or 32-bits wide. This option allows you to specify the slot data width. Select the 16-bit option if the BT-640A is to be plugged into a 16-bit slot. Select the 32-bit option if the BT-640A is to be plugged into a 32-bit slot. If a BT-640A that has been configured as 16-bit is plugged into a 32-bit slot, then the actual data transfer will be limited to 16 bits. If a BT-640A that has been configured as 32-bit is plugged into a 16-bit slot, then it will automatically limit the data width to 16 bits. *The default setting is the 16-bit slot.*

Host Adapter SCSI ID. There are eight SCSI IDs (0–7) 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.

This setting enables you to define the SCSI ID for the BT-640A on the SCSI bus. Because the BT-640A 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-640A'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-640A. *The us-shipped (default)* SCSI ID *is* 7.

SCSI Configuration
Host Adapter SCSI ID

```
(•)ID = 7 - default
( )ID = 6
( )ID = 5
( )ID = 4
( )ID = 3
( )ID = 2
( )ID = 1
( )ID = 0
```

Host 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-640A is capable of up to 5 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 5 MBytes/sec. *The default setting is disabled.*

The default mode assumes that a SCSI target device connected to the BT-640A 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-640A 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-640A, the option may be enabled to allow the host adapter board to initiate the negotiation for a synchronous data transfer with a selected SCSI target device.

Adapter Initiate Sync Negotiation

```
(•)Disable - default
( )Enable
```

Host Adapter SCSI Parity Checking. There are 8 bits of data plus one bit of parity on a standard SCSI bus. This setting allows you to enable or disable parity on the SCSI bus. *The default setting is to have parity enabled.*

SCSI Parity

```
(•)Enable - default
( )Disable
```

Disk > 1 GB and not SCO UNIX. In the DOS environment, INT 13 calls are routed through the BT-640A's ROM BIOS. This on-board BIOS intercepts host interrupt 13H calls and dispatches a command to the BT-640A for all host to SCSI disk accesses. When the >1GB option is turned on, the BT-640A BIOS can access up to 8 GBytes per disk. Otherwise, it can only access the first 1 GBytes even if the formatted disk capacity is greater than 1GByte.

This 1GByte restriction does not apply to other operating systems, such as NetWare, UNIX, SCO UNIX 3.2.4, or OS/2 if the operating system can boot without accessing > 1 GBytes. If the operating system's bootable image resides below 1 GBytes 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 GB option is not turned on.

Under SCO UNIX 3.2.2, the >1GB 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 reached. For SCO UNIX 3.2.4, the operating system does not impose the 1 GByte limit, and this option can be turned on or off accordingly.

Consequently, the >1GByte support must be turned on under the following two conditions: (1) the combined space of all the DOS partitions exceeds 1GByte, or (2) >1GByte disk accesses are required to boot the operating system. To enable the > 1 GB support, turn on this option.

Note: If this option is changed, you must reformat the disk to avoid corrupting the existing file system.

Disk > 1 GB and not SCO UNIX

```
Off
On
```

HARD DISK INITIALIZATION

This section describes the system set up, initialization, partitioning and formatting of hard disk drives used with the BT-640A. 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. Reboot the host system and insert the MS-DOS diskette containing the **DEBUG program.**

2. After the MS-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.

3. 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 3A. 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 3A. To exit to DOS, type:

5 <RETURN>

The following Steps 4 and 5 may not be necessary if the operating system to be installed is not DOS.

4. 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: [1]
```

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: [l]
```

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.

5. 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-640A hardware and software installation proce-
dures.

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

INSTALLATION NOTES

Customers installing this product in some IBM™ PS/2™ 20MHz Model 80-111, 121, 311, 321 computers or European models M21 and X21 **may** require a replacement system board which is available from IBM at no charge under engineering change announcement (ECA) 048.

Affected model 80 computers are detailed below. If you require this change or need assistance in determining whether your system is affected, please contact your IBM service representative or authorized IBM remarketer before you install this product.

System serial numbers above the following contain the engineering change which corrects the timing inconsistency, and do not require further action; conversely, serial numbers below the following may require this change:

For Systems Manufactured in the United States

Model	Serial Number	Action Required
8580- 111	72-6101500 and higher	None
8580-I 21	72-9015000 and higher	None
8580-311	72-6553500 and higher	None
8580-321	72-9215500 and higher	None

For Systems Manufactured in Australia

Model	Serial Number	Action Required
8580-121	90-3100250 and higher	None
8580-321	90-3400600 and higher	None

For Systems Manufactured in Scotland

Model	Serial Number	Action Required
8580-M21	**55-00LFVW0** and higher	None
8580-X21	**55-00WMZ45** and higher	None
8580-I 11	**55-00F6001** and higher	None
8580-311	**55-00AW000** and higher	None

The serial number is on the front cover, and indicates the country of manufacture by its first two digits. The country of manufacture is also listed on the back cover.

If the system serial number indicates further action, the system board field replaceable unit (FRU) part number should be examined to verify that the engineering change has not been previously installed.

In order to view the system board FRU part number you must remove the cover. The FRU part number is visible near the Micro Channel bus connectors. FRU part numbers 33F8415, 90x7390, or no visible FRU number will exhibit this problem and are eligible for replacement.

B

BT-640A INTERNAL DIAGNOSTICS

When power is first applied to the BT-640A, 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-640A 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
Constantly Flashing	**Fuse Blown.**

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 RE-QUEST 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.