CHANNEL-IN (BT)

Connect a computer directly to the mainframe channel

Documentation Edition 1

For Revision 3.x

Editors

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November 20, 2000

Preface

Welcome to a high-performance product that directly connects your computer to an IBM mainframe. This manual tells you how to install the CHANNEL-IN (BT) hardware that comes with these products:

- PRINT/CHANNEL
- BARR/CHANNEL *for SNA Server with Bus & Tag*
- BARR/CHANNEL-IN SDK

Follow the instructions in this manual to install the CHANNEL-IN (BT) adapter and Channel Attach Box. See your Barr software manual for software installation and hardware diagnostics instructions.

Barr Technical Support

Contact Barr Technical Support at 800-BARR-SYS Monday through Friday between 9 a.m. and 8 p.m. eastern time if you have questions or problems with Barr hardware or software. Technical Support will ask for your adapter serial number and software version number. When you call, please have this information on hand.

If you contact Technical Support by fax, e-mail, or the Web site support page, please include the serial number and software version number in your correspondence.

You can obtain the adapter serial number from any of these places:

- Label on the adapter box
- Blue sticker on the adapter edge that is visible from the rear of the computer
- Back of the adapter, where it is handwritten

Acknowledgments

Barr Systems thanks the following people for their contributions to this manual.

- Maynard Calkin, Northeast Regional Data Center, Gainesville, FL
- Jerry Wetherington, Northeast Regional Data Center, Gainesville, FL

Notes:

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1. Introduction

CHANNEL-IN (BT) hardware and Barr software allow you to connect the computer to a mainframe channel. CHANNEL-IN (BT) hardware includes the CHANNEL-IN (BT) adapter and the Barr Channel Attach Box (CAB).

1.1   Features

The CHANNEL-IN (BT) hardware includes these features.

Direct Connection to the Mainframe Channel

CHANNEL-IN (BT) hardware provides your computer with a fast, direct link to the mainframe. The computer connects to the mainframe using the CHANNEL-IN (BT) adapter and the CAB. You can put the computer with the CHANNEL-IN (BT) adapter in a location that is convenient to the operator. You can install the CAB anywhere along the Bus & Tag lines. A thin, flexible CHANNEL-IN cable connects the adapter to the CAB. Bus & Tag cables connect the CAB to the mainframe and to any other downstream channel-attached devices.

Convenient Channel Attachment

When you connect a computer to the mainframe, you need the ability to isolate the mainframe from the computer environment. The Barr CAB allows you to disconnect the computer without affecting the mainframe or other channel devices.

The CAB electronically isolates the channel signals from the computer. When you exit the software, the CAB disables the computer connection. LED indicators on the box show the connection status, so you can tell if the mainframe is operational and communication is taking place.

Fast Access to the Mainframe

The CHANNEL-IN (BT) interface supports transfer rates up to 4.5 megabytes per second (MBps). For any type of computer-to-mainframe access, CHANNEL-IN (BT) provides a faster, more direct link that can dramatically improve your throughput and response times.

Block Multiplex Interface Connection Mode

CHANNEL-IN (BT) supports the block multiplex interface connection mode for the interlock and data streaming transfer modes.

Data Streaming Channel Transfer Mode

In data streaming mode, you can achieve transfer rates of 3 or 4.5 MBps. Moreover, the transfer rate is independent of the total Bus & Tag cable distance, which can be up to 400 feet.

High-Performance Adapter

The CHANNEL-IN (BT) adapter is a high-performance, PCI-compatible adapter. PCI technology offers much higher performance than ISA, which has a bandwidth limitation that cannot support 4.5 MBps transfer rates. Furthermore, you do not need to set any adapter jumpers or switches with a PCI-compatible adapter. The CHANNEL-IN (BT) adapter fully supports interrupt sharing.

1.2   Computer Requirements

You can install CHANNEL-IN (BT) hardware on a computer that meets the following requirements:

- PCI local bus (Rev. 2.1 or later)
- One 32-bit slot for the CHANNEL-IN (BT) adapter

1.3   Power Requirements

The CAB requires power. A CAB power supply and power cord are provided. Power requirements are as follows:

- 50Hz to 60Hz
- 100V to 250V
- 50W

> *International Use:*
> The auto-sensing power supply meets most international electrical standards (see Appendix A). However, you might need to replace the power cord with one that will plug into your electrical outlet. (A standard computer power cable meets these requirements.)

1.4   Package Contents

The CHANNEL-IN (BT) package contains these items:
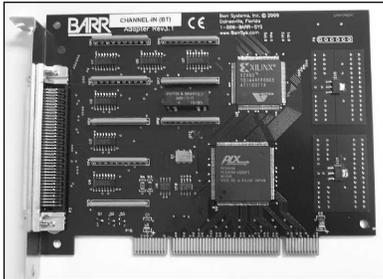
CHANNEL-IN (BT) adapter

CAB

6-meter (19.6-foot)
CHANNEL-IN cable for
connecting the adapter
to the CAB

CAB power supply

Bus & Tag terminator
plugs and test plugs
(included in the
Diagnostic Tools Bag)

2.5-meter (8-foot)
power cord

See your Barr software manual for software package contents.

1.5   Additional Hardware Required

You need Bus & Tag cables to connect the Barr CAB to the mainframe channel. If the CAB is the last device on the channel, you also need Bus & Tag terminators. Typically, more than one device is installed on the mainframe channel and the channel devices are daisy-chained together. You will use the Bus & Tag cables to insert the CAB in the chain. You also will install the terminators on the last device in the chain.

Bus & Tag cables and terminators are not included in the CHANNEL-IN (BT) package. (You should reserve the terminators included with CHANNEL-IN (BT) for performing diagnostics.) If you need to obtain Bus & Tag cables and terminators, contact your mainframe vendor.
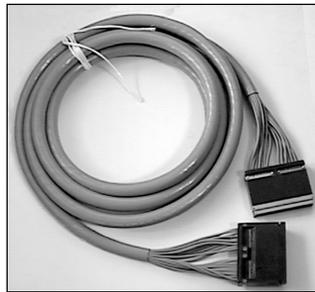
Bus & Tag daisy-chain cables
(you need two cables)

Bus & Tag terminators

2. Install the Adapter

You can install the CHANNEL-IN (BT) adapter in an open, 32-bit PCI slot in your computer like any other PCI adapter.

Follow these steps to install the adapter.

1. Set the BIOS IRQ.
2. Insert the adapter in your computer.
3. Connect the cable to the adapter.
4. Test the adapter.

2.1   Set the BIOS IRQ

PCI technology means you do not have to set any adapter switches or jumpers, but it sometimes requires computer setup. Although your computer's BIOS program can automatically set up PCI and ISA adapters, it might encounter IRQ conflicts with non-PCI adapters. (DMA and address conflicts are unlikely with PCI adapters, because PCI adapters typically do not use a DMA setting and their address range differs from non-PCI adapters.) To prevent conflicts, you need to tell BIOS which IRQ settings your non-PCI adapters use. You also need to make sure that at least one IRQ is available for PCI adapters.

Before you install the CHANNEL-IN (BT) adapter, use your computer setup utility to check the BIOS IRQ settings. See your computer user's manual for instructions.

> *Note:*
> The device drivers that accompany some PCI adapters might not allow interrupt sharing. If a conflict exists, the software will not function correctly when you try to start or operate it. If you detect a conflict, contact the vendor of the other PCI adapter.

2.2   Insert the Adapter in Your Computer

After you check for an available IRQ setting, follow the instructions in your computer user's manual to install a PCI adapter.

> *Caution:*
> Disconnect your computer and all attached devices from power sources before you install the CHANNEL-IN (BT) adapter.

2.3 Connect the Cable to the Adapter

Follow these steps to connect the cable to the CHANNEL-IN (BT) adapter.

1. Connect the supplied CHANNEL-IN cable to the adapter.
2. Power on the computer.

> *Note:*
> Velcro strips provided with the cable may be used to relieve the strain that the cable's weight may put on the adapter and to protect the adapter if the cable is pulled or stretched. Support the cable by securing it to a nearby structure with the Velcro strips.

> *Note:*
> If you also have the CHANNEL-OUT (BT) or PRINT370 adapter for connecting to S/390 channel-attached printers, be sure to correctly connect the adapters and cables. The CHANNEL-IN (BT) and CHANNEL-OUT (BT) adapters look identical, but they have different firmware and function differently. Connect the CHANNEL-IN cable to the adapter labeled **IN**. Connect the CHANNEL-OUT cable to the adapter labeled **OUT**. The IN and OUT adapter labels are visible from the rear of the computer.

2.4 Test the Adapter

After you install the adapter, install the Barr software and run the adapter diagnostics as described in your Barr software manual. Adapter diagnostics verify that you have correctly installed the adapter and that it functions properly.

3. Install the CAB

The Barr CAB electronically isolates the computer from the mainframe channel and from any other devices on the channel. Isolating the computer protects the mainframe and other channel devices when you disconnect the computer.

The CAB has two states of operation: when the Barr software is loaded and when the Barr software is not loaded.

- When the Barr software is loaded, the adapter sends a signal to the CAB. The CAB connects the computer to the channel while constantly monitoring the signal from the adapter. If the CAB loses the adapter signal, it disables the computer's channel connection.
- When the Barr software is not loaded, the computer-to-channel connection is disabled. CHANNEL-IN signals connect directly through to Channel Out. Even if the CAB has no power, it continues to pass channel signals.

Additional CAB features keep you aware of and in control of communications. LED indicators tell you the status of the connection to the mainframe, the ENABLE/DISABLE switch gives you manual control over computer access to the channel, and the PRIORITY switch lets you set the priority on the channel for the Barr CHANNEL device. Sections 3.1 through 3.3 explain these features. See Section 3.4 for CAB installation instructions.

3.1 LED Status Display

LED indicators tell you the status of the connection to the mainframe (see Figure 3-1).

FIGURE 3-1
LED indicators display the mainframe connection status.
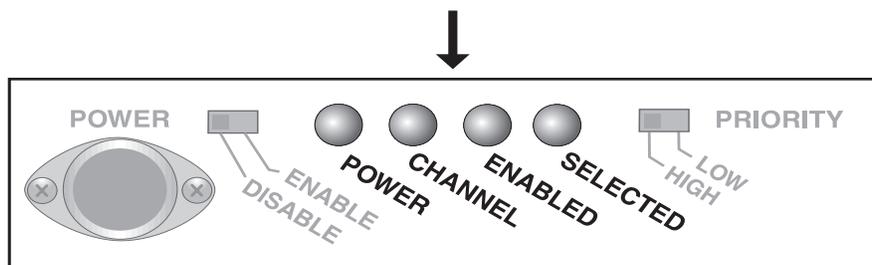
The CAB has four lights:

- POWER – The CAB has power. The CAB must have power before the computer can enable it.
- CHANNEL – The channel has been varied on at the mainframe.
- ENABLED – The computer connection to the channel is enabled. This indicator lights when the CAB switch is set to ENABLE, and the device driver has initialized the adapter.
- SELECTED – The computer has been selected by the channel and is actively communicating with the mainframe. This indicator often flashes on and off during data communication with the channel.

More than one indicator light can be on at a time. For example, if the computer is actively communicating with the mainframe, then all four LED indicators are on.

3.2   ENABLE/DISABLE Switch

The ENABLE/DISABLE switch gives you manual control over computer access to the channel (see Figure 3-2).

FIGURE 3-2
Use the ENABLE/DISABLE switch to control computer access to the channel.
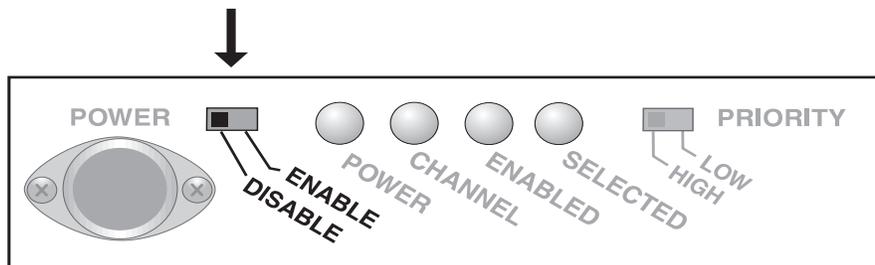
Use the switch to connect the computer to or disconnect the computer from the channel.

- When you set the switch to ENABLE, the computer can connect to the channel (if the CAB detects drivers and a functioning adapter).
- When you set the switch to DISABLE, the computer is disconnected from the channel.

Usually you do not need to use the ENABLE/DISABLE switch because the CAB maintains the integrity of the channel. During computer maintenance or extended offline operations, however, you might want to manually disable the computer connection to the channel as a precaution.

The ENABLE/DISABLE switch is inset from the CAB housing to prevent accidental movement. To change the setting, move the switch with a pen or screwdriver.

3.3   PRIORITY Switch

Device priority determines the order in which devices are serviced. The Barr CAB includes a PRIORITY switch (see Figure 3-3).

FIGURE 3-3
The PRIORITY switch affects the device priority.
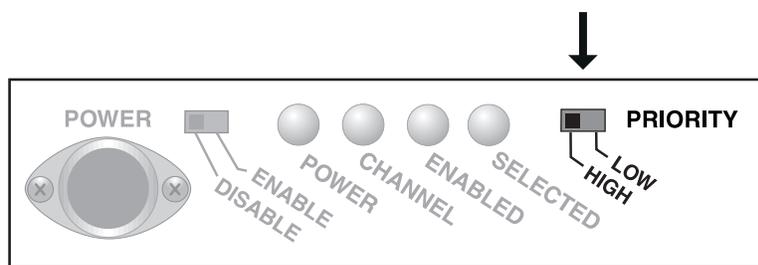
This switch allows you to set the priority of the Barr CHANNEL device to HIGH or LOW.

- When the PRIORITY switch is set to HIGH, the Barr CHANNEL device responds to the Select Out signal.
- When the PRIORITY switch is set to LOW, the Barr CHANNEL device responds to the Select In signal.

Typically the CAB is set for high priority. However, your system requirements determine how you should set this switch. Consult mainframe personnel to determine the requirements at your site. For more information about channel device priority, see Appendix B.

The PRIORITY switch is inset from the CAB housing to prevent accidental movement. To change the setting, move the switch with a pen or screwdriver.

3.4   CAB Installation

CAB installation requires you to isolate the mainframe channel, physically connect the CAB to the channel, define the channel device to the mainframe, and return the channel to service. This section discusses mainframe procedures for isolating and activating the channel and describes how to connect the CAB to the channel. See your Barr software manual for mainframe configuration information.

> *Warning:*
> Failure to follow mainframe procedures during channel device installation can bring down the mainframe and all devices attached to it. Most data centers have procedures you *must* follow. Barr Systems strongly advises that you review these procedures with authorized mainframe personnel before you install any channel device. At a minimum, the channel must be isolated before you install the CAB.

Computer Availability

You might want to install the CAB during scheduled mainframe maintenance — before the computer and a power connection are available. You can install the CAB independently of the computer with the communications software and CHANNEL-IN (BT) adapter. (However, you will not be able to run CAB diagnostics until you connect the CAB to the computer, and the diagnostics require you to disconnect the CAB from the mainframe channel.) Power also is not required to install the CAB or operate it in DISABLE mode.

After you install the CAB, it has no effect on the channel until you install and start the computer.

Mainframe Procedures

When you install any channel device, you *must* follow the procedures required by the data center where the mainframe resides. Typically these procedures involve isolating the mainframe channel by turning off a channel switch or varying offline each channel device. Before you begin installation, thoroughly review the procedures with authorized mainframe personnel. Be prepared to provide mainframe personnel with the addresses of the devices that share the channel with the CAB.

See Appendix C for more information about varying the channel offline.

When the channel has been isolated from the mainframe in accordance with the data center's requirements, you can begin installation.

Installation Steps

Because the CAB requires power, you need to install it near a power outlet receptacle. Follow these steps to install the CAB, as shown in Figure 3-4.

1. Set the Enable/Disable switch to ENABLE.
2. Connect the CAB to the CHANNEL-IN cable.
3. Connect the power supply to the CAB. Be sure to tighten the cable's coupler ring to secure the cable to the CAB. Then use the power cord to connect the power supply to an electrical outlet.

4. Run the CAB diagnostics described in your Barr software manual. (You can run the diagnostics only when the CAB is not connected to the mainframe.)

5. Attach the CAB to the channel with Bus & Tag cables.

6. If the CAB is the last device in the chain, install Bus & Tag terminators in the Bus Out and Tag Out plug receptacles.

7. Request that mainframe personnel return to service the addresses assigned to all devices on the channel and place into service the address assigned to the CAB.

The computer has no connection to the mainframe until both of these conditions are met:

- The Barr software is up and running.
- The CAB is switched to ENABLE.

FIGURE 3-4
Make sure the gray connector plugs into the outbound connector.
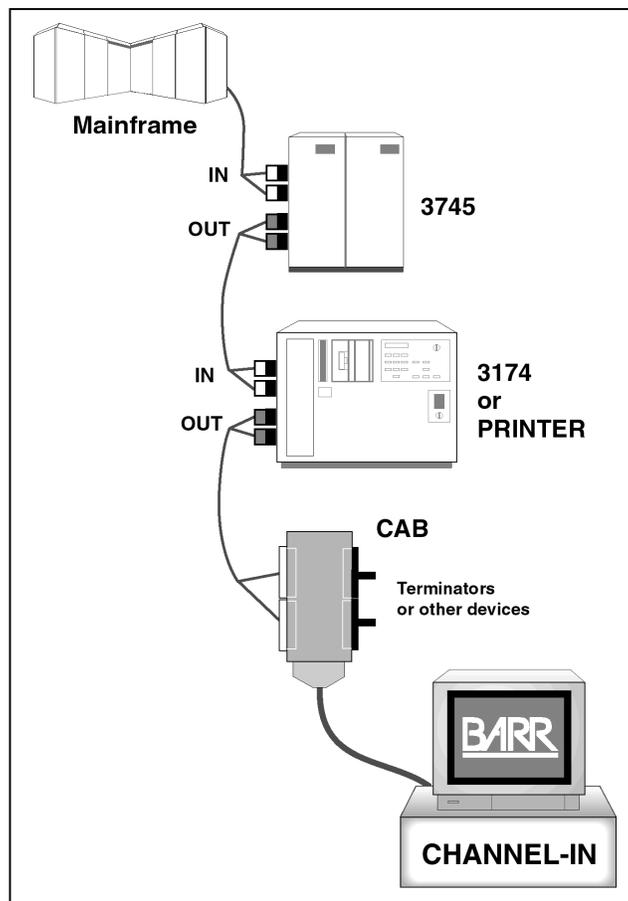
Notes:

A. CAB Power Supply Specifications

You need to install the CAB near a properly grounded outlet receptacle so you can plug in the power supply.

CAB power supply

To remove power, disconnect the input power plug.

For 120V connection: Use a UL-listed type SJT or SVT 3-Conductor, 18 AWG power supply cord terminating in a molded-on plug cap rated 125 VAC 15 A minimum, with a minimum length of 1.8 meters (6 feet).

For 220-240V connection: Use an international harmonized, 300V rated, PVC-insulated jacket, three conductors of 0.75 mm² minimum cross-sectional area each with a molded-on plug cap marked with the proper agency marking for the country it will be used in. Agency marks are as follows:
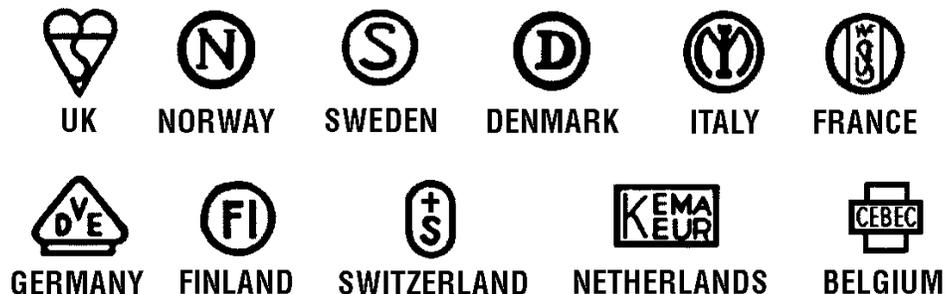
Notes:

B. Priority of Channel Devices

The Priority switch setting and the physical placement of each device on the channel determine the device's priority. The mainframe will first service devices set to HIGH priority. When two or more devices are set to the same priority, physical placement on the channel determines which device the mainframe services first.

The priority switch for each device determines whether the device will respond to the Select Out or Select In signal (see Figure B-1).

FIGURE B-1
The Select Out and Select In signals are electrically retransmitted from channel device to channel device.
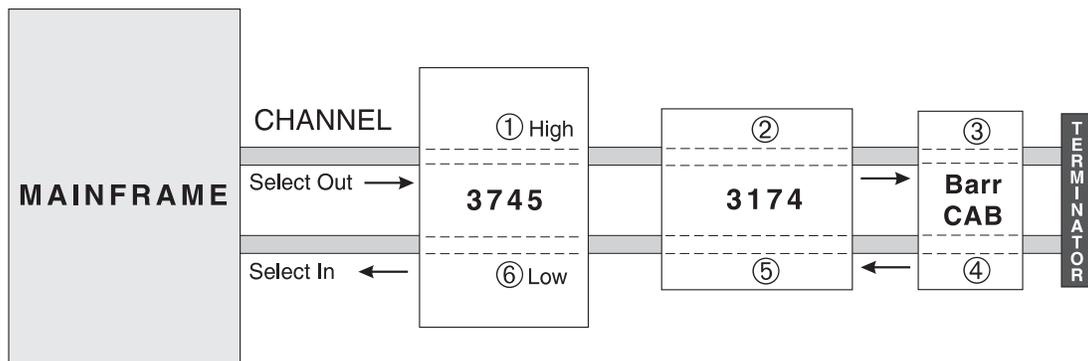
The mainframe raises Select Out when a channel device signals that it wants to begin communications. The mainframe signal passes from channel device to channel device along the Select Out line and then returns from channel device to channel device along the Select In line. A channel device that is ready to begin communication with the mainframe will not pass the Select signal to the next channel device until it has completed communication with the mainframe.

The channel device positioned first on the channel and set to HIGH priority receives the Select signal and responds to it first. It takes priority over the other devices on the channel.

The figure above illustrates how the channel device locations and the priority switch settings affect the order in which devices are serviced.

When all channel devices are set to HIGH priority, they receive the Select signal according to their proximity to the mainframe. The device closest to the mainframe receives the signal first, so it has the highest priority. In the figure, the devices receive the Select signal at points

①, ②, and ③ along the Select Out line. The 3745 device has the highest priority and the Barr CAB has the lowest priority.

If all devices are set to LOW priority, the last device has the highest priority. The Select Out line is looped back through the terminator and becomes the Select In line. The devices then receive the Select In signal in reverse order of their proximity to the mainframe. The device closest to the mainframe receives the Select signal last and thus has the lowest priority. In the figure, the Barr CAB takes priority over the other devices. The CAB receives the Select signal at point ④, the 3174 device receives the Select signal at point ⑤, and the 3745 receives the Select signal at point ⑥.

C. Vary the Channel Offline and Online

The channel and all channel devices must be offline when you install the CAB. The commands for varying the channel offline and online depend on your mainframe operating system. The example commands in this section are for MVS.

Before you install the CAB, request that mainframe personnel vary offline the addresses assigned to all devices on the channel. For MVS, mainframe personnel must first vary the devices offline and then vary the path offline. If a device is in use or is allocated by a mainframe subsystem (such as JES or VTAM), the system will not place the path offline.

After you install the CAB, ask mainframe personnel to vary online the same addresses. For MVS, mainframe personnel must first vary the path online and then vary the devices online. When a device is taken offline by a Vary command it can be placed online only by another Vary command.

TABLE C-1
Example commands

Command	Description
`V PATH01-F1,OFFLINE`	Places paths `01` through `F1` offline.
`V PATHFF,ONLINE`	Places path `FF` online.
`V NET,INACT,ID=BARR700`	Deactivates the physical units and logical units at node `BARR700`.
`V NET,ACT,ID=BARR700,SCOPE=ALL`	Activates node `BARR700` and subordinate resources.

See the IBM publication *VTAM Operation* (SC31-6420) for more information about the Vary command.

Notes:

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The following is a declaration of conformity for the European community.

DECLARATION OF CONFORMITY
(In accordance with EN 45014)

We,

Barr Systems Inc.
4500 NW 27th Ave.
Gainesville, FL 32606

declare under our sole responsibility that the product,

Type of Equipment: Channel BT Adapter
Model Number: CHANNEL IN / CHANNEL OUT (Rev 3)

to which this declaration relates is in conformity with the following
standards or other normative documents:

EMC: EN 55022 (1998) Class A
EN 55024 (1998)
IEC 1000-4-2 (1995)
IEC 1000-4-3 (1995)
IEC 1000-4-4 (1994) / EN 61000-4-4 (1995)
IEC 1000-4-5 (1995) / EN 61000-4-5 (1995)
IEC 1000-4-6(1996) / EN 61000-4-6 (1996)
IEC 1000-4-8(1994) / EN 61000-4-8 (1994)
IEC 1000-4-11(1994) / EN 61000-4-11(1994)

following the provision of EMC directive 89/336/EEC.

Gainesville, FL 32606   USA

Al Hodges   11/7/00
Signature and Date

Al Hodges   VP of Development
Typed Name and Title

European Contact:

Al Hodges   VP of Development
Typed Name and Title

European Contact:

Notes:

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Glossary

adapter
Add-on piece of equipment you can plug into a computer to allow the computer to connect to another device.

BIOS
Acronym for Basic Input/Output System. Program(s) permanently stored in read-only memory (ROM) chips on your computer's system board.

Bus & Tag cables
Cables used to connect devices to mainframe channels. The bus cable transmits data and the tag cable controls the information on the bus.

CAB
Acronym for Channel Attach Box. Allows you to electronically isolate the computer from the mainframe channel and from other devices on the channel.

channel
Functional unit that directs the flow of information between control units and main storage.

channel command word (CCW)
One or more CCWs make up the channel program that directs data channel operations.

command
Something you instruct the computer to do, such as run a program.

daisy chain
A method of interconnecting a series of devices, such as printers.

data rate
The rate at which data can be moved between a device and a control unit during the data transfer portion of an I/O operation.

data streaming
The uninterrupted transfer of information over an interface to achieve high data transfer rates (for channel data streaming, 3 or 4.5 MBps). Data streaming is not adversely affected by signal delays introduced by long cable lengths.

DCI
Acronym for Direct-Coupled Interlock. A type of channel data transfer that can achieve data rates of up to 1.5 MBps. DCI Single Tag uses one signal pair (Service In, Service Out). DCI High Speed Transfer uses two signal pairs (Service In, Service Out, and Data In, Data Out).

device address
A number that uniquely identifies a device.

diagnostics
A program to detect and isolate errors in programs and faults in equipment.

DMA
Acronym for Direct Memory Access. A technique for moving data directly between main storage and peripheral equipment without requiring the processing unit to process the data.

host computer
A computer that controls the communications network and has databases and large computing and memory capacity. Other computers can connect to the host to share its resources.

HST
Acronym for High-Speed Transfer. A type of channel data transfer that uses two signal pairs (Service In, Service Out, and Data In, Data Out).

IRQ
Acronym for Interrupt Request. A request for processing on a particular priority level.

ISA
Acronym for Industry Standard Architecture. A standard for the computer's expansion bus (where you plug in add-on adapters).

LED
Acronym for Light-Emitting Diode. A semiconductor that converts electrical energy into light, used, for example, for the activity lights on computer disk drives.

mainframe
Term used for a large central computer that offers a full set of computing services. The term originated in the days when the central processor, memory, and input/output channels were located in one central housing called the mainframe. Synonymous with host computer.

MBps
Abbreviation for megabytes per second.

megabyte
One million bytes (more accurately, 1,048,576 bytes).

PCI
Acronym for Peripheral Component Interconnect. Standard for a high-performance, 32-bit or 64-bit computer local bus with multiplexed address and data lines. Enables fully automatic configuration of add-on adapters.

terminator plug
A part that ends the cable path on a computer system. The terminating plug is attached to the last device in a series.

VAC
Acronym for Volts Alternating Current. The measure of the peak-to-peak voltage swing of an electrical signal.

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