10/100 EtherJet PCI Adapter
10/100 EtherJet PCI Adapter with Wake on LAN

Installation and User's Guide

IBM

Note

Before using this information and the product it supports, be sure to read the general information under Appendix, “Notices” on page A-1.

Third Edition (March 1998)

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Contents

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Upozornění: než zahájíte instalaci tohoto produktu, přečtěte si nejprve bezpečnostní informace v pokynech „Bezpečnostní informace“ č. 21-0030. Tato brožurka popisuje bezpečnostní opatření pro kabeláž a zapojení elektrického zařízení.

 **Fare!** Før du installerer dette produkt, skal du læse sikkerhedsforskrifterne i *NB: Sikkerhedsforskrifter—Læs dette først* SD21-0030. Vejledningen beskriver den fremgangsmåde, du skal bruge ved tilslutning af kabler og udstyr.

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| 

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| Säkerhetsföreskrifter— Läs detta först,* SD21-0030. Där beskrivs hur
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| 

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注意：

請先閱讀 - 安全資訊 SD21-0030

此冊子說明插接電器設備之電纜線的安全程序。

About This Manual

This manual contains instructions for installing and setting up the device drivers for the following adapters:

- IBM 10/100 EtherJet PCI Adapter
- IBM 10/100 EtherJet PCI Adapter with Wake on LAN

Included is a product overview and a description of some of the common installation problems and recommended solutions.

Note: The illustrations in this publication might be slightly different from your hardware.

This manual is intended for adapter installers and network administrators.

How This Manual Is Organized

This manual contains the following chapters and appendixes:

- Chapter 1, “Introducing the Adapters” provides an introduction to the adapters. A description of the adapter kit contents, the Wake on LAN feature, the Adapter Fault Tolerance feature, the DHCP/RPL option, the installation checklist, and help sources are included.
- Chapter 2, “Installing the Adapter Hardware” provides instructions for removing the cover and cables for your PC and for locating the required components. Safety precautions and handling techniques are discussed, along with the required procedures for installing the adapters.
- Chapter 3, “Dynamic Host Configuration Protocol and Remote Program Load” provides information for installing and programming the Remote Program Load and Dynamic Host Configuration Protocol (DHCP/RPL) option on the 10/100 EtherJet PCI Adapters.
- Chapter 4, “Testing Your Adapters and Installing Device Drivers” provides information about how to use the help files on the

Diagnostics and Help Diskette to test your adapters and install your device drivers.

Note: You can access the Diagnostics and Help Diskette to obtain instructions for loading the device drivers from the Device Driver Diskette. See “Help Files” on page 1-6 for more information.

A description of common problems and recommended solutions, PCI installation tips, and related technical topics are included.

- Appendix, “Notices” contains IBM notices and trademark information.

Changes Since the Second Edition

| The following information has been added:

| • Information about adapter Fault Tolerance feature (see “About the Adapter Fault Tolerance Feature” on page 1-3)

| • DHCP/RPL Remote Boot Option (see “About DHCP/RPL Support with the Adapters” on page 1-4)

| • On-board bootprom chip on LC 2.1 (see “Adapter Overview” on page 1-1)

Chapter 1. Introducing the Adapters

This manual contains the information you need to install and use the following products:

- IBM 10/100 EtherJet PCI Adapter
- IBM 10/100 EtherJet PCI Adapter with Wake on LAN

This chapter describes the adapters, the contents of the adapter kits, and other materials you need to install these adapters. Topics include:

* DHCP support means Pre-Execute Environment (PXE) remote boot with Intel's LANDesk Service Agent (LSA) code in Dynamic Host Configuration Protocol (DHCP).

It is important that you are familiar with the PC in which either of the adapters will be installed and with the PC's operating system and network software.

These adapters use the same drivers and software utility. Therefore, most of the information in this manual applies to both adapters interchangeably. Where the information differs, it is noted.

Adapter Overview

The IBM 10/100 EtherJet PCI Adapters pave the way to higher bandwidth operation and improved network performance, without disrupting your existing infrastructure. It is easy to use these Plug and Play, 32-bit Busmaster adapters. Designed for flexibility, they run at 10 Mbps or 100 Mbps in full- or half-duplex mode to support a

variety of network configurations, ranging from conventional 10BASE-T to Fast Ethernet environments.

The adapters:

- Operate in shared 10BASE-T or 100BASE-TX environments as well as in switched 10 Mbps and 100 Mbps Ethernet networks
- Run at either 10 Mbps or 100 Mbps in full-duplex mode, yielding 20-Mbps and 200-Mbps capacity, respectively
- Attach to 10-Mbps and 100-Mbps LANs with a single RJ-45 connector
- Operate in symmetrical multiprocessing (SMP) environments
- Display the status of link, activity, and 100-Mbps operation via LEDs
- Support Novell NetWare 3.12 or higher, IBM OS/2 LAN Server, Microsoft LAN Manager, Windows for Workgroups 3.11, Windows NT 3.51 or higher, Windows 95, PC97 compliance and Windows 98, SCO Open Desktop 3.0, SCO Open Server 5.0, and SCO UnixWare 2.1
- The 10/100 EtherJet PCI Adapter with Wake on LAN supports the IBM Wake on LAN function in Wake on LAN PCs.
- The Boot ROM module is a standard feature for the 10/100 EtherJet PCI Adapter with Wake on LAN. The card comes with an on-board ROM pre-flashed with Intel LANDesk Service Agent code (LSA code) for Dynamic Host Configuration Protocol (DHCP) remote boot ready. For the Remote Program Load (RPL) remote boot, a flash utility disk is available for re-flashing the ROM to RPL code.
- For 10/100 EtherJet PCI Adapter, an optional ROM Module kit (PN 86H2856) is available for your DHCP or RPL remote boot applications.

Using the Wake on LAN Feature

The Wake on LAN feature can be disabled or enabled using your system configuration utility. Refer to your PC documentation for details.

Power for the 10/100 EtherJet PCI Adapter with Wake on LAN is always ON when the PC is connected to ac power, regardless of the PC ON/OFF switch. When the PC power is OFF, this adapter constantly monitors the LAN for the wake-up frame that requests power to be applied to the PC.

The wake-up frame can be a broadcast or an individually addressed frame. The following data is required and can occur anywhere in the data portion of the wake-up frame.

- 6 bytes of X'FF', followed by
- 48-bit universally administered address (UAA or MAC address) of the adapter to be woken up, repeated eight or more times. Eight repetitions are required; more than eight are acceptable.

If you are not familiar with Wake on LAN operation, you can refer to the following World Wide Web based documents:

- *Wake on LAN* at **http://www.pc.ibm.com/infobrf/iblan.html**
- *Wake up to Wake on LAN* at **http://www.networking.ibm.com/eji/ejiwake.html**

About the Adapter Fault Tolerance Feature

Adapter Fault Tolerance (AFT), also known as redundant NIC, is a simple, effective, and fail-safe approach to increase the reliability of server connections. AFT gives you the ability to set up link recovery to the server adapter in case of a cable, port, or network interface card failure. By assigning two IBM 10/100 EtherJet PCI Adapters as a team, AFT enables you to maintain uninterrupted network performance. For further AFT details, read the AFT.TXT help file in the A:\INFO\GENERAL directory of the Diagnostics and Help diskette.

About DHCP/RPL Support with the Adapters

With the on-board ROM on the 10/100 EtherJet PCI Adapter with Wake on LAN, or the optional ROM module on the 10/100 EtherJet PCI Adapter, the following support and features are provided:

- The adapters can support DHCP remote boot with DHCP flash code or RPL remote boot with RPL flash code.
- The DHCP LANDesk Service Agent (LSA) code supports both Intel's LANDesk Configuration Manager (LCM) and the IBM LAN Client Control Manager 2.0 (LCCM 2.0).

  The RPL code supports only the IBM LAN Client Control Manager 1.1 (LCCM 1.1).
- The flash diskette provided gives you the option to load the Flash Module with DHCP code or with RPL code.

  You can download this diskette from the Web at: **http://www.networking.ibm.com/nes/nesether.htm**.

  Select **EtherJet 10/100 PCI Adapters** and then look for the DHCP/RPL flash diskette ETPFLSH.EXE.

For further information regarding the DHCP/RPL option, see Chapter 3, “Dynamic Host Configuration Protocol and Remote Program Load.”

Prerequisite Operating System PCI Updates

Please check with your operating system supplier for the latest information concerning required updates to support PCI adapters. Some currently available operating systems are not PCI-aware, so the device drivers for the IBM 10/100 EtherJet PCI Adapters are written to the PCI architected BIOS or register-level interfaces.

Help is available to guide you through manual installation in these environments. (“Help Files” on page 1-6 describes how to access help information.)

Kit Contents

Along with this manual, the adapter kits contains:

- The IBM 10/100 EtherJet PCI Adapter or the 10/100 EtherJet PCI Adapter with Wake on LAN
- Diskette 1 containing device drivers and Diskette 2 containing diagnostics and help files
- *Caution: Safety Information—Read This First* booklet

In addition to the items listed here, the 10/100 EtherJet PCI Adapter with Wake on LAN kit contains two Wake on LAN cables.

If any item is missing or damaged, contact your place of purchase.

Adapter Installation Checklist

To install either adapter, complete the following steps in order. You might want to mark this page for easy retrieval or make a copy to use for reference.

__ 1. Preparation

   Check the kit contents list on page 1-5.

   In addition to the publications shipped with the adapter, you will need:

   - The manual provided with your PC
   - The manual provided with your network operating system or network application
   - Your operating system and network application software

__ 2. Installing the adapter. See the instructions on page 2-1.

| __ 3. Installing the DHCP/RPL option. See the instructions in 3-1.

__ 4. Refer to the help files on your Diagnostics and Help diskette for:

   - Information about testing the adapter
   - Procedure for installing device drivers
   - Other technical details

See “Help Files” on page 1-6 for more information.

Help Information

This includes help files and IBM product support.

Help Files

The help files provide detailed information about the IBM 10/100 EtherJet PCI Adapters. Instructions on how to load the device drivers from the Device Drivers Diskette are also included.

To view the help files, insert the Diagnostics and Help diskette in drive A, switch to that drive, and from a DOS prompt enter:
setup /readme

Topics include:

- Latest news and general adapter information
- Hardware specifications and cabling information
- Testing the adapter
- Installing device drivers
- Running diagnostics and error messages

IBM Product Support

The following IBM product support is available:

- Download the code from the **Internet** or the IBM Bulletin Board System

  You can download the latest drivers and related code from the IBM **Internet** or the BBS. If you are outside the United States or Canada, contact your IBM marketing representative for BBS information.

- **World Wide Web**:
  - On a Web browser:

    1 Access URL
    http://www.networking.ibm.com/nes/nesether.htm

2. Select **EtherJet 10/100 PCI Adapters**.

   You now have access to all the latest drivers and related code for the IBM EtherJet 10/100 PCI Adapters. For other information regarding these adapters and other IBM Networking products, select **Network Environment Support** or **IBM Networking**.

   – FTP as Anonymous to **lansupport.raleigh.ibm.com**, directory **/pubs/products/lanprods/ethernet**

Note: At the date of this publication, the BBS telephone number and Internet Server address are current. If you find that either the telephone number or the Internet address is not available, check the README file to see whether a new number or address is available. ("Help Files" on page 1-6 describes how to access this information.)

- IBM PC Company Bulletin Board System (BBS). For a new or updated version of the installation code or the drivers:
  - 1-919-517-0001 (Directory 32) for the United States
  - 1-604-664-6464 for Vancouver
  - 1-416-956-7877 for Toronto
  - 1-514-938-3022 for Montreal
  - 1-905-316-4255 for Markham
- IBM product support:
  - 1-800-426-7299 for Options by IBM HelpCenter
  - 1-800-237-5511 for IBM Support Services
  - 1-800-722-2227 for IBM HelpCenter
  - 1-800-565-3344 for HelpPC (Canada)

Chapter 2. Installing the Adapter Hardware

This chapter contains information to assist you in installing the IBM 10/100 EtherJet PCI Adapter or 10/100 EtherJet PCI Adapter with Wake on LAN. Topics include:

Before starting, you should review the following information:

- Chapter 1, "Introducing the Adapters"
- Appendix, "Notices" on page A-1
- The safety information in your PC manual concerning adapter installation

Installing the Adapter

1. In the manual provided with your PC, locate the instructions for installing an adapter. Be sure to follow any safety instructions in that manual.

2. Switch OFF the PC and all connected devices.

3. Remove the power cord from the outlet.

   Note: In the U.K., by law, the telephone line cable (if connected) must be disconnected before the power cord.

4. Remove all cables from your PC to the connected devices.

   Note: Make sure to label the cables for correct reconnection later.

5. Follow the instructions provided in your PC manual for removing the cover or otherwise accessing the adapter slots.

   If you are installing the IBM 10/100 EtherJet PCI Adapter without the Wake on LAN feature, continue with step 6 on page 2-2.

If you are installing the IBM 10/100 EtherJet PCI Adapter with Wake on LAN, go to “Connecting Your Wake on LAN Cables” on page 2-4.

6 Remove the screw and cover for the appropriate PCI Busmaster-capable expansion slot. (Refer to your PC manual.) Keep the cover to use again if you remove the adapter.

7 Place the adapter in the slot.

Note: Most PCI slots in PCs are Busmaster-enabled, but some are not. If you have configuration problems, refer to your PC manual.

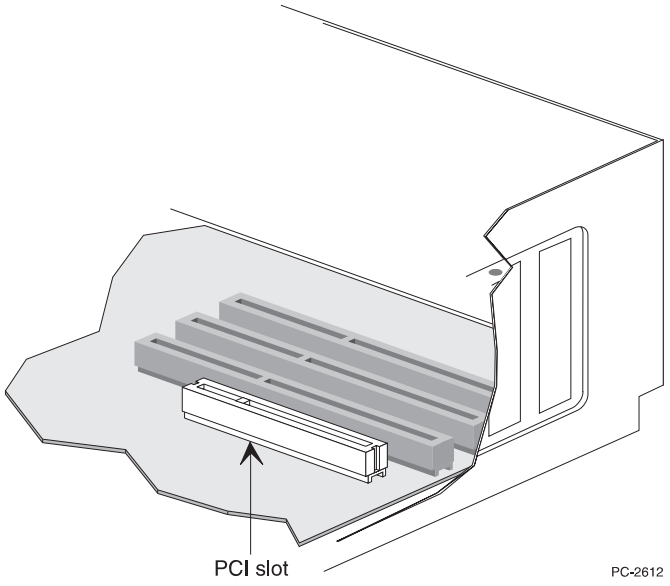


Figure 2-1. PCI Slot Illustration

8 Push the adapter into the slot until the adapter is seated firmly. Secure the adapter bracket with a screw.

9 If you are installing more than one adapter, repeat steps 6, 7, and 8 for each adapter you want to install.

Otherwise, go to step 10.

Note: Only one adapter per PC can be connected and used as a Wake on LAN adapter.

10 Replace the cover on the PC, connect the cables to the connected devices, connect the signal cables to the receptacles, and finally, connect the power cord to the outlet.

Note: In the U.K., by law, the power cord must be connected before the telephone line cable.

11 Connect a twisted-pair Ethernet category 3 or category 5 cable to the adapter and to your Ethernet outlet. See “Using the Correct Adapter Cable” for more information.

Notes:

a. If you use the 10/100 EtherJet PCI Adapter with Wake on LAN and connect the cables as described, the LNK LED should be lit even if the PC is powered off. This indicates that the Wake on LAN power cable has been correctly connected to your adapter.

b. To use Wake on LAN, you must enable the Wake on LAN function in your system configuration. Refer to your PC documentation for more information.

12 Switch ON the connected devices and the PC.

13 Step 2 of the Adapter Installation Checklist is now complete.

If you want to run the adapter diagnostics at this point, see Chapter 4, “Testing Your Adapters and Installing Device Drivers” for details.

Using the Correct Adapter Cable

To reliably operate your network at 100 Mbps, you must use category 5 Data Grade cabling with this adapter. Although category 3 or 4 cabling might work initially, it will soon cause data loss. For more information, see the Hardware Specifications and Cabling topic on the Diagnostics and Help diskette. (“Help Files” on page 1-6 describes how to access this information.)

You can use category 3, 4, or 5 cabling at 10 Mbps.

Note: The adapter Ethernet address is printed on a sticker on the edge of the adapter as shown in Figure 2-2. The Ethernet address is sometimes called the *Node address* or the *MAC address*. This unique, 12-digit hexadecimal address was stored in the adapter memory at the factory.

You can use this address to match the adapter to the slot number when configuring multiple adapters.

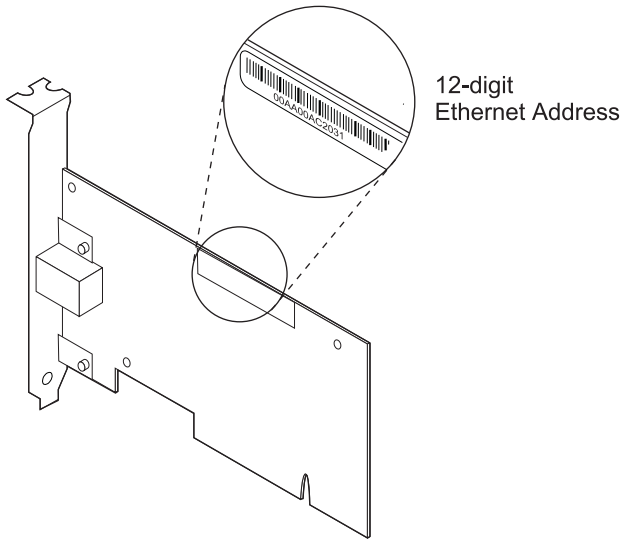


Figure 2-2. Ethernet Address Location

Connecting Your Wake on LAN Cables

There are two ways to connect the 10/100 EtherJet PCI Adapter with Wake on LAN to the PC to enable the Wake on LAN function. Depending on your PC, you might need either:

- A 2-way combined Wake on LAN signal and power cable (IBM PN 08L2559) as shown in Figure 2-3 on page 2-5, to be used between the adapter and PC model that has a combined signal

and power connector for Wake on LAN. The two ends of this cable are identical and thus are interchangeable.

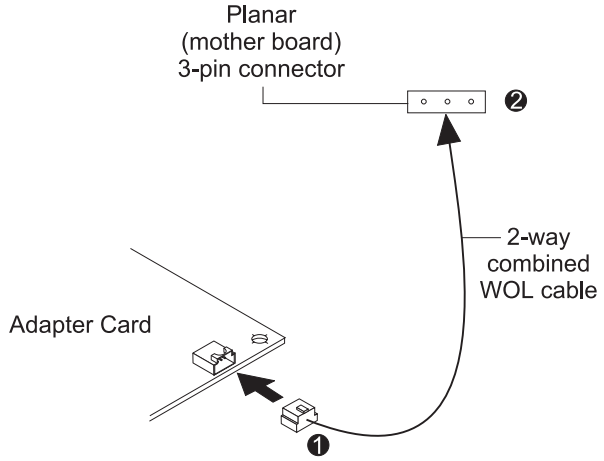


Figure 2-3. Connecting the Combined Signal and Power Cable to Your PC

- A 3-way combined Wake on LAN signal and power cable (IBM PN 08L2558) as shown in Figure 2-4 on page 2-6, to be used between the adapter and PC model that has separate signal and power connectors for Wake on LAN. On this cable, the end that has a single female connector is for the adapter connection. The other end, with one male connector and one female connector, is for the PC connection.

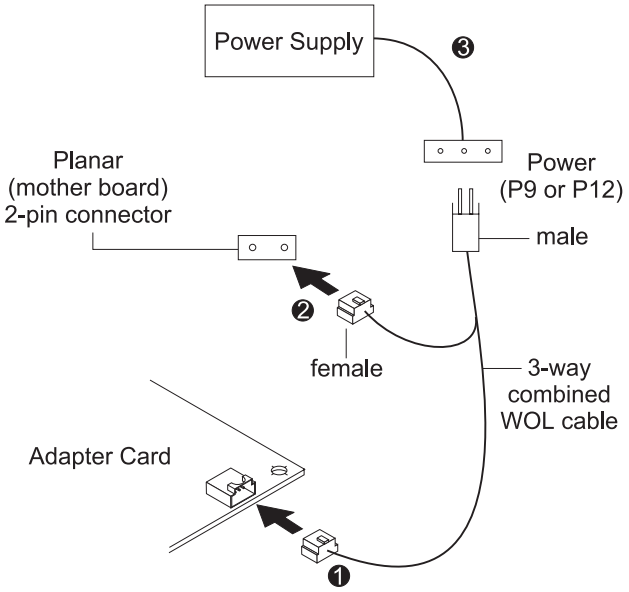


Figure 2-4. Connecting the Signal and Power Cables to Your PC

For your convenience, both Wake on LAN signal cables are included in your adapter kit.

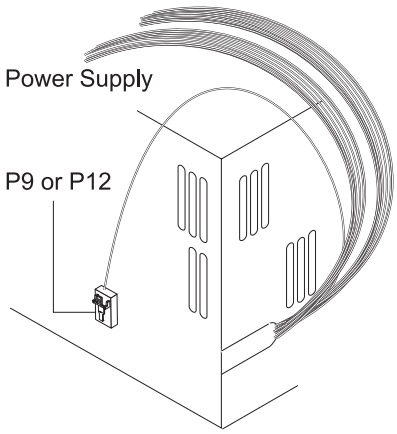
Important

Ensure that your PC is unplugged from the electrical outlet before installing or removing this adapter. Wake on LAN capable PCs always supply power to the connector, which attaches to the adapter, even when the PC appears to be in the powered OFF state.

To prepare your PC for adapter installation and to determine which cable to use:

1 Perform steps 1 through 5 on page 2-1. .

2 Locate the power supply for your system (see Figure 2-5 on page 2-7).



| *Figure 2-5. PC Power Supply*

| **3** If your PC power supply has a power cable labelled **P9** or **P12**,
| as shown in Figure 2-5, continue with "Connecting the 3-Way
| Combined Wake on LAN Cable."

| Otherwise, go to "Connecting the 2-Way Combined Wake on
| LAN Cable" on page 2-9.

| Connecting the 3-Way Combined Wake on LAN Cable

| It is important that you perform these steps in the order shown.

| To install the Wake on LAN feature using the separate Wake on LAN
| cable (IBM PN 08L2558):

| **1** Connect the single female end of the 3-way combined Wake
| on LAN cable to the Wake on LAN 3-pin connector on the
| adapter, as shown in Figure 2-4 on page 2-6.

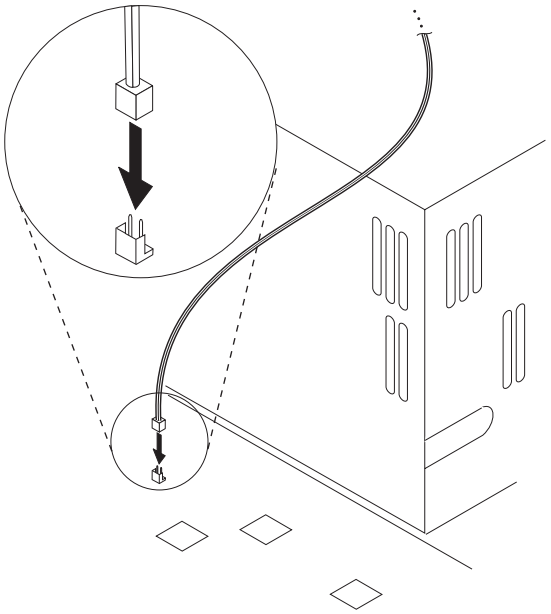


Figure 2-6. PC Wake on LAN Signal Connector (Two Pin)

2 Install the adapter as described in steps 6, 7, and 8 on page 2-2.

3 With your PC cover off, locate the 2-pin Wake on LAN signal connector on the PC planar as shown in Figure 2-6. On the male-female end of the 3-way cable, connect the female connector to the PC 2-pin Wake on LAN signal connector. Make sure that the cable is below the riser bracket so that it does not become dislodged or damaged when you close or open the PC cover.

| **4** Then, also on the male-female end of the 3-way cable, connect the male connector to the PC Wake on LAN power cable (marked **P9** or **P12**).

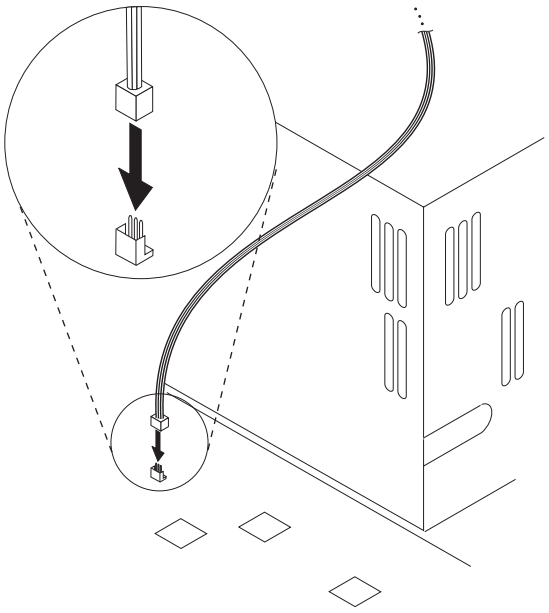
| **5** Go to step 9 on page 2-2 to complete the installation.

| Connecting the 2-Way Combined Wake on LAN Cable

| It is important that you perform these steps in the order shown.

| To install the Wake on LAN feature using the 2-way combined Wake | on LAN cable (IBM PN 08L2559):

| **1** Connect one end of the 2-way combined Wake on LAN cable to the Wake on LAN 3-pin connector on the adapter as shown in Figure 2-3 on page 2-5.



| *Figure 2-7. PC Wake on LAN Signal Connector (Three Pin)*

| **2** Go to step 6 on page 2-2 to proceed with the adapter installation.

3 With your PC cover off, locate the 3-pin Wake on LAN connector on the planar, as shown in Figure 2-7. Connect the other end of the 2-way combined Wake on LAN cable to this 3-pin connector. Make sure that the cable is below the riser bracket so that it does not become dislodged or damaged when you close or open the PC cover.

4 Go to step 9 on page 2-2 to complete the installation.

Chapter 3. Dynamic Host Configuration Protocol and Remote Program Load

This chapter provides instructions for installing and programming the Dynamic Host Configuration Protocol and Remote Program Load (DHCP/RPL) Option on the IBM 10/100 EtherJet PCI Adapters.

In this chapter, the DHCP/RPL Option is referred to as the Flash module.

About the Flash Module

The DHCP and RPL ROM for IBM 10/100 EtherJet PCI Adapter Option (IBM PN 86H2856) contains the following items:

- The Flash module (IBM PN 31F2093)
- The IBM 10/100 EtherJet PCI Adapter DHCP/RPL Flash Utility Diskette (IBM PN 01L1949)

The Flash module is supported by the following IBM adapters:

- The IBM 10/100 EtherJet PCI Adapter (IBM PN 08L2549, FRU PN 08L2550)
- The IBM 10/100 EtherJet PCI Adapter (IBM PN 86H2432, FRU PN 86H2423)
- The IBM 10/100 EtherJet PCI Adapter with Wake on LAN (IBM PN 85H9921, FRU PN 85H9928)

  Note: The IBM 10/100 EtherJet PCI Adapter with Wake on LAN (IBM PN 08L2565, FRU PN 08L2566) comes with on-board ROM pre-flashed with LSA 2.0 code for DHCP-boot ready.

Installing the Flash Module

The instructions in this section guide you through the installation and programming of the module for correct operation.

The module must be correctly installed in the IBM 10/100 EtherJet PCI Adapter.

Note: The Flash module is not programmed: it is blank.

1 If the adapter is installed in a computer, remove the adapter from the computer by following the installation instructions in reverse order. Use the installation instructions in the adapter installation manual.

2 Place the adapter on a flat surface, component side up. The arrow in Figure 3-1 indicates the socket location for the Flash module.

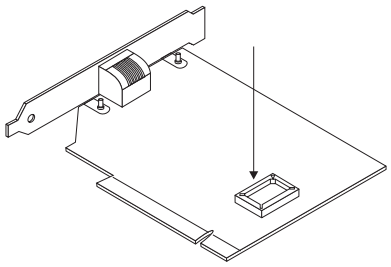


Figure 3-1. 10/100 EtherJet PCI Adapter

3 The Flash module has one corner that is angled. Align the angled corner with the arrow, as illustrated in Figure 3-2.

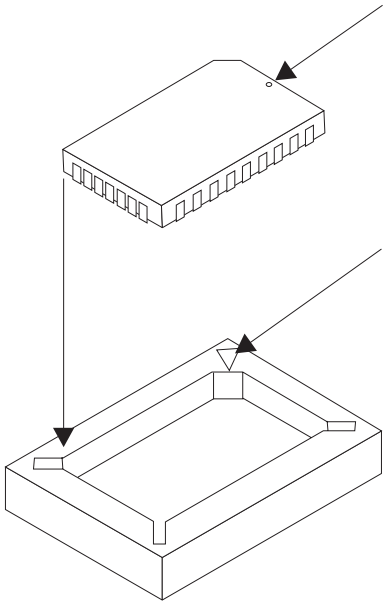


Figure 3-2. Match the Notches

4 Carefully insert the pins into the socket. Be sure to align the pins on the module with all the pins in the socket.

5 When all the pins are aligned, press on the top of the module until it is fully seated.

6 Examine the module from all sides to be certain that all pins are seated in the socket.

7 Install the adapter card in your computer, following the installation instructions in your adapter installation manual.

Programming the Flash Module

The Flash Module and adapter must already be installed before you can program the Flash Module.

You must also configure your PC to start up from the network in order for the DHCP or RPL process to work. See your PC documentation for more information about configuring start-up options.

Note: Only one adapter in your system can be programmed with the DHCP or RPL image. Only one adapter performs the DHCP or RPL boot operation.

1 Insert the Flash Utility diskette in your PC diskette drive and power on your system.

Note: The Flash Utility Diskette is a bootable diskette. Booting from diskette is the default configuration for most PCs. If the configuration for your PC has been changed, it must be configured so that the diskette drive is the device from which a boot is attempted. See your PC documentation for more information about configuring start-up options.

The Flash Utility will run an automatic test to verify that there is a valid, working adapter installed in your PC.

If the test fails, verify that you are using one of the IBM adapters that supports this Flash module. If you are using a valid adapter, refer to the adapter's installation and user's guide for additional testing and debugging information.

2 Select one of the following options:

DHCP Selects a DHCP boot
RPL Selects an RPL boot
Erase Erases the Flash
Cancel Exits the utility

After you make your selection, the utility automatically installs the selected image from the utility diskette onto the Flash module.

3 Remove the utility diskette from the diskette drive.

4 Reboot your PC when the utility prompts you to.

RPL Configuration

The RPL function enables a client computer to be booted by a server through the client's network adapter. The following requirements must be met in order for an RPL to occur.

- A LAN server that is configured for RPL support must be active on the network. Supported servers include:
  - IBM OS/2 LANServer 3.0 or higher
  - Novell NetWare 3.12 or higher
  - Windows NT 3.51 or higher
- The adapter in the client computer must have the RPL feature installed.
- This RPL feature supports IBM LAN Client Control Manager 1.1 (LCCM 1.1).

  Notes:

  1. The RPL feature can be enabled on only one IBM 10/100 EtherJet PCI Adapter in any computer.
  2. If the DHCP/RPL Flash module is installed in the IBM 10/100 EtherJet PCI Adapter and you program the Flash module as described in "Programming the Flash Module" on page 3-4, the adapter will attempt to RPL or perform a DHCP boot. This will happen every time your system unit boots.

  The RPL function for this adapter uses the IBM FIND/FOUND protocol to perform the remote program load. Refer to the *IBM Personal System/2 Remote Program Load for Ethernet Network User's Guide*, FN S15F-2292 for information about the FIND/FOUND protocol.

RPL Messages

When it is programmed with the RPL image, the Flash module displays two types of messages during its operation:

- "Error Messages"
- "Standard Messages" on page 3-7

Error Messages

These messages could be displayed if there are errors or malfunctions during RPL operation.

100 LAN Adapter cannot be found.

Operator Response: Be sure the correct adapter is being used. See "About the Flash Module" on page 3-1 for a list of supported adapters.

Verify that the adapter is correctly seated in its PCI slot and that the slot is enabled for Busmaster operation configuration.

Refer to the adapter's documentation for additional information about testing the adapter.

101 LAN Adapter was unable to initialize.

Operator Response: Be sure the correct adapter is being used. See "About the Flash Module" on page 3-1 for a list of supported adapters.

Verify that the adapter is correctly seated in its PCI slot and that the slot is enabled for Busmaster operation in the system's configuration.

Refer to the adapter's documentation for additional information about testing the adapter.

102 LAN Adapter could not be reset.

Operator Response: Be sure the correct adapter is being used. See "About the Flash Module" on page 3-1 for a list of supported adapters.

Verify that the adapter is correctly seated in its PCI slot and that the slot is enabled for Busmaster operation in the system's configuration.

Refer to the adapter's documentation for additional information about testing the adapter.

103 There are multiple LAN Adapters in the system. Please specify the correct serial number in NET.CFG.

Operator Response: Add the serial number of the adapter to the NET.CFG file.

107 LAN Adapter failed the media test. Please check the cable and reboot the system unit.

Operator Response: Verify that the network cable is correctly connected to the adapter and reboot the system to run RPL again.

Refer to the adapter's documentation for additional information about cabling.

Standard Messages

These messages could be displayed during standard RPL operation.

RPL-ROM-ADR: xxxx xxxx xxxx

Explanation: The values displayed in the place of xxxx xxxx xxxx indicate the 12-character hexadecimal node address of the installed adapter. This address might be required for your RPL server to respond to your adapter.

Operator Response: You might need to supply this address to your server.

RPL-ROM-ERR: BADA; RPL Halted

Explanation: This message indicates that the RPL server sent a File Data Response frame with a Locate or Transfer address that is not valid.

Operator Response: Check your server configuration and retry. On a NetWare server, set the ACK bind time parameter for this requester. Refer to your NetWare documentation for information on setting the ACK parameter.

RPL-ROM-ERR: DExx; RPL Halted

Explanation: This message indicates that an internal error occurred in the RPL function.

Operator Response: Retry the operation. If you still experience problems, refer to your adapter's installation manual for information about obtaining service for your adapter.

RPL-ROM-ERR: RPL failed; returning control to system BIOS.

Explanation: The RPL function failed. This message occurs only on certain systems that are enabled for Plug and Play. The reason for the failure appears in the message prior to this one on your computer's display. System control is being returned to the system BIOS.

Operator Response: Refer to the other messages on your computer display.

RPL-ROM-FFC: nnnn

Explanation: The values displayed in the place of nnnn represent a decimal field that indicates the number of find frames sent by the RPL function.

An excessive find-frame count indicates that the RPL server is not present, is not configured to respond to your adapter's address, or is congested. If the system unit in which your adapter is installed has specific support for Plug and Play boot devices, then a maximum number of 50 find frames will be sent. If no response is received before the maximum number is sent, then this is considered to be an RPL failure, and control is returned to the system. The system can then attempt to boot from other installed devices.

Operator Response: Verify that your server is connected to the same network as your RPL requester and that the server has been configured to respond to your adapter's RPL request.

RPL-ROM-HSM: nn

Explanation: An error has occurred in the RPL module's internal device driver. The error number nn identifies the specific error.

Operator Response: The error messages for this driver have the format IBMEINWx-yy-nnn, where

x Is either C for Client or S for Server

yy Is OS/2, DOS, or NW

nnn Corresponds to the number following the RPL-ROM-HSM: message prefix.

For example, if the message is RPL-ROM-HSM: 54, then look up message IBMEINWx-yyy-54. Take whatever action is recommended for the driver error.

RPL-ROM-IRQ: nn

Explanation: A decimal field that indicates the interrupt level being used by your adapter.

Operator Response: No action required.

RPL-ROM-PIO: xx

Explanation: A 2-byte, hexadecimal field containing the programmed I/O (PIO) address being used by your adapter.

Operator Response: No action required.

RPL-ROM-SEQ: nnnn

Explanation: A decimal field containing the number that specifies the last valid sequence number received from the LAN server. The sequence number is included in each frame of the image file sent by the server to the RPL requester.

Operator Response: No action required.

RPL-ROM-SFC: nnnn

Explanation: A decimal field indicating the number of Send File Request frames sent by the your adapter to the RPL server. An excessive number of Send File Request frames indicates that the RPL server is not responding after it has been found.

Operator Response: Check your RPL server configuration.

DHCP Configuration

THe DHCP (Dynamic Host Configuration Protocol) function provided with this Flash module enables a PC using an IBM 10/100 EtherJet PCI Adapter to download its configuration from a DHCP server. Among the information that can be downloaded from the DHCP server to a DHCP client is the IP address of the client, the subnet mask and the default gateway. The DHCP process uses the TCP/IP protocol. DHCP allows for dynamic allocation of client network addresses and configurations.

The following requirements must be met in order for the DHCP process to operate:

1. A DHCP server that is configured for DHCP client support must be active on the network. Supported servers are:
   - Intel LANDesk Configuration Manager (LCM). For additional information, point your web browser to http://www.intel.com.
   - IBM's LAN Client Control Manager 2.0 (LCCM 2.0). For additional information, point your web browser to http://www/us.pc.ibm.com.
2. The adapter in the DHCP client PC must have the DHCP feature installed. Use the Flash module to install the DHCP feature.

Notes:

1. The DHCP feature should be enabled on only one IBM 10/100 EtherJet PCI Adapter in any computer.
2. If the DHCP/RPL Flash module is installed in the IBM 10/100 EtherJet PCI Adapter and you program the Flash module as described in “Programming the Flash Module” on page 3-4, the adapter will attempt to RPL or perform a DHCP boot. This will happen every time your system unit boots.

Chapter 4. Testing Your Adapters and Installing Device Drivers

This chapter contains information to assist you in testing your adapters and installing device drivers for your network environment. Topics include:

Using the Help Files on the Diagnostics and Help Diskette

You can use the help files on the Diagnostics and Help diskette to guide you through the procedure for testing your adapters and installing the required device drivers for your operating system.

Note: You can view these files on a PC that does not have the 10/100 EtherJet PCI Adapter or 10/100 EtherJet PCI Adapter with Wake on LAN installed. For more information, see "Help Files" on page 1-6.

To access this information:

1. Start your PC without loading the drivers.

   If your PC already has the adapter's drivers installed, restart the PC without loading them.

   If the drivers are loaded from the AUTOEXEC.BAT file, add *REM* in front of each line that loads a driver. Or, you can also boot from a DOS disk so that the drivers are not loaded.

2. Insert the Diagnostics and Help diskette in drive A and switch to that drive. At a DOS prompt, enter **setup**

3. If you have more than one 10/100 EtherJet PCI Adapter or 10/100 EtherJet PCI Adapter with Wake on LAN in your PC, the Board menu is displayed.

a Select the adapter you want to work with.

b Press **Enter**.

4 Select **View Help Files**.

A list of help files is displayed.

5 Select **Getting Started** for an introduction and instructions on how to proceed.

Common Problems and Solutions

Table 4-1 describes common problems and suggested solutions.

Table 4-1 (Page 1 of 3). Common Problems and Solutions

Problem	Action
The SETUP.EXE program reports the adapter's interrupt as 0 or 255.	The PCI BIOS is not configuring the adapter correctly. See "PCI Installation Tips" on page 4-5 for more information.
The SETUP.EXEC program indicates that there is *No PCI Bus*.	The PCI BIOS is not configuring the adapter correctly. See "PCI Installation Tips" on page 4-5 for more information.
The PC halts when loading drivers.	Change the PCI BIOS interrupt settings. See "PCI Installation Tips" on page 4-5 for more information.
The diagnostics are completed successfully, but the connection fails.	• Ensure that the network cable is securely attached. • Ensure that you are using category 5 cabling when operating at 100 Mbps.

Table 4-1 (Page 2 of 3). Common Problems and Solutions

Problem	Action
LNK LED does not light.	• Ensure that you have loaded the network drivers. • Check all connections at the adapter and the hub. • Try another port on the hub. • If you forced duplex mode, ensure that you also force the speed to either 10 or 100 Mbps. • Ensure that the hub port is configured for the correct speed, 10 or 100 Mbps. • For Wake on LAN mode, the LNK LED is on even if the PC is powered off, indicating that the adapter is ready to receive a Wake on LAN packet. If the LNK LED does not light, verify that your Wake on LAN power cable is correctly connected. See "Connecting Your Wake on LAN Cables" on page 2-4 for more information.
ACT LED does not light.	• Ensure that you have loaded the network drivers. • If you suspect that the network might be idle, try sending data from the workstation. • Try another adapter if the adapter is not transmitting or receiving data.
Data is corrupted or sporadic.	Ensure that you are using category 5 cabling when operating at 100 Mbps.

Table 4-1 (Page 3 of 3). Common Problems and Solutions

Problem	Action
The adapter stopped working when another adapter was added to the PC.	• Ensure that the cable is connected to the 10/100 EtherJet PCI Adapter or 10/100 EtherJet PCI Adapter with Wake on LAN. • Ensure that your PCI system BIOS is current. • Try reseating the adapter. • See "PCI Installation Tips" on page 4-5 for more information.
The adapter stopped working without apparent cause.	• Try reseating the adapter or try a different slot. • If the network driver files are missing or might be corrupted, reinstall the drivers. • Try a different 10/100 EtherJet PCI Adapter or 10/100 EtherJet PCI Adapter with Wake on LAN.
The adapter does not respond to a Wake on LAN packet.	• Verify that the Wake on LAN cables are properly connected. See "Connecting Your Wake on LAN Cables" on page 2-4 for more information. • Ensure that your PC configuration has the Wake on LAN function enabled. See your system documentation for more information.

Related Technical Topics

This section contains additional technical topics of interest, such as:

- "PCI Installation Tips" on page 4-5
- "Fast Ethernet Cabling" on page 4-6
- "Fast Ethernet Hubs" on page 4-6

PCI Installation Tips

Some PCI PCs require additional steps to configure a PCI adapter. You might need to:

- Reserve interrupts (IRQs) or memory addresses or both for ISA adapters
- Enable the PCI slot and assign an IRQ

  In some PCI PCs, you must use the PCI BIOS setup program to enable the PCI slot and assign an IRQ. This is especially common in PCI PCs with the Phoenix BIOS.
- Update your PCI BIOS

  An updated PCI system BIOS can correct some PCI configuration problems. Contact your PC manufacturer to see whether an updated BIOS version is available for your PC. Phone numbers for the top PCI PC manufacturers are listed in the PCI Installation help file on the Diagnostics and Help diskette. (“Help Files” on page 1-6 describes how to access this information.)
- Configure the slot for level-triggered interrupts

  The slot the adapter is using must be configured for level-triggered interrupts rather than edge-triggered interrupts. Check your PCI BIOS setup program.

Table 4-2 describes some of the common PCI BIOS setup program parameters.

Table 4-2 (Page 1 of 2). PCI BIOS Setup Program Parameters

Parameter Names	Values
PCI slot #:	Slot where the adapter is installed
Master:	ENABLED
Subordinate:	ENABLED
Latency timer:	40
Interrupt:	Choose any one of several that the BIOS setup provides.

Table 4-2 (Page 2 of 2). PCI BIOS Setup Program Parameters

Parameter Names	Values
Edge-level:	Level

Note: Parameter names can vary with different PCs.

Fast Ethernet Cabling

The 100BASE-TX specification supports 100-Mbps transmission over two or four pairs of twisted-pair Ethernet cabling. In two-pair cabling, one pair of cables is used for transmission, and the other is used for reception and collision detection.

Because a 125-MHz frequency is used on the wire, 100BASE-TX requires category 5 cabling.

Segment lengths are limited to 100 m (328 ft) with 100BASE-TX for signal-timing reasons.

Fast Ethernet Hubs

New hubs are becoming available to support a variety of Fast Ethernet LAN configurations. These hubs can be divided into two basic types: shared and switched. The 10/100 EtherJet PCI Adapter or the 10/100 EtherJet PCI Adapter with Wake on LAN can be used with either type of hub for 10-Mbps or 100-Mbps operation.

Shared Hubs

In a shared network environment, PCs are connected to hubs. A repeater is built into each port of the hub. All ports of the repeater hub share a fixed amount of bandwidth, or data capacity.

A 100-Mbps shared hub means that all nodes on the hub must share the 100 Mbps of bandwidth. As stations are added to the hub, the effective bandwidth available to any individual station becomes smaller.

Think of a shared repeater hub as a single-lane highway that everyone uses. As the number of vehicles on the highway increases, the traffic becomes congested and transit time for individual cars increases.

On a shared hub all nodes must operate at the same speed, either 10 Mbps or 100 Mbps. Fast Ethernet repeaters provide 100 Mbps of available bandwidth, ten times more than what is available with a 10BASE-T repeater. Repeaters use a well-established, uncomplicated design, making them highly cost-effective for connecting PCs within a workgroup. These are the most common type of Ethernet hubs in the installed base.

Switched Hubs
In a switched network environment, each port gets a fixed, dedicated amount of bandwidth.

In a switched environment, data is sent to only the port that leads to the correct destination station. Network bandwidth is not shared among all stations, and each new station added to the hub gets access to the full bandwidth of the network.

If a new user is added to a 100-Mbps switching hub, the new station receives its own dedicated 100-Mbps link and does not affect the 100-Mbps bandwidth of another station. Switching hubs can effectively increase the overall bandwidth available on the network, significantly improving performance.

Appendix. Notices

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Telecommunications Safety Requirements in the United Kingdom

This IBM product is made to high safety standards. It complies inherently with telecommunications safety standard BS 6301. It is not designed to provide protection from excessive voltages appearing externally at its interfaces. Therefore, when this product is connected to a public telecommunications network via any other equipment, and you connect to this product items not supplied by IBM United Kingdom Ltd., you must comply with mandatory telecommunications safety requirements.

Statement of Compliance with the United Kingdom Telecommunications Act 1984

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connections to the public telecommunications systems in the United Kingdom.

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Note: 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 a 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 from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled: *Digital Apparatus*, ICES-003 of Industry Canada.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouiller : *Appareils numériques*, NMB-003 édictée par Industrie Canada.

European Norm (EN) Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. IBM cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

Hinweis zur Elektromagnetischen Vertraeglichkeit (EMVG)

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die

IBM UK Ltd
PO Box 30
Spango Valley,
Greenock,
Scotland PA16 0AH.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

Japanese Voluntary Control Council for Interference (VCCI) Statement

Japanese Voluntary Control Council for Interference (VCCI) Statement

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Machine 10/100 EtherJet PCI Adapter
10/100 EtherJet PCI Adapter with Wake on LAN

Warranty Period* Lifetime

**Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new parts). In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

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IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. IBM calculates the expiration of the warranty period from the Machine's Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

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For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

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If a Machine does not function as warranted during the warranty period, IBM in its sole discretion will repair, replace it (with a Machine that is at least functionally equivalent), or refund the purchase price. To obtain coverage under the warranty you may be required to present proof of purchase.

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It is your responsibility to:

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2. where applicable, before service is provided —
    a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
    b. secure all programs, data, and funds contained in a Machine,
    c. inform IBM or your reseller of changes in a Machine’s location, and
    d. for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

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10/100 EtherJet PCI Adapter
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