DECchip 21041 PCI Evaluation Board

User's Guide

Order Number: EC–QD2LA–TE

Revision/Update Information: This is a preliminary manual.

Digital Equipment Corporation
Maynard, Massachusetts

April 1995

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Preface

This document describes the DECchip 21041 PCI Evaluation Board, which is a sample design and development board for systems based on the DECchip 21041 PCI Ethernet LAN Controller. The DECchip 21041 PCI Evaluation Board (also referred to as the EB41) complies with the *PCI Local Bus Specification, Revision 2.0*.

Audience

This document is intended for developers who are evaluating the functionality of the DECchip 21041 PCI Ethernet LAN Controller, and who use the EB41 to design systems based on the DECchip 21041 PCI Ethernet LAN Controller.

Content Overview

This manual contains the following chapters and an appendix:

- **Chapter 1, Introduction** — Describes the DECchip 21041 PCI Ethernet LAN Controller and the EB41.
- **Chapter 2, System Requirements, Kit Contents, and Installation** — Lists the requirements for installing the EB41 and loading its drivers. It also provides the contents of the DECchip 21041 PCI Evaluation Board Kit and the procedure for installing the EB41.
- **Appendix A, Technical Support, Ordering, and Associated Literature** — Provides information about ordering Digital's microprocessor and peripheral chips, and associated literature. It also explains how to obtain technical support and information.

1
Introduction

This chapter describes the DECchip 21041 PCI Ethernet LAN Controller and the DECchip 21041 PCI Evaluation Board (EB41). It also describes the LEDs and main parts of the EB41.

1.1 DECchip 21041 PCI Ethernet LAN Controller

The DECchip 21041 PCI Ethernet LAN Controller (21041) is a single-chip master, direct memory access (DMA) Ethernet LAN controller with a direct interface to the peripheral component interconnect (PCI) local bus. It supports full-duplex operation, and its unique design is optimized to reduce host bus utilization. The 21041 is compliant with the *PCI Local Bus Specification, Revision 2.0*.

The 21041 supports 10BASE5, 10BASE-T, and 10BASE2 network connections. It provides a direct interface to a 64KB to 256KB boot ROM. The 21041 supports both PCI 3.3-volt and 5.0-volt signaling environments and a power-down mode for energy conservation.

For more information about the 21041, refer to the *DECchip 21041 PCI Ethernet LAN Controller Data Sheet*.

1.2 DECchip 21041 PCI Evaluation Board

The DECchip 21041 PCI Evaluation Board (EB41) is a PCI bus master board that demonstrates the functionality of the DECchip 21041 PCI Ethernet LAN Controller. With the EB41 installed in a PC, you can do the following:

- Evaluate hardware and develop software to create an Ethernet node.
- Evaluate the features of the 21041, the PCI protocol, and the autonegotiation algorithm.
- Debug drivers.

The EB41 supports PCI bus master operation with programmed burst length and uses INTA as its primary interrupt line. An onboard 20-megahertz crystal oscillator circuit is used to generate the network (serial) clock.

The EB41 can be used in systems with 5-volt or 3.3-volt signaling environments. An onboard, 5-volt single power supply voltage regulator supplies 3.3-volts to the 21041 to enable connection to systems without a 3.3-volt power supply.

The EB41 supports a boot ROM (flash) of 64KB to 256KB. A standard MICROWIRE ROM is used to support a unique Ethernet address ROM.

1.2.1 Features

The EB41 has the following features:

- Direct PCI interface
- PCI revision 2.0 compliance
- PCI bus master operation
- Direct 10BASE-T, 10BASE5, and 10BASE2 network connections
- Onboard unique Ethernet address MICROWIRE ROM
- Onboard boot ROM
- Full JTAG support
- Autodetection of half- and full-duplex network environments
- Jumperless board—fully software-controlled including port selection
- Transmit and receive LEDs and optional LED indication for link pass, collision, receive address match, polarity, and transmit jabber
- Single 5-volt power supply
- Supports both PCI 5.0-volt and 3.3-volt signaling environments
- Online network port autosensing
- Onboard 3.3-volt voltage regulator to support 5.0-volt systems
- Minimum chip count application
- Power management

1.2.2 LEDs and Connectors

Each EB41 has a transmit LED and a receive LED. These LEDs are mounted on the back panel.

The EB41 also supports five, optional diagnostic LEDs. These include Collision, Receive Address Match, Polarity, Transmit Jabber, and LinkPass. The diagnostic LEDs are located on the EB41 board, above the TP (RJ45) connector.

Figures 1–1 and 1–2 show the LEDs, and Table 1–1 describes the LEDs.

Figure 1–1 EB41 Back Panel LEDs and Connectors

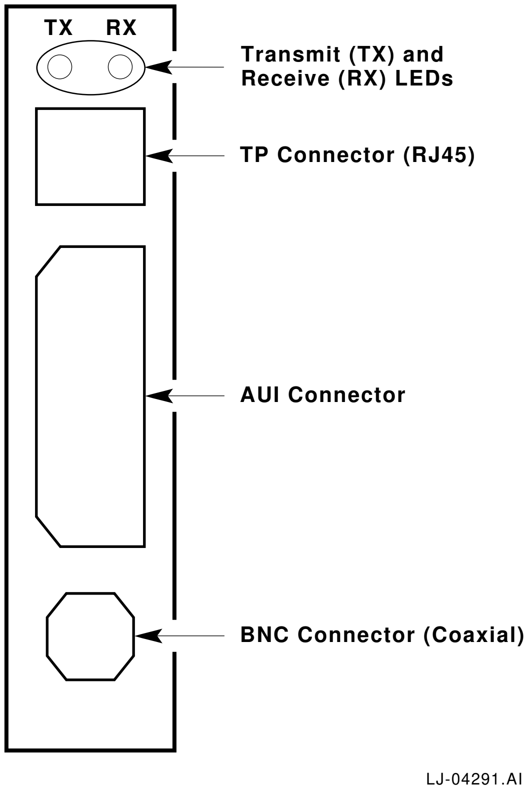


Figure 1–2 EB41 Diagnostic LEDs

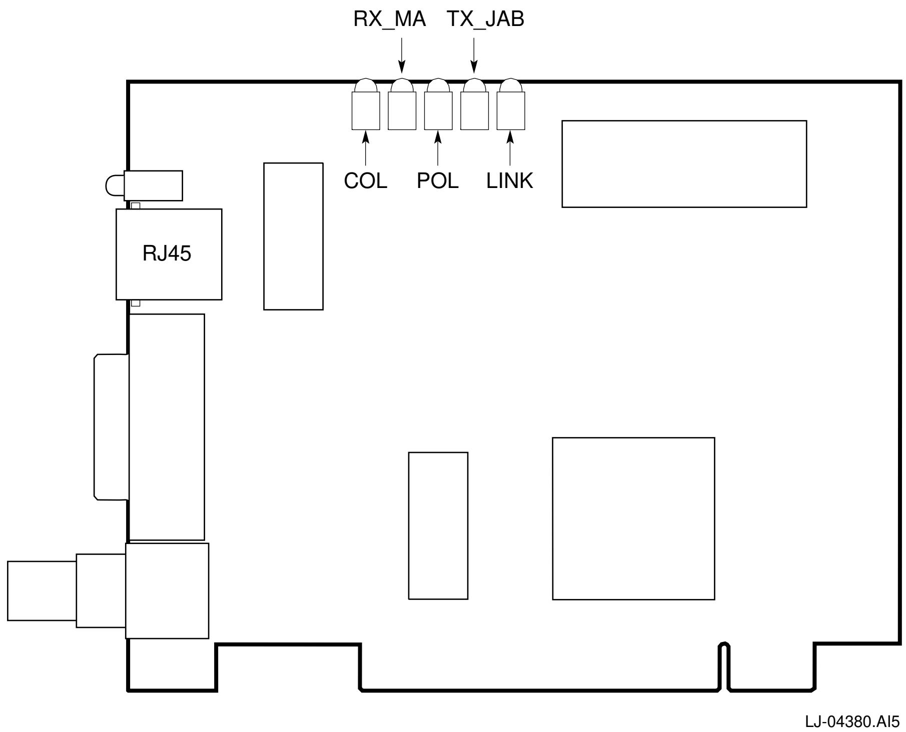


Table 1–1 LED Descriptions

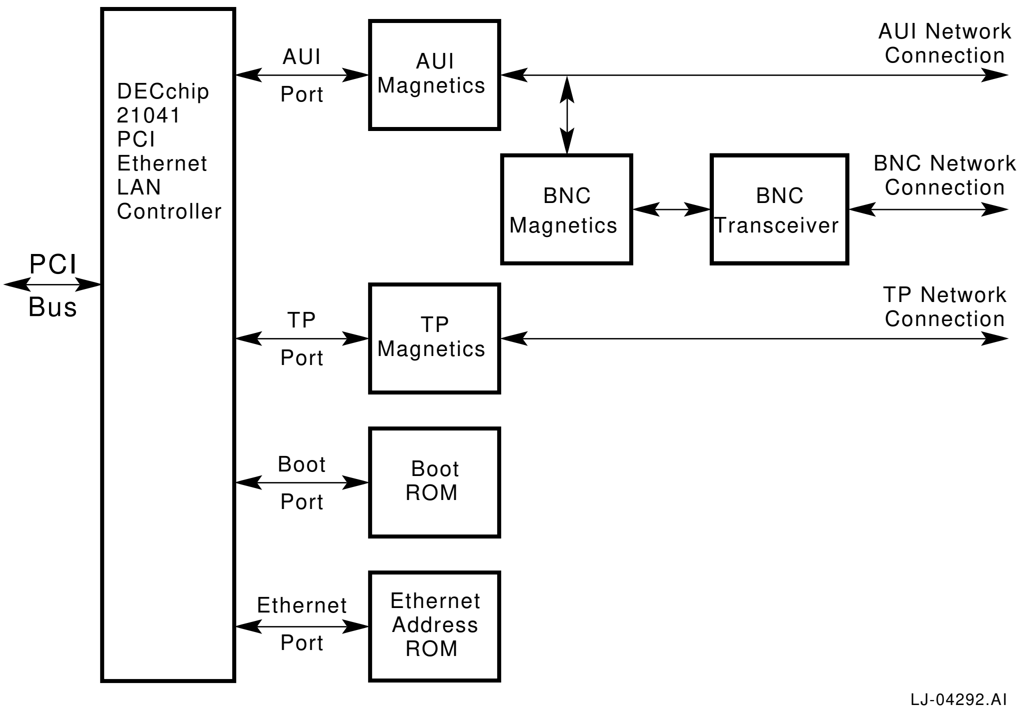
LED	Description
TX	Transmit. This yellow LED is on when a transmission is in progress.
RX	Receive. This green LED is on when a receive is in progress.
COL	Collision. This optional LED is on when a collision is detected on the network.
RX_MA	Receive Address Match. This optional LED is on when a received packet is identified by the 21041 as a packet directed to the particular station.
POL	Polarity. This optional LED is on when the 21041 automatically reverses polarity on the twisted-pair lines.
TX_JAB	Transmit Jabber. This optional LED is on when the 21041 is in transmit jabber mode. For detailed information about transmit jabber mode, refer to the *DECchip 21041 PCI Ethernet LAN Controller Hardware Reference Manual*.
LINK	LinkPass. This optional LED is on when link is established.

1.2.3 Block Diagram

The EB41 requires a minimum chip implementation to support PCI bus connections and the three Ethernet media (TP, AUI, and BNC). For AUI (10BASE5) and TP (10BASE-T) network connections, only a magnetics component is required for direct connection to the network. BNC (10BASE2) network connection requires a magnetics component and a BNC transceiver.

Figure 1–3 shows the mains parts of the EB41.

Figure 1–3 EB41 Block Diagram



2

System Requirements, Kit Contents, and Installation

This chapter provides the system requirements for using the EB41, lists the contents of the DECchip 21041 PCI Evaluation Board Kit, and describes how to install the EB41. It also provides information about how to obtain additional drivers and updates.

2.1 System Requirements

To use the EB41, you need the following:

- A PCI-based PC system that supports master mode operation
- A PCI master mode expansion slot
- A system that is compliant with the *PCI Local Bus Specification, Revision 2.0*
- A 5-volt power supply to the expansion slot (low-power, 7.5 W maximum)
- A 3½-inch diskette drive

2.2 Kit Contents

The DECchip 21041 PCI Evaluation Board Kit contains the following materials:

- DECchip 21041 PCI Evaluation Board (EB41)
- A hardware design package diskette that contains the following information. Section 2.2.2 describes how to extract the files.
  - Board schematics (MD and UA)
  - Unit assembly and mechanical drawings
  - Gerber files
  - Vendor parts list

- A driver diskette that contains the following executables:
  - Novell NetWare (client/server)
  - NDIS2 (DOS, OS/2)
  - NDIS3 (Windows NT, Windows for WorkGroups, and Windows 95)

  The README.TXT file in the top-level directory describes the structure of this diskette.
- A utility diskette that contains the following utilities:
  - A program called PCITEST to verify compliance with the *PCI Local Bus Specification, Revision 2.0* and the *PCI BIOS Specification, Revision 2.0*.
  - A diagnostic program called EVBDEBUG to perform low-level debugging of the DECchip 21041 PCI Evaluation Board.
  - An SROM utility to modify the serial ROMs on 21140 and 21041 based network cards.

  The README.TXT file in the top-level directory describes the structure of this diskette.
- The following documents:
  - *DECchip 21041 PCI Ethernet LAN Controller Product Brief*
  - *DECchip 21041 PCI Ethernet LAN Controller Data Sheet*
  - *DECchip 21041 PCI Ethernet LAN Controller Hardware Reference Manual*
  - *Connecting the DECchip 21041 PCI Ethernet LAN Controller to the Network: An Application Note*
  - *Using the DECchip 21041 with Boot ROM, Serial ROM, and External Register: An Application Note*
  - *Digital Semiconductor PCI Ethernet Driver Information Sheet*
  - *EB41 Schematics*
  - *EB41 Vendor Parts List*
  - Warranty statement/registration card

2.2.1 Using the Documentation

Table 2–1 provides guidelines for using the documentation and software to accomplish specific tasks.

Table 2–1 Guidelines for Using Documentation

If you want to ...	Start with the ...
Install the DECchip 21041 PCI Evaluation Board	DECchip 21041 PCI Evaluation Board User's Guide
Install a driver	README.TXT file on the diskette that contains the driver
Design new hardware	DECchip 21041 PCI Ethernet LAN Controller Data Sheet
	DECchip 21041 PCI Ethernet LAN Controller Hardware Reference Manual
	Connecting the DECchip 21041 PCI Ethernet LAN Controller to the Network: An Application Note
Obtain driver sources	Digital Semiconductor PCI Ethernet Driver Information Sheet

2.2.2 Unpacking the Hardware Design Package

Table 2–2 lists the files that are on the hardware design package diskette. The files with an .EXE extension have been compressed using PKZIP, Version 2.04g and converted to self-extracting archives using ZIP2EXE.

Table 2–2 Hardware Design Package Files

File Name	Contents	Comments
README.TXT	Provides a general description of the diskette contents.	You do not have to extract this file.
GERBER.EXE	Contains the gerber files.	To extract this file, enter **GERBER** at the system prompt.
EB41VPL.TXT	Contains a vendor parts list.	You do not have to extract this file.
SCHEM.EXE	Contains the schematics, mechanical drawings, and unit assembly drawings.	This file is scaled to print on 8½ x 11 paper. To extract this file, enter **SCHEM** at the system prompt.

2.3 Installation Procedure

To install the EB41 and load the drivers, do the following:

1. From the diskette that contains the driver you are loading, read the README.TXT file located in the top-level directory. It provides information about how to configure the EB41.
2. Turn off the power to the PC and remove its cover.
3. Insert the card edge of the EB41 into an available master PCI option slot in the PC.
4. Connect the communications media (10BASE-T, 10BASE5, or 10BASE2). Multi-connection is allowed. The EB41 autosensing feature will select the active port.
5. Replace the PC box cover.
6. Remove any diskettes from the PC disk drive.
7. Turn on the PC.
8. Load the driver for your operating system. Each driver is stored in its own subdirectory on the shipped driver diskette. Refer to the README.TXT and RELEASE.TXT files in the subdirectory for the particular driver for installation and release information.

2.4 Drivers and Updates

Additional drivers and updates are available on a regular basis. To register your evaluation board and be notified of these updates, complete the customer reply card included in the kit, or send the following information to the address listed below:

Name
Address
Telephone number
FAX number
Product purchased
Serial no.
Date purchased

Mail the information to:

Digital Equipment Corporation
Attn: Marketing/Product Updates
77 Reed Road, HLO2-2/M9
Hudson, MA 01749
USA

A

Technical Support, Ordering, and Associated Literature

This appendix provides information about ordering Digital's microprocessor and peripheral chips, and associated literature. It also explains how to obtain technical support and information.

A.1 Digital Semiconductor Information Line

If you need technical support or help deciding which literature best meets your needs, call the Digital Semiconductor Information Line:

United States and Canada	**1–800–332–2717**
TTY (United States only)	**1–800–332–2515**
Outside North America	**+1–508–568–6868**

A.2 Ordering Digital Semiconductor Products

To order the following Digital Semiconductor products, contact your local distributor.

Product	Order Number
DECchip 21041 PCI Ethernet LAN Controller	21041–AA
DECchip 21041 PCI Evaluation Board Kit	21A41–01
DECchip 21140 PCI Evaluation Board Kit	21A40–03

A.3 Ordering Associated Literature

The following table lists DECchip 21041 literature that is available. For ordering information, contact the Digital Semiconductor Information Line.

Title	Order Number
DECchip 21041 PCI Ethernet LAN Controller Product Brief	EC–QAWVA–TE
DECchip 21041 PCI Ethernet LAN Controller Data Sheet	EC–QAWWA–TE
DECchip 21041 PCI Ethernet LAN Controller Hardware Reference Manual	EC–QAWXA–TE
Connecting the DECchip 21041 PCI Ethernet LAN Controller to the Network: An Application Note	EC–QJBWA–TE
Using the DECchip 21041 with Boot ROM, Serial ROM, and External Register: An Application Note	EC–QJLGA–TE

A.4 Ordering Third-Party Literature

You can order the following third-party literature directly from the vendor.

Title	Vendor
PCI Local Bus Specification, Revision 2.0 PCI BIOS Specification, Revision 2.0	PCI Special Interest Group M/S HF3–15A 5200 N.E. Elam Young Pkwy Hillsboro, Oregon 97124–6497 (503) 696–2000
Institute of Electrical and Electronics Engineers (IEEE) 802.3	IEEE Service Center 445 Hoes Lane P.O. Box 1331 Piscataway, NJ 08855–1331 1–800–678–IEEE (U.S. and Canada) 908–562–3805 (Outside U.S. and Canada)