USER'S MANUAL

NEC

ATM ADAPTER CARD
FOR PCI BUS

μPD98401
μPD98402A

WindowsNT is a trademark of Microsoft Corporation.
PC/AT is a trademark of IBM Corporation.
Ethernet is a trademark of Xerox Corporation.

INTRODUCTION

Readers This manual is intended for the engineers and network administrators who use the ATM PCI adapter.

Purpose This manual explains how to install and use the ATM (Asynchronous Transfer Mode) PCI adapter. It specifically explains how to mount and initialize the ATM PCI adapter. It also explains the concept of ATM.

Organization This manual contains the following information:

- Product Outline
- Mounting adapter
- Installing Windows NT™ software
- Setting
- Specifications
- Circuit diagrams and component lists

How to Read This Manual It is assumed that the readers of this manual have general knowledge of electricity, logic circuits, and microcontrollers, and basic knowledge of your target operating system, shell commands, and ATM networks.

Legend Instructions to the user and information are provided in this manual in the following formats:

Note : Explains the points to be noted. Also indicates useful hints and reference to the other manuals.

Caution : Explains the points where particular care is needed, or where there is danger of damage. Unless the equipment is correctly operated as described, the equipment may be damaged, data may be lost, or the operator may be harmed. Before starting operation with the equipment, make sure you are familiar with the standard operations concerning electronic circuits to prevent danger and accidents.

Related document:

- **μPD98401 and 98402A**

Document Name / Part Number	Brochure	Data Sheet	User's Manual	Application Note
μPD98401	S11294E	S11403E	S11380E	S11441E
μPD98402A		S10835E	S10673E	

- **Tools**
  - ATM Adapter Card for PCI Bus User's Manual (this manual)
  - ATM-LAN NDIS Driver User's Manual (S11653E)
  - ATM-LAN Low-Level Driver User's Manual (S11654E)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 PRODUCT OVERVIEW

This chapter outlines the ATM network adapter product.

1.1 ATM Concepts

ATM is a switched, connection-oriented LAN/WAN technology, and enables high-speed communication among an unlimited number of users.

By using ATM, an information network, be it large-scale or small-scale, can be designed with high efficiency and flexibility. ATM is the ideal solution for a network that calls for high speed, low latency, and flexible application support. An ATM network beats Ethernet™ and token ring technologies in a number of areas.

ATM links can operate at different transfer speeds, and can transmit information from a variety of media. These links can be freely mixed in a single network.

ATM is suitable for a wide range of network environments, and can be used in all kinds of applications.

The performance and flexibility of ATM are high because information is packed in standard 53-byte fixed-format cells and transferred, regardless of the link transfer speed, media type that must be traversed, or application being executed.

1.2 Adapter Features

The ATM PCI adapter consists of devices boasting a very large scale of integration. This ATM PCI adapter has functions to reduce the internal data flow and minimize the overhead demanded of the host processor.

To maximize the throughput, the ATM PCI adapter supports 32-bit data transfer and data burst of up to 64 bytes. The functions and features of this ATM PCI adapter are as follows:

- Bus master function minimizing processing by host processor
- DMA bus master function (to reduce overhead of CPU)
- Conforms to ATM Forum, so that other products conforming to ATM Forum can be connected
- Can be easily mounted to all types of PCI bus based work station
- LED status indicators (Link OK and Frame ERR indicators check circuit status)
- High-performance, single-slot design
- Two or more adapters can be connected to one system.
- 32-bit bus interface and burst mode function (data can be efficiently transferred at high speeds because transfer rate is maximized)
- Full-duplex, 155M-bps SONET (Synchronous Optical NETwork) interface for high-speed, accurate data transfer
- Complicated drivers and software can be integrated into system without programmer having to be aware of them.
- Supports 1,800 virtual connections
- Existing applications using IP can be executed on ATM network by using IP (Internet Protocol) via ATM software (conforms to RFC1577).

1.3 Overview of ATM PCI Adapter

1.3.1 PCI bus interface

The PCI (Peripheral Component Interconnect) bus is provided on the mother board of a PC or work station and can access the system memory and host processor at speeds close to the intrinsic speed of the processor. All read/write transfers executed on the PCI bus are burst transfers.

This ATM PCI adapter is a highly integrated design and occupies only one PCI slot (**Figure 1-1**).

Figure 1-1. ATM PCI Adapter
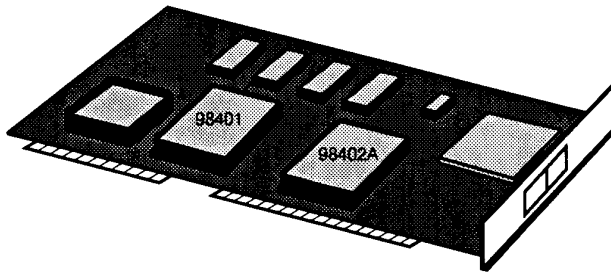
1.3.2 Transceiver connector interface

This ATM PCI adapter uses an ATM standard interface that can be connected to a multi-mode fiber.

- The ATM PCI adapter uses an SC duplex connector. A multi-mode fiber can be used with this connector. A transceiver of this type can transmit over a distance of up to 2 km.

This adapter supports 155Mbps, SONET STS-3c synchronous payload frame format, and SDH STM-1 frame format as the physical layer interface of ATM.

1.4 Software Interface

The ATM PCI adapter is supplied with the following software for set up.

* Device driver
  The device driver resides in the host system (the system in which the ATM PCI adapter is mounted). The device driver provides the connection between the ATM PCI adapter and user's application software.
* Virtual channel setting program
  WZCONF.EXE is provided as a set-up utility that sets up a permanent virtual connection (PVC).

(1) Device driver interface

The device driver of the ATM PCI adapter manages transmission/reception of ATM cells between the host system and the network. Because IP addresses are allocated to the ATM PCI adapter, the host system can transmit or receive ATM packets with other ATM-based systems.

The ATM PCI adapter disassembles a transmit protocol data unit (PDU) into cells, and transmits the cells to the ATM network. Conversely, when the ATM PCI adapter receives cells, the cells are assembled into a protocol data unit.

(2) Setting virtual channel

The ATM network is a point-to-point switched network that requires connection between ATM end points. Although a PC or work station can be physically connected to the ATM network by mounting the ATM PCI adapter in it, establishment of connections or virtual channels between ATM points is necessary to perform communication.

The virtual channels include permanent virtual connections (PVC) and switched virtual connections (SVC). This ATM PCI adapter supports PVC.

[MEMO]

4

CHAPTER 2 ADAPTER INSTALLATION

This chapter explains the requirements and procedures for installing the ATM PCI adapter card.

2.1 Requirements

The ATM PCI adapter has requirements peculiar to hardware. This section describes these requirements and the portions that can be modified by the user to set up his own system.

For software requirements, refer to **CHAPTER 3 Windows NT SOFTWARE INSTALLATION.**

2.1.1 Hardware

The operation of the ATM PCI adapter is guaranteed only on the IBM PC/AT™ or compatible machine, and not on the PC-9800 series.

Note To insert the card, refer to the Hardware Manual of your computer. The ATM PCI adapter is a plug-and-play card whose setting is automated.

2.1.2 Preparation for installing

To install the ATM PCI adapter, the following is necessary.

- Philips screwdriver
- Anti-static ground wrist band
- PCI adapter installation documentation for the computer in which ATM PCI adapter is to be installed

2.2 Unpacking

This section explains how to unpack and handle the ATM PCI adapter.

Caution   Be sure to wear a grounded wrist band to protect the components of the ATM PCI adapter from damage due to static electricity when handling the ATM PCI adapter.

2.2.1 Checking contents of package

Confirm the contents of the package by referring to the list below.
The package of the ATM PCI adapter contains the following.

- "ATM ADAPTER CARD FOR PCI BUS" User's Manual (this manual)
- ATM PCI adapter
- 3.5" floppy disk with the sticker "ATM PCI Adapter for Windows NT"

Note   Check the appearance of the ATM PCI adapter to see that it was not damaged during transportation.

2.2.2 Unpacking carton

When unpacking the carton containing the ATM PCI adapter, pay attention to the following points:

- Wear the grounded wrist band to eliminate static electricity before taking the ATM PCI adapter out from the anti-static bag.
- Hold the ATM PCI adapter by the edge. Make sure that the components on the ATM PCI adapter do not touch any other metal.
- Store the ATM PCI adapter in the anti-static bag until preparation to install it in the system is completed.

2.3 Hardware Installation

Insert and install the ATM PCI adapter card in the following procedure:

<1>   Turn off power to the computer.

<2>   Remove the screws from the cover of the computer and remove the cover (to remove the cover, refer to the hardware manual of the computer).

<3>   Remove the cover from the PCI slot in which the ATM PCI adapter is to be mounted.

<4>   Connect the grounding band to a clean metal surface on the work station, and attach the band to your wrist or ankle.

<5>   Take out the adapter card from the anti-static bag.

<6>   Insert the ATM PCI adapter into the PCI slot, holding the card by the edge. Insert the adapter at right angles to the mother board, and insert the edge connector into the slot.

> **Caution   The ATM PCI adapter will be damaged if an attempt is made to install it in a slot other than a PCI slot.**

<7>   Attach the mounting bracket of the ATM PCI card to the case by using the screws from the slot cover.

<8>   Remove the grounded wrist band.

<9>   Attach the cover of the computer to its original position.

<10> Connect the optical fiber cable to the transceiver interface connector of the ATM PCI adapter.

2.4 Hardware Setting

The ATM PCI adapter can be inserted into any PCI bus master slot in the PC. In almost all systems, this adapter card is treated as a plug-and-play device that is automatically set up when power is supplied to the system. No jumper and switches need to be set before inserting this adapter in a work station.

Because the ATM PCI adapter operates as a bus master, the BIOS of the PC must recognize this. For details of the expansion slots in the computer, refer to the hardware manual of the computer (related to the mother board). Confirm that the slot to be used has the bus master function.

If the computer does not automatically set up the PCI bus device, the slot must be manually configured by starting the BIOS setup utility after inserting the ATM PCI adapter.

2.5 Checking Hardware Installation

After correctly connecting the ATM PCI adapter transceiver to the network, check the LED indicators of the adapter. Check the status of the adapter by referring to **Table 2-1**.

Table 2-1. LED Indicator and Adapter Status

LEDs	Meaning
Green	Adapter is correctly connected, and is receiving valid SONET frame.
Yellow	Physical layer error indicating possibility of link status error is detected by SONET framer. Check connection (there is possibility that connection is reversed).
Green, yellow	Signal is detected but error is detected in creating SONET frame. Correctly connect adapter to another ATM device (other than FDDI and token ring).
None	Adapter is not correctly inserted in the slot. Turn off power to system immediately. Then insert adapter properly in PCI slot.

If the green LED is on and yellow LED goes off, the installing of the ATM PCI adapter is completed. To install the ATM PCI adapter software, refer to **CHAPTER 3 Windows NT SOFTWARE INSTALLATION**.

CHAPTER 3 Windows NT SOFTWARE INSTALLATION

3.1 General

This chapter explains how to install the ATM PCI adapter software in a Windows NT workstation client or server. Install the software in the specified installation and setting procedures.

After inserting the ATM PCI adapter, install the corresponding software. When the software is installed, the following processing is performed.

- Files are copied to a specified directory from the ATM PCI adapter software floppy disk.
- The setting of the network configuration is changed from the Windows NT control panel.
- The system is re-booted.

Note To install the ATM PCI device driver, the internet protocol (IP) address and subnet mask must be allocated during installation. Ask the network administrator for a valid IP address and subnet mask.

3.2 Requirements

Before installing the ATM PCI adapter driver, the following procedures must be carried out.

<1> Make sure there is 1M byte of usable space in the hard disk.
<2> Correctly install the ATM PCI adapter (refer to **CHAPTER 2 ADAPTER INSTALLATION**).
<3> Make sure you have 24M bytes RAM or more.
<4> Install Microsoft Windows NT 3.5 or 3.51.
<5> Install the TCP/IP protocol driver. Double-click on the [Network] icon on the control panel. If [TCP/IP] is missing from the [Installed Network Software] list, click on the [Add Software...] button, and select [TCP/IP] from the list. Next, click on [Restart Now].

3.3 Software Installation

Note   Make a back-up of the floppy disk containing the ATM PCI software, and keep the original disk in a safe
location.

<1>   Double-click on the [Network] icon on the control panel in Windows NT (**Figure 3-1**).

Figure 3-1. Control Panel Network Control Icon
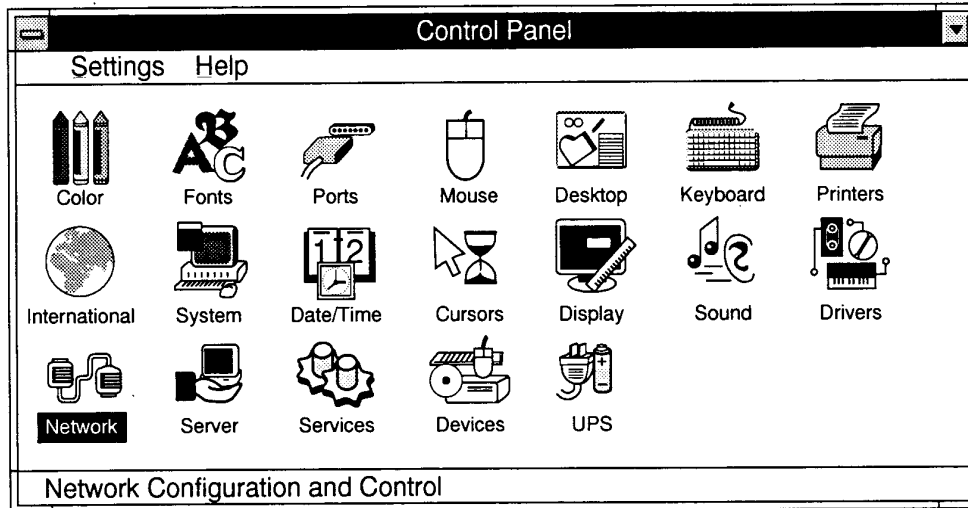
The [Network Settings] dialog box is displayed (**Figure 3-2**).

Figure 3-2. [Network Settings] Dialog Box

```
┌──────────────────────────────────────────────────────────────────────┐
│ ▭                          Network Settings                           │
├──────────────────────────────────────────────────────────────────────┤
│                                                                        │
│  Computer Name: SALPC17              ┌─────────┐      ┌──────────┐      │
│                                      │ Change..│      │    OK    │      │
│                                      └─────────┘      └──────────┘      │
│  Workgroup:      WORKGROUP           ┌─────────┐      ┌──────────┐      │
│                                      │ Change..│      │  Cancel  │      │
│                                      └─────────┘      └──────────┘      │
│  ┌─ Network Software and Adapter Cards ──────────────┐ ┌──────────┐     │
│                                                        │ Bindings.│     │
│    Installed Network Software:                       └──────────┘     │
│    ┌───────────────────────────────────┐  ┌─────────────┐ │Networks..│  │
│    │Compaq Internal NetFlex ENET/PCI Driver│▲│ │Add Software..│           │
│    │NEC ATM NDIS 3.5 Miniport Driver   │  └─────────────┘ ┌──────────┐  │
│    │NetBIOS Interface                  │  ┌─────────────┐ │   Help   │  │
│    │NetWare Client Service             │  │Add Adapter..│ └──────────┘  │
│    │NWLink IPX/SPX Compatible Transport│▼│ └─────────────┘               │
│    └───────────────────────────────────┘  ┌─────────────┐              │
│    Installed Adapter Cards:                │ Configure.. │              │
│    ┌───────────────────────────────────┐  └─────────────┘              │
│    │[1] Compaq Internal NetFlex ENET/PCI Controller│  ┌─────────────┐   │
│    │                                   │  │   Update    │              │
│    └───────────────────────────────────┘  └─────────────┘              │
│                                            ┌─────────────┐              │
│                                            │   Remove    │              │
│    Description:   Compaq Internal NetFlex ENET/PCI Controller            │
│                                                                        │
└──────────────────────────────────────────────────────────────────────┘
```
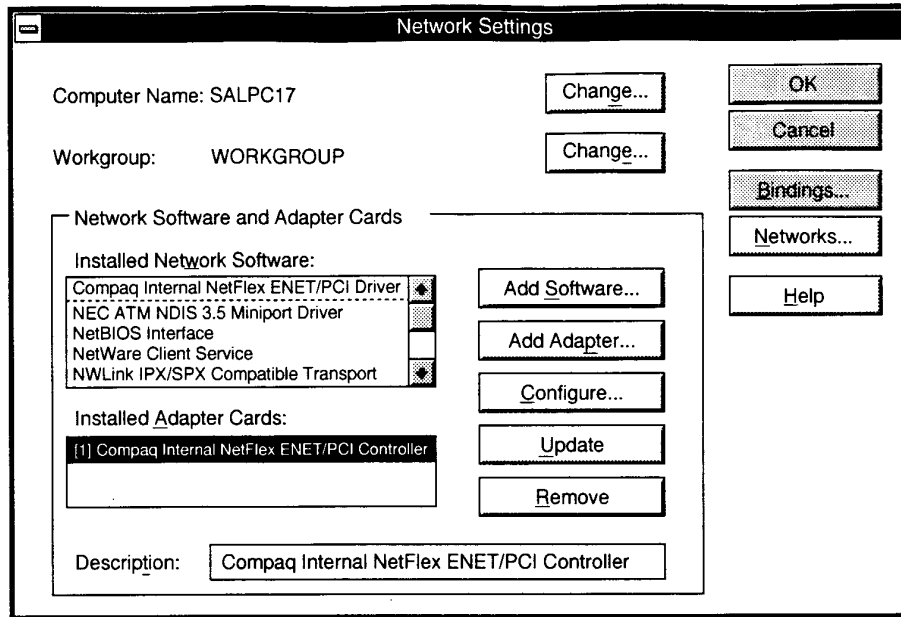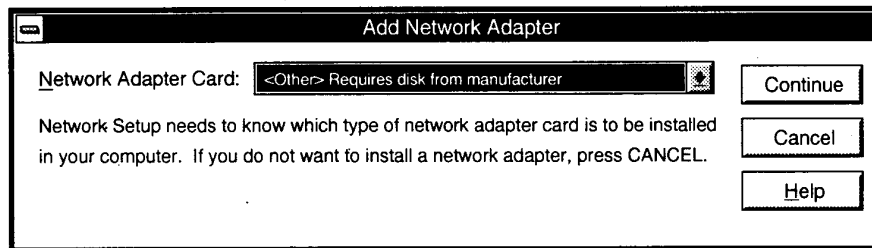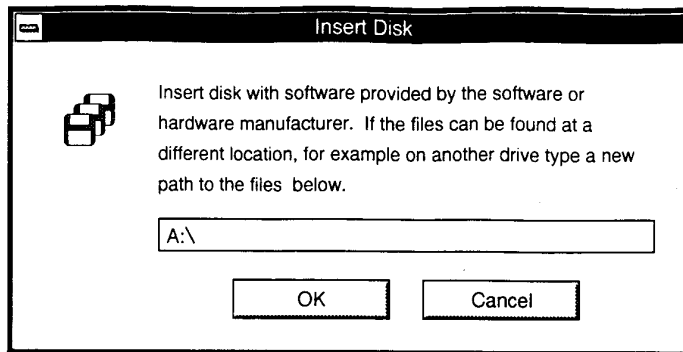
<2>   To install the ATM PCI adapter driver, click on the [Add Adapter...] button in the [Network Settings] dialog box.
The [Add Network Adapter] dialog box is displayed (**Figure 3-3**).

Figure 3-3. [Add Network Adapter] Dialog Box

```
┌──────────────────────────────────────────────────────────────────────┐
│ ▭                        Add Network Adapter                           │
├──────────────────────────────────────────────────────────────────────┤
│                                                                        │
│  Network Adapter Card: ┌──────────────────────────────────┐  ┌────────┐│
│                        │<Other> Requires disk from manufacturer│▼│ │Continue││
│                        └──────────────────────────────────┘  └────────┘│
│  Network Setup needs to know which type of network adapter card is to be installed  ┌────────┐│
│  in your computer. If you do not want to install a network adapter, press CANCEL.    │ Cancel ││
│                                                              └────────┘│
│                                                              ┌────────┐│
│                                                              │  Help  ││
│                                                              └────────┘│
└──────────────────────────────────────────────────────────────────────┘
```

<3>   Select the following item from the [Network Adapter Card] combo box in the [Add Network Adapter] dialog box:
[<Other> Requires disk from manufacturer]

<4>   Click on the [Continue] button. The [Insert Disk] dialog box is displayed (**Figure 3-4**).

Figure 3-4. [Insert Disk] Dialog Box

```
┌──────────────────────────────────────────────────────┐
│ [▭]                    Insert Disk                     │
├──────────────────────────────────────────────────────┤
│                                                        │
│   ┌─┐   Insert disk with software provided by the software or │
│  ┌┴┐│   hardware manufacturer.  If the files can be found at a │
│  │ ├┘   different location, for example on another drive type a new │
│  └─┘    path to the files  below.                      │
│                                                        │
│         ┌────────────────────────────────────────────┐│
│         │ A:\                                        ││
│         └────────────────────────────────────────────┘│
│                                                        │
│            ┌──────────────┐  ┌──────────────┐          │
│            │      OK       │  │    Cancel     │          │
│            └──────────────┘  └──────────────┘          │
│                                                        │
└──────────────────────────────────────────────────────┘
```

<5>   Specify the source path (such as A:\) for the ATM PCI installation disk from the [Insert Disk] dialog box.

<6>   Click on the [OK] button.

The [Select OEM Option] dialog box is displayed (**Figure 3-5**).

Figure 3-5. [Select OEM Option] List Box

```
┌──────────────────────────────────────────────────────┐
│ [▭]                 Select OEM Option                  │
├──────────────────────────────────────────────────────┤
│                                                        │
│   Please choose a network adapter driver.              │
│                                                        │
│   ┌────────────────────────────────────────────────┐  │
│   │ NEC PCI ATM Adapter for S15                     │  │
│   │                                                │  │
│   │                                                │  │
│   │                                                │  │
│   └────────────────────────────────────────────────┘  │
│                                                        │
│      ┌──────────┐  ┌──────────┐  ┌──────────┐          │
│      │    OK     │  │  Cancel   │  │  Help     │          │
│      └──────────┘  └──────────┘  └──────────┘          │
│                                                        │
└──────────────────────────────────────────────────────┘
```
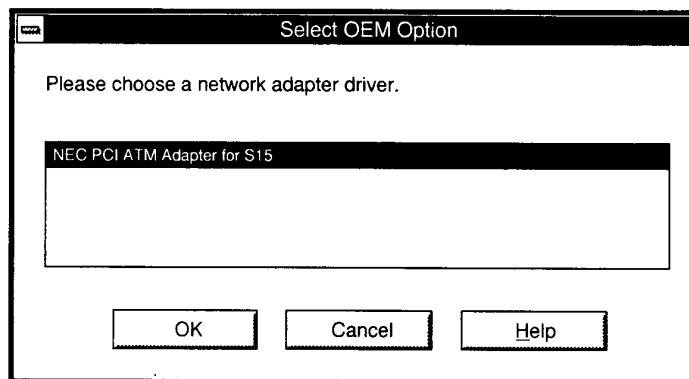
<7> Select [NEC PCI ATM Adapter for S15] from the [Select OEM Option] list box.

<8> Click on the [OK] button and install the driver.

The [Network Settings] dialog box is displayed (**Figure 3-6**). [NEC PCI ATM Adapter] is displayed in the [Installed Adapter Cards:] list box in this dialog box, indicating that the adapter has been installed.
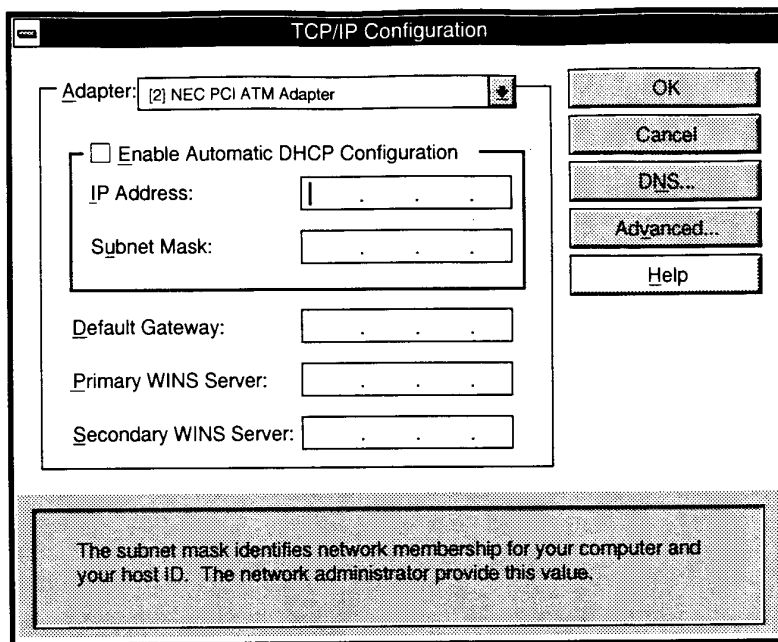
Figure 3-6. [Network Settings] Dialog Box
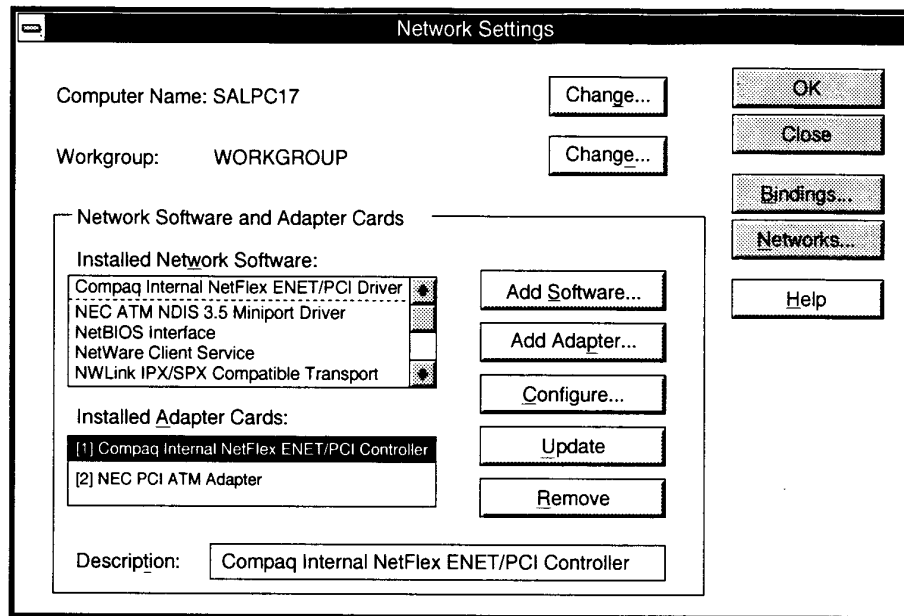
Note For the other options in the [Network Settings] dialog box, refer to the Windows NT manual.

<9> After setting up the configuration, click on the [Close] button to close the [Network Settings] dialog box. The [TCP/IP Configuration] dialog box is displayed (**Figure 3-7**). The ATM PCI adapter driver is displayed in this list box. If the adapter is installed in addition to a work station and it is not set for TCP/IP, the adapter must be set according to this protocol.

Figure 3-7. [TCP/IP Configuration] Dialog Box

<10> Input appropriate values in the [IP Address:] and [Subnet Mask:] fields in the [TCP/IP Configuration] dialog box. To complete the installation, click on the [OK] button.

Note If necessary, ask the network administrator for the valid IP address.

For the other options in the [TCP/IP Configuration] dialog box, refer to the Windows NT manual. For example, directories can be set by using Directory Naming Services (click on the [DNS...] button), a host can be added, and IP routing (click on the [Advanced...] button) can be performed. These options can be set afterward.

The [Network Settings Change] dialog box is displayed (**Figure 3-8**).

Figure 3-8. [Network Settings Change] Dialog Box
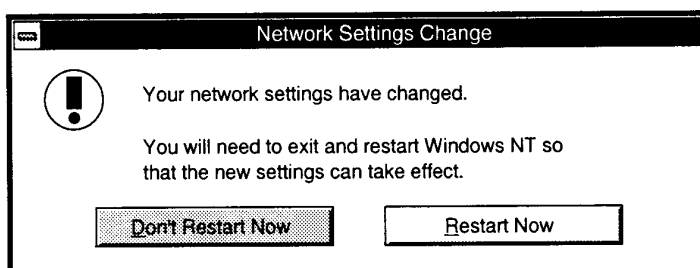
Changes in settings become valid when the system is restarted. To restart the computer immediately, click on the [Restart Now] button.

3.4 Checking Software Installation

Check whether the adapter has been recognized by the system and whether the driver software has been correctly installed by the methods described in this section.

3.4.1 Duplicate adapter address

Addresses must be specified for the systems that constitute the network. Therefore, the ATM PCI adapter address must be different from the address specified for the work group and addresses of the other adapters connected to the domain. If an address is duplicated, the network connection will be lost when Windows NT is started.

Note Consult the network administrator so that the address of the IP is not duplicated.

3.4.2 TCP/IP Configuration

To check whether the TCP/IP configuration is correctly set up, try using ping on the local system.
For example, ping the local host IP loopback address 127.0.0.1.
To do this, input the following at the OS prompt.

ping 127.0.0.1

The system should immediately respond. If the ping utility is not found, or if command execution fails, check the contents of [System Event Log] by using Event Viewer. The Event Viewer utility displays the problems reported by Setup or the TCP/IP service.

[MEMO]

16

CHAPTER 4 SETTING

4.1 Overview

This chapter explains how to add and delete Permanent Virtual Circuits (PVC) with the PVC mapping utility.

To use the driver, the user must manually set an IP address and PVC mapping. The PVC mapping utility is used for this purpose. The file name of the PVC mapping utility is WZCONF.EXE.

4.2 Starting

- When the PVC mapping utility (hereafter referred to as WZCONF) is started, the dialog box shown in Figure 4-1 is displayed.
- WZCONF displays an error message and is terminated if the driver is not installed. Therefore, install the driver and then start the utility.
- Only one copy of WZCONF can be started. The active window for input is always the one started first, and any other copy of WZCONF will be terminated.

Figure 4-1. PVC Mapping Utility

4.2.1 Description of screen

- Src IP

  Text box to set a source IP address.
- Dst IP

  Text box to set a destination IP address.

- Default

  Turn ON this button to set I/M of the Shaper value to 1/1.
- User

  Turn ON this button to set I/M of the Shaper value to any other value.
- I/M

  Enter a value in this text box to set I/M of the Shaper value. Unless the User button is turned ON, the text box is not valid.
- Src IP· Dst IP : vpi vci : I/M

  List box that displays the set PVC mapping.
- "Exit" button

  Click on this button to terminate WZCONF.
- "Set" button

  Click on this button to set PVC.

  This button is invalid if the keyboard cursor is not in the text box.
- "Delete" button

  Used to reset PVC mapping.

  This button is invalid if the keyboard cursor is not in the list box.

4.3 PVC Setting

On starting, the default value (1/1) of Shaper (I/M) is selected (refer to **Figure 4-1**). To change the Shaper value, click on the User button. The I/M text box becomes valid, and a value can be substituted. Enter all values as decimal numbers.

- Shaper Default (Default button ON)

  Input Src (source) IP address, Dst (destination) IP address, and vpi/vci value.

  Click on the "Set" button. I/M is set to 1/1.
- Shaper User (User button ON)

  Input Src (source) IP address, Dst (destination) IP address, vpi/vci value, and I/M value. Click on the "Set" button.

The "Set" button in Figure 4-1 is invalid (gray) on initialization. It becomes valid when the keyboard cursor is in the I/M text box (refer to "Set" button in **Figure 4-2**).

If the setting is performed without an error message being displayed, the value is displayed in the list box below (refer to the list box in **Figure 4-2**).

Figure 4-2. PVC Setting

4.3.1 Valid range of values

The following table shows the valid range of the values. If an attempt is made to set a value exceeding this range, an error message is displayed.

Table 4-1. Valid Range of Values

Parameter	Lower Limit	Upper Limit
Src IP	0.0.0.0	255.255.255.255
Dst IP	0.0.0.0	255.255.255.255
vpi	0	3
vci	1	4095
I	1	255
M	1	16777215

4.4 PVC Reset

To delete the set PVC mapping, select the PVC character string to be deleted from the list box, and then click on the "Delete" button.

The selected, highlighted PVC character string is deleted from the list box.

The "Delete" button is valid if the keyboard cursor is in the list box.

Figure 4-3. PVC Reset

4.5 Displaying the Version Number

To display the version number of WZCONF and the driver, click on the "Version" button.

Figure 4-4. Displaying the Version Number

4.6 Exiting

To terminate WZCONF, click on the "Exit" button.

CHAPTER 5 SPECIFICATIONS

5.1 Physical Characteristics

5.1.1 LED indicator

Lighting LED Color	Meaning
Green	Signal is detected.
Yellow	Error is detected. There is possibility of link status error (device is not connected or signal is not received).

5.1.2 Operating temperature

- Operating : 0 to 50°C
- Storage : −20 to +60°C
- Relative humidity : 10 to 90% (without condensation)

5.1.3 Dimensions

- Size : 4.25 × 7 × 0.75 inches

5.2 Usable Interface OS

- Windows NT 3.5 or 3.51

5.3 Circuit Characteristics

- Circuit speed: 155.54 Mbps
- SONET STS-3c/SDH STM-1 synchronous
- Payload frame format

5.4 Transmission Characteristics

5.4.1 Fiber

- Total fiber power   :   −19 dbm
- Transmission wave length :   1260 to 1360 nm
- Transmission over 2 km with multi-mode fiber

5.5 Reception Characteristics

- Maximum input power : −14 dbm
- Minimum input power : −30 dbm
- BER=1.0E−10

5.6 Connector Specifications

- SC duplex connector, 0.5-inch interval
- Standard PCI bus connector

CHAPTER 6 CIRCUIT DIAGRAM AND COMPONENT LIST

This chapter shows the circuit diagrams and component lists.

6.1 Circuit Diagram

Figure 6-1. Top Sheet

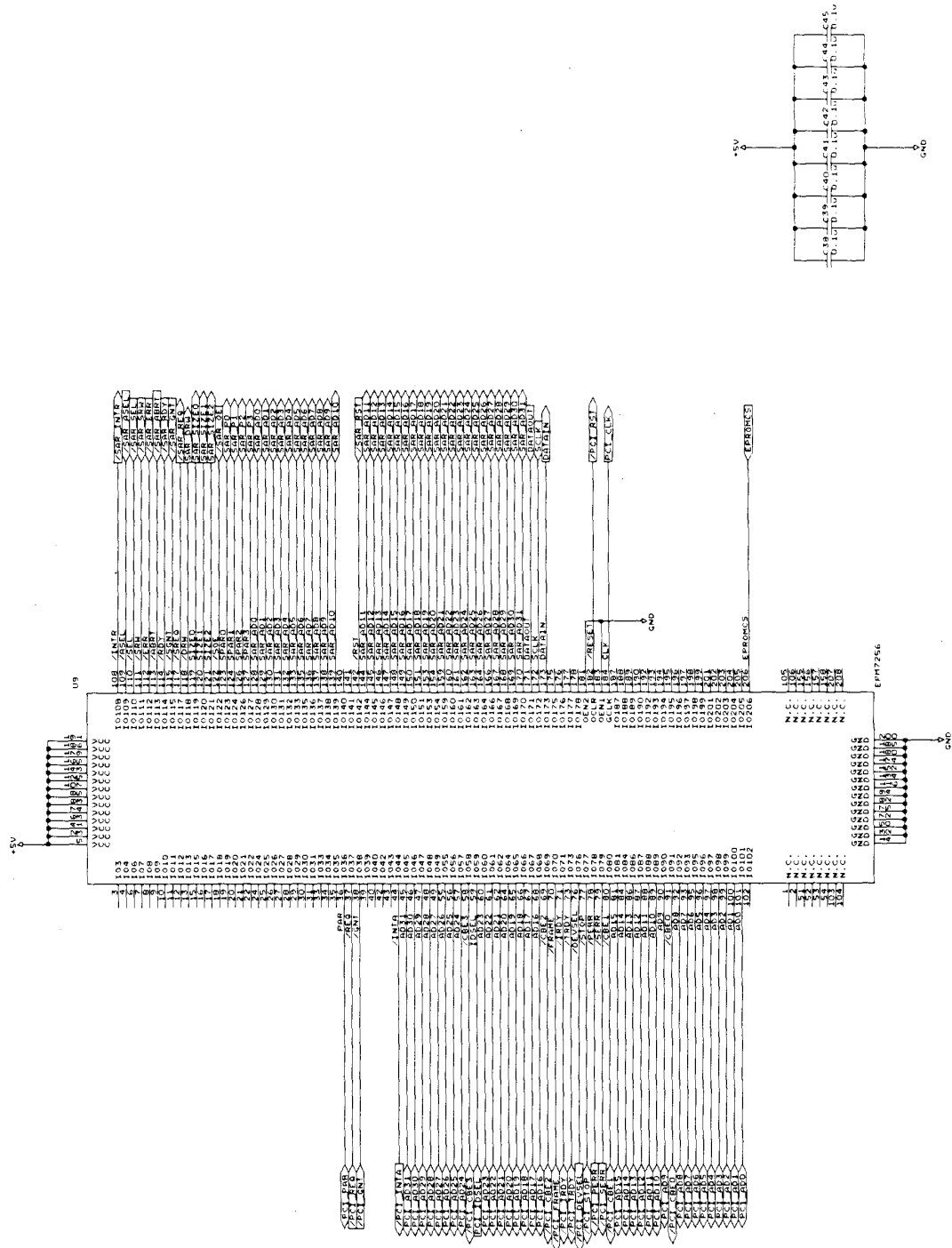**Figure 6-3.   PCI Bridge**

Figure 6-4. ATM SAR (μPD98401)
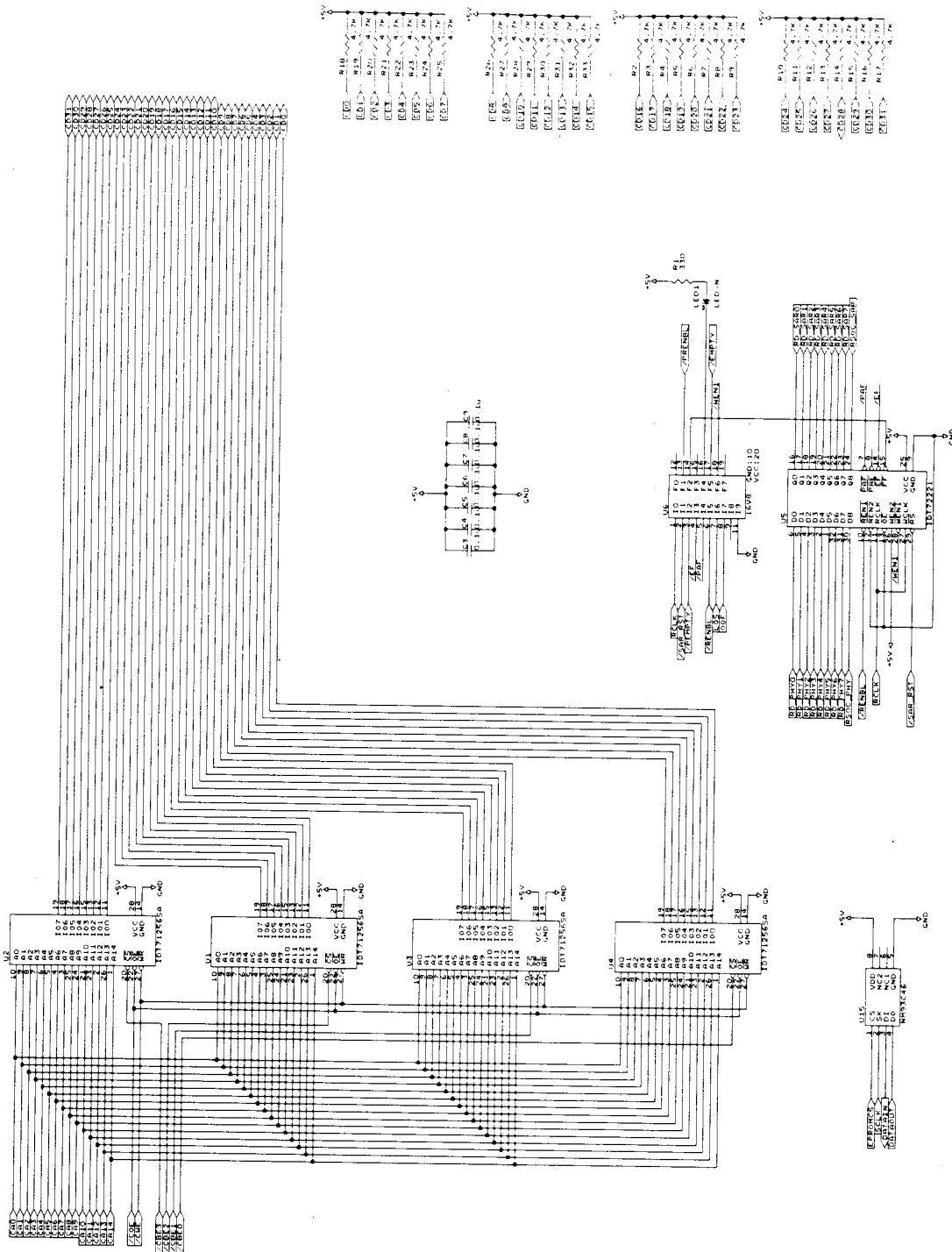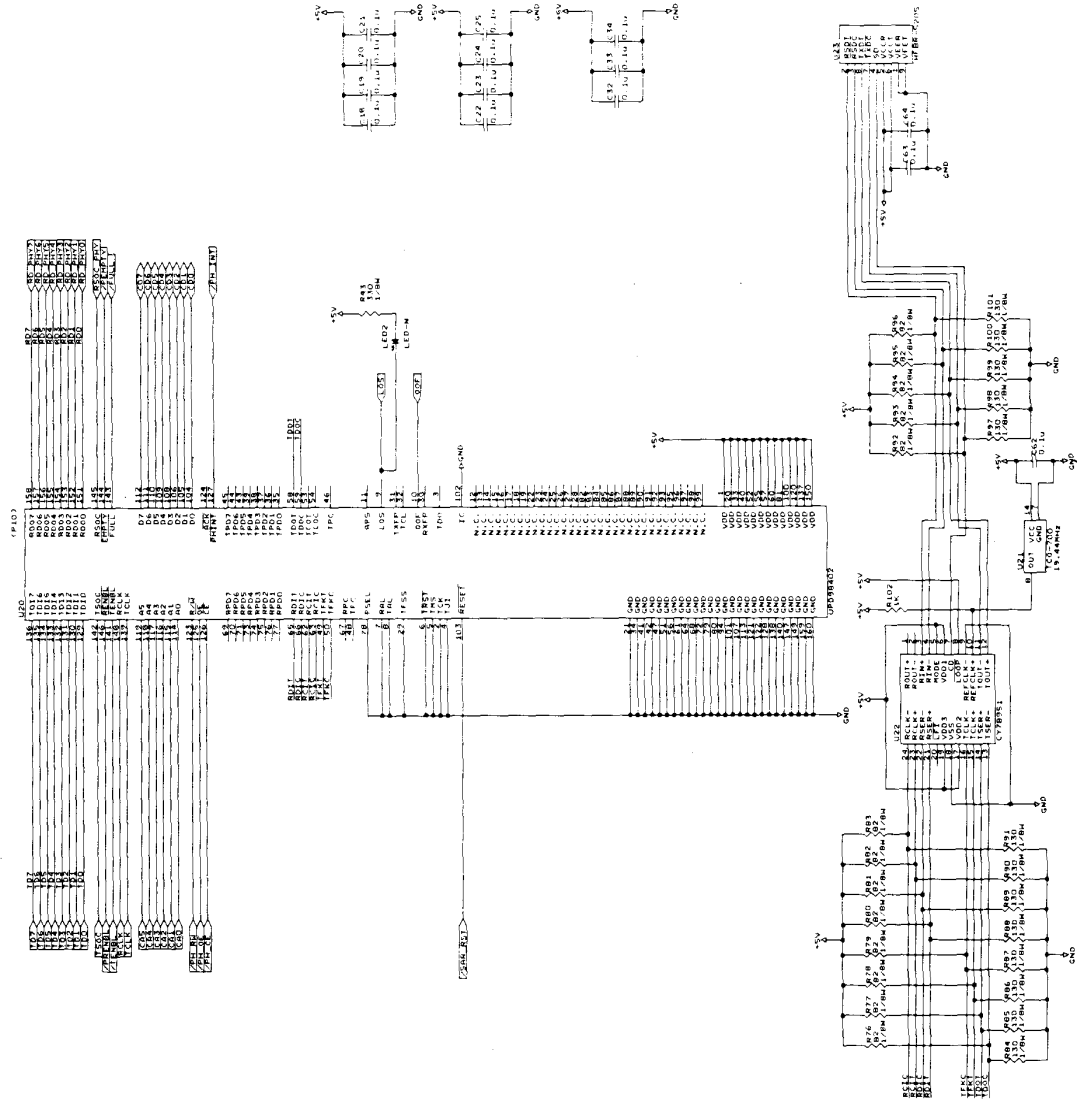
Figure 6-5.   Control Memory and FIFO

Figure 6-6. Physical Layer (μPD98402A) and Clock Recovery

6.2 Component List and Layout

This section shows the component list and layout of the PCI ATM NIC evaluation adapter board.

Table 6-1. Components of PCI ATM NIC Evaluation Adapter Board

| Item	Quantity	Component No.	Device Type	Component Name	Manufacturer	Remark
1	4	U1-U4	SRAM	IDT71256SA20	IDT	28-pin SOJ
2	1	U5	FIFO	IDT72221L15	IDT	32-pin PLCC
3	1	U6	PAL	GAL16V8B-7LP	LATTICE	20-pin DIP
4	1	U7	SAR	μPD98401GD	NEC	208-pin PQFP
5	1	U20	PHY	μPD98402AGM	NEC	160-pin PQFP
6	1	U9	FPGA	EPM7256ERC208-15	ALTERA	208-pin RQFP
7	1	U21	Oscillator	TCO-700 19.44MHz		DIL-14
8	1	U15	EEPROM	NM93C46	NSC	8-pin SOP
9	1	U22	CLOCK REC.	CY7B951	CYPRESS	24-pin SOIC
10	1	U23	OPT	HFBR-5205	YHP	1 × 9 SIP
11	2	C1, C2	Electrolytic capacitor	SRA16VB47M		47 μF/16 V
12	39	C3-C25, C32-C34, C38-C45, C59, C60 C62-C64	Ceramic capacitor	GRM40F104Z50		0.1 μF
13	2	LEC1, LED2	LED	HLMP-3750		2-pin
14	2	R1, R43	Resistor chip	RK73K2B330 ohm J		330 Ω
15	40	R2-R41	Resistor chip	RK73K2B4.7K ohm J		4.7 kΩ
16	2	R42, R102	Resistor chip	RK73K2B1K ohm J		1.0 kΩ R102 not mounted
17	13	R76-R83, R92-R96	Resistor chip	RK73K2B82 ohm J		82 Ω
18	13	R84-R91, R97-R101	Resistor chip	RK73K2B130 ohm J		130 Ω

Figure 6-7. PCI NIC Component Layout (top)
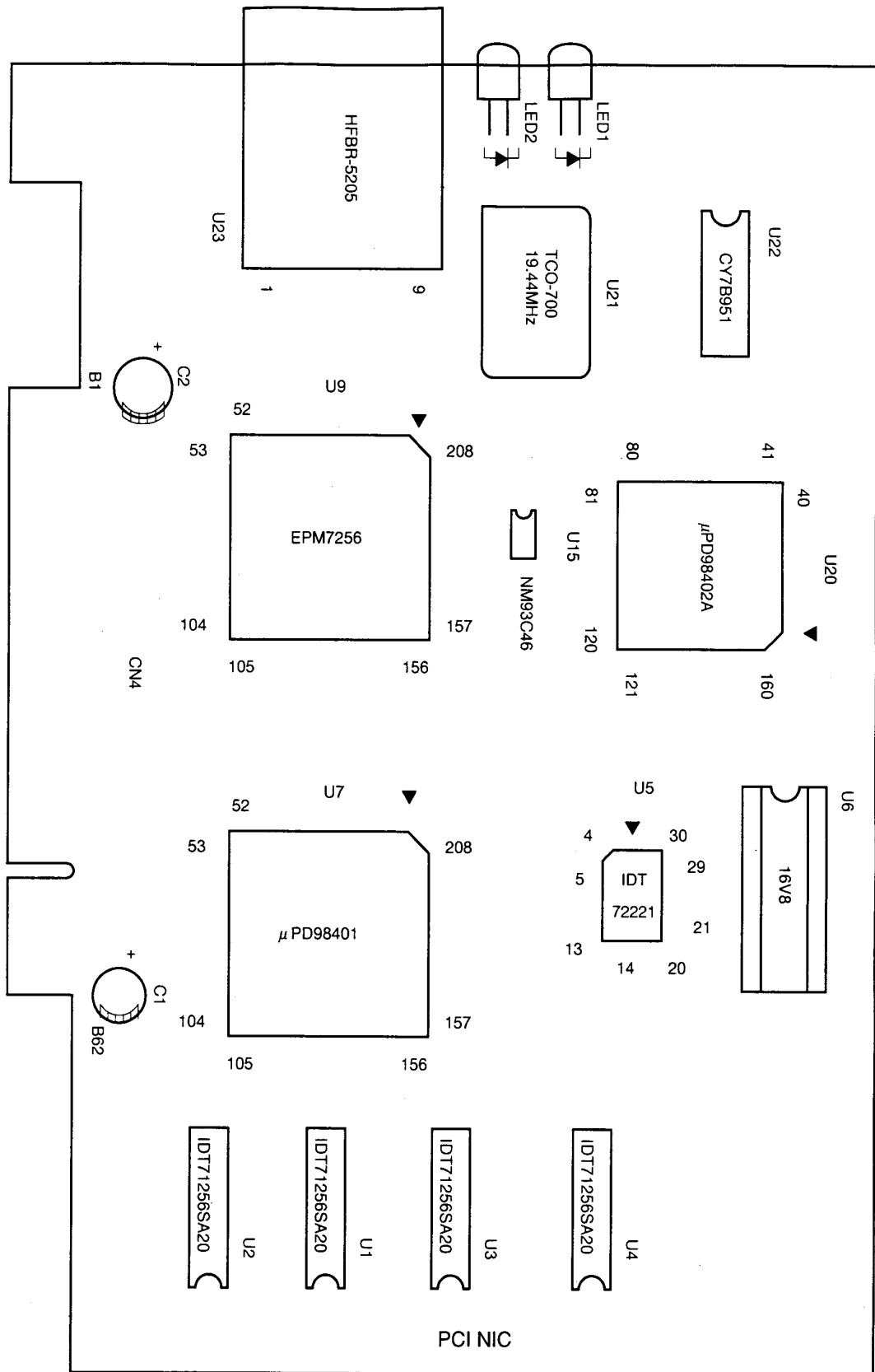
PCI NIC

Figure 6-8. PCI NIC Component Layout (bottom)

NEC
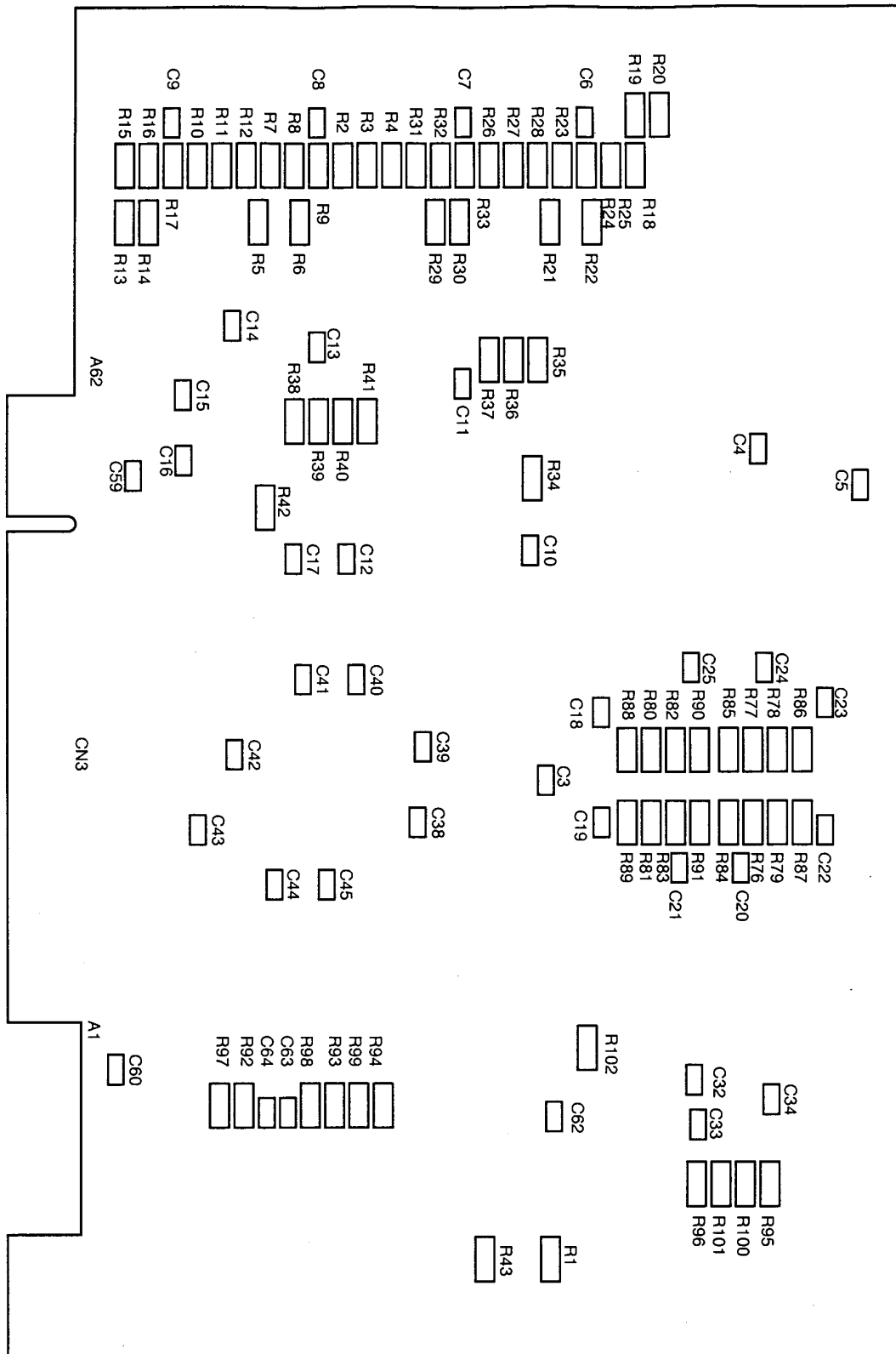
Facsimile Message

From:

_____
Name

_____
Company

_____
Tel.   FAX

_____
Address

Although NEC has taken all possible steps to ensure that the documentation supplied to our customers is complete, bug free and up-to-date, we readily accept that errors may occur. Despite all the care and precautions we've taken, you may encounter problems in the documentation. Please complete this form whenever you'd like to report errors or suggest improvements to us.

Thank you for your kind support.

North America	**Hong Kong, Philippines, Oceania**	**Asian Nations except Philippines**
NEC Electronics Inc.	NEC Electronics Hong Kong Ltd.	NEC Electronics Singapore Pte. Ltd.
Corporate Communications Dept.	Fax: +852-2886-9022/9044	Fax: +65-250-3583
Fax: 1-800-729-9288		
Europe	**Korea**	**Japan**
NEC Electronics (Europe) GmbH	NEC Electronics Hong Kong Ltd.	NEC Corporation
Technical Documentation Dept.	Seoul Branch	Semiconductor Solution Engineering Division
Fax: +49-211-6503-274	Fax: 02-528-4411	Technical Information Support Dept.
		Fax: 044-548-7900
South America	**Taiwan**	
NEC do Brasil S.A.	NEC Electronics Taiwan Ltd.	
Fax: +55-11-889-1689	Fax: 02-719-5951	

I would like to report the following error/make the following suggestion:

Document title: _____

Document number: _____ Page number: _____

_____

_____

_____

If possible, please fax the referenced page or drawing.

Document Rating	Excellent	Good	Acceptable	Poor
Clarity	❑	❑	❑	❑
Technical Accuracy	❑	❑	❑	❑
Organization	❑	❑	❑	❑

CS 96.4