

OpenLAN
Reference Guide for
OWS Adapter Card
ND-830108.1 EN



OpenLAN
Reference Guide for
OWS Adapter Card
ND-830108.1 EN

NOTE:

The numbering system for Norsk Data's documentation changed in September 1988. All numbers now start with an 8. The numbering structure is therefore ND-8xxxxx.xx xx. Example: ND-863018.3A EN. Existing manuals will receive a new number if and when they are updated or revised.

The information in this manual is subject to change without notice.

Norsk Data A.S assumes no responsibility for any errors that may appear in this manual, or for the use or reliability of its software on equipment that is not furnished or supported by Norsk Data A.S.

Copyright © 1988 by Norsk Data A.S

Version 1 September 1988

Send all documentation requests to:

*Norsk Data A.S
Graphic Centre
P.O. Box 25 – Bogerud
N-0621 Oslo 6
NORWAY*

Table of Contents:

Preface	
Chapter 1 - Introduction	1
Adapter Card Features	3
Chapter 2 - Hardware Configuration	5
Configuring the Adapter Card	5
Shared Memory Window Config.	6
Base Memory Address Config.	7
Interrupt Level Config.	8
Chapter 3 - Hardware Troubleshooting	11
Startup and Verification	11
Troubleshooting Hardware Installation	12
Symptoms	13
Chapter 4 - Installing OpenLAN Software	19
Setup Diskette Files	19
OWS System Files	20
SETUP.exe Program Menu	24
AIP-Hosts File	25
Appendix A - Hardware Specification	27
Appendix B - Cabling Systems	33
Appendix C - Interface Connections	35
Appendix D - Hardware Diagnostics	37
Index	44

Preface

The Manual

This manual contains the information necessary to configure and verify the installation of an OpenLAN Adapter card (for either Standard Ethernet or Cheapernet). The adapter card serves as a communications interface between an ND Workstation (model 12, 55, or 85) and an OpenLAN (Ethernet) Local Area Network (LAN) environment. It is normal that a supervisor assists the user in configuring and installing a personal computer. The hardware adapter cards and devices are installed first, and then the software. . This manual covers both hardware and software installation. For a quick reference guide to installation, see manual **ND-99.115 How to install the OWS OpenLAN Adapter Card in the OWS.**

Chapter 1 is an **INTRODUCTION** to the OpenLAN Adapter cards and their role in an OpenLAN network.

Chapter 2 describes the **HARDWARE CONFIGURATION** information and values for the adapter card. Also included is a description of the procedure for reconfiguration.

Chapter 3 covers **HARDWARE TROUBLESHOOTING** of the cards. The chapter describes how to verify the installation, and also contains a brief explanation of what corrective actions you should take if it fails to operate properly.

Chapter 4 describes **SOFTWARE INSTALLATION** of the OWS OpenLAN Adapter software on the workstation, and creation of a host file on your OWS through DTM.

Appendix A: HARDWARE SPECIFICATIONS. HW, physical size, electrical, environment, etc.

Appendix B: CABLING SYSTEMS for Cheapernet and Standard Ethernet.

Appendix C: INTERFACE CONNECTIONS. Bus interfaces.

Appendix D: SOFTWARE DIAGNOSTICS. Self test, diagnostic routines, and error messages.

The Reader

This guide assumes that the reader is familiar with:

- * Standard procedures for installing Personal Computer (OWS) peripherals, including grounding and power requirements
- * The MS-DOS operating system
- * The ND Desk Top Manager (DTM) program and installation procedures
- * The basic concepts for LANs and network management

Related Manuals

Configuring a LAN (on the ND Host machine) is explained in the manual **ND-30.107 OpenLAN Network Supervisor Guide**.

Supervision of a workstation (i.e., backup, disks, maintenance etc.) is covered in the manual **ND-30.094 OWS System Reference Manual**.

A quick reference to installation of the Adapter Card is described in the reference card **ND-99.115 How to install the OWS OpenLAN Adapter card in the OWS**.

Other Related Manuals:

ND-60.326 Using the OWS with Non-ND Hosts

ND-60.295 OWS User Guide

The Products

The OpenLAN adapter is available in two different versions. One card is for THICK Ethernet cabling systems (sometimes called PCET1) and another card for CHEAPERNET (thin) Ethernet systems (called PCET2). See Appendix B for more info about cabling systems. These adapter cards provide a communications-interface between an OWS workstation and the OpenLAN local area network via an Ethernet connection.

ETHERNET ON THE WORKSTATION

Standard (thick) Ethernet Cabling Systems:

ND 110386 The OpenLAN Adapter/Ethernet consists of:

1. PCET1 Adapter card
2. OWS OpenLAN Setup Diskette ND 230033
3. How to install OpenLAN Adapter ND 99.115

Cheapernet (thin) Ethernet Cabling Systems:

ND 110394 The OpenLAN Adapter/Cheapernet consists of:

1. PCET2 Adapter card (Cheapernet)
2. OWS OpenLAN Setup Diskette ND 230033
3. How to install OpenLAN Adapter ND 99.115

Norsk Data wishes to thank Bridge Communications Inc. for their help and assistance with this manual.

OpenLAN is a trademark of Norsk Data, Inc.

ILANA, ILANA/XT are trademarks of Bridge Communications, Inc.

IBM PC XT is a trademark of International Business Machines Corporation.

UNIX is a registered trademark of AT&T.

Intel is a trademark of Intel Corporation.

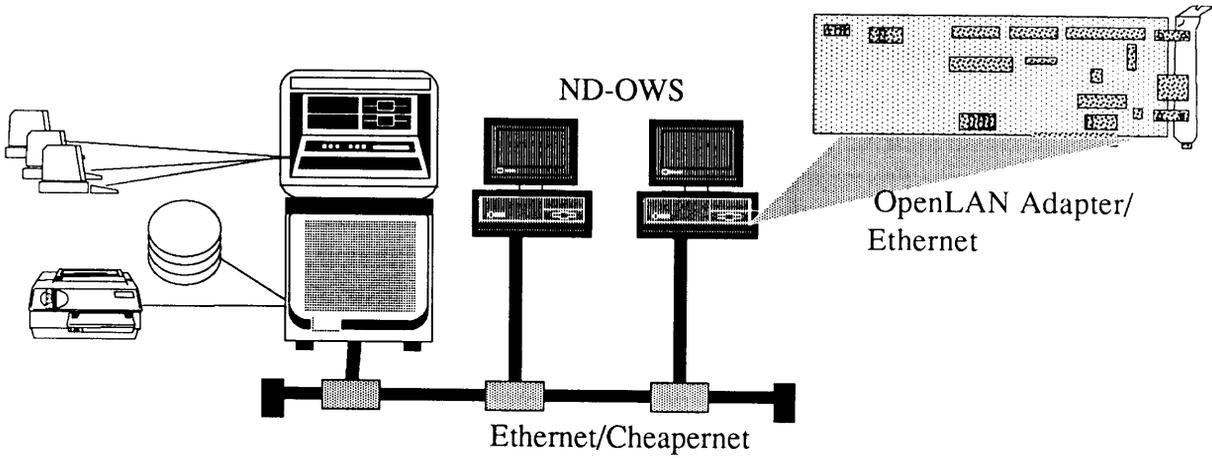
MS-DOS is a trademark of Microsoft Corporation.

Chapter One: Introduction

This manual describes configuration, verification and setup of the OWS OpenLAN Adapter/Ethernet card. This card provides a communication interface between ND workstations and ND-mini host machines, servers, and other peripheral devices. This communication is based on TCP/IP (Berkley's 4.2 BSD) protocols over Ethernet Local Area Networks.

Included with the OpenLAN software is the program FTP. This program is UNIX's File Transfer Protocol and is provided so that your OWS can transfer files to and from non-ND machines also connected to the network (i.e., SUN, DEC, IBM, or any others which support TCP/IP protocols). Transfer of files between ND machines is made easy by offering menu choices in the Desk Top Manager. For instructions on the use of Desk Top Manager, see the manual **OWS-55 User Guide ND-60.295**. For instructions about use of the FTP included in this package, see manual **Using the OWS with Non-ND Hosts ND-60.326**.

An OpenLAN network may consist of a number of OWS workstations, ND-Mini Host machines, servers, printers and specialized devices.



The OpenLAN adapter card is a high-performance network interface controller for OWS workstations. With the OpenLAN Adapter software, the Adapter cards enable your workstation to share resources with mainframes, terminals, peripherals, and other workstations connected to your network.

Adapter Card Features

Designed as communications interfaces for LAN environments, the OpenLAN Adapter for Ethernet provides your workstation with the physical and electrical links necessary to communicate with communications- and data processing-equipment attached to an Ethernet network. A powerful on-card microprocessor offloads all protocol processing from the workstation, thereby increasing the speed and efficiency of network communications between your workstation and other network devices.

The Adapter Card (PCET) hardware operates at the physical and data link level of the Open Systems Interconnect (OSI) reference model, thereby supporting the high-level network protocol Transmission Control Protocol/Internet Protocol (TCP/IP).

The following sections highlight the Adapter Card features.

Physical Description

The Adapter cards support a network interface with either a standard Ethernet (PCET1) or Cheapernet (PCET2) cabling system. The standard Ethernet version of the card (PCET1) uses an external IEEE 802.3 transceiver to transmit and receive data packets on the network. The Cheapernet version of the card (PCET2) uses a built-in transceiver to transmit and receive network packets. The Adapter card also implements the CSMA/CD collision detection scheme.

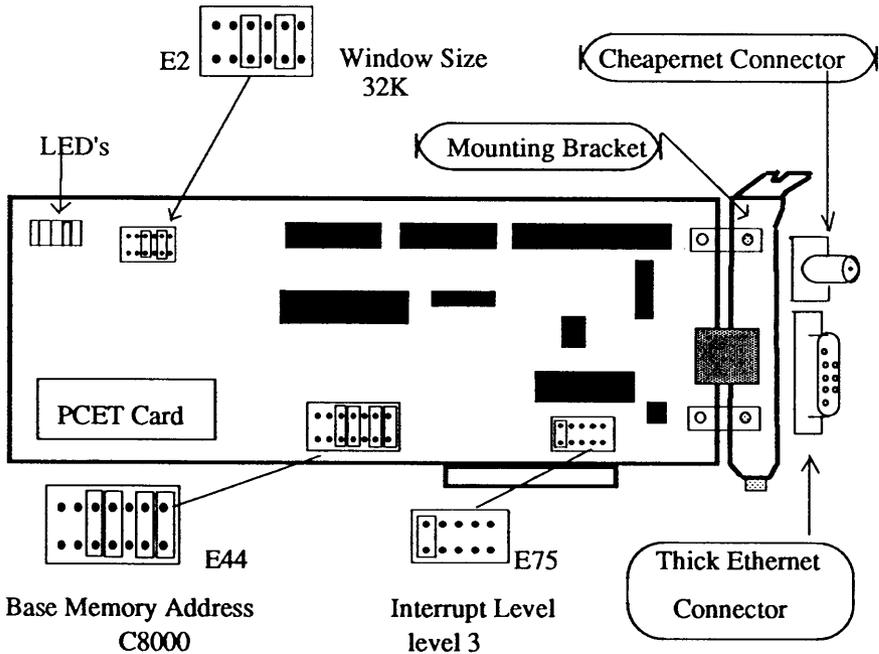
The Adapter card is a standard IBM PC XT form factor card. It occupies one 8-bit expansion slot of an IBM PC XT and measures 13.33" x 4.20" (33.86 x 10.67 centimeters) overall. It can also be installed in an 8-bit or 16-bit expansion slot of

an IBM PC AT; however, ND recommends reserving 16-bit expansion slots for 16-bit devices. Card specifications are listed in Appendix A.

The following physical features combine to provide the PCET's high-performance network interface capability:

- Motorola 68000 microprocessor (8 MHz)
- Intel 82586 LAN Coprocessor
- Intel 82501 Ethernet Serial Interface
- Intel 82502 Transceiver (Cheapernet only)
- Shared memory buffer (512-Kilobytes RAM)
- Power-on diagnostics in firmware
- Standard (IEEE 802.3) or Cheapernet interface

The following figure shows the placement of hardware components on the Adapter card. The figure indicates the positions of the LEDs, configuration areas, cable connectors, Ethernet address PROM, and mounting bracket.



Chapter Two: Hardware Configuration

This chapter describes the Adapter configuration areas, possible configuration values, and configuration instructions for each card.

For quick installation instructions, refer to the HOW TO INSTALL THE OWS OpenLAN ADAPTER booklet included with your Adapter card.

Each personal computer adapter, such as a graphics card, serial adapter card, or PCET card, must have a unique configuration for the computer to operate properly. If the factory-set (default) configuration of the Adapter card conflicts with the configuration of other adapter cards installed in your personal computer (OWS), the computer will fail to operate properly, and you must reconfigure one of the conflicting cards.

To determine whether a conflict exists, you must compare the configuration of the Adapter card with the configuration of other adapter cards in the OWS. Configuration information for adapter cards manufactured by the other companies should be provided with each device.

Configuring the Adapter card

This section provides instructions for configuring the Adapter card. It describes the shared memory window size, base memory address, interrupt level, and the proper jumper positions for each area.

The Adapter card is shipped with default values for the shared memory window size(E2), base memory address(E44), and interrupt level(E75). All other configuration areas on the card should not be changed, as they are not used by Norsk Data.

Any changes to the default configuration must also be made when filling-in the OWS OpenLAN Setup Menu. Record any changes you make.

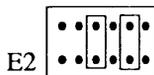
In the event of a conflict on your machine with other OWS adapter cards, the configuration values can be changed. You can change these values by simply resetting the jumper plugs in the appropriate configuration area to match the values listed in the following three figures.

Refer to the previous figure for the Adapter configuration areas used by Norsk Data and their default jumper settings.

NOTE!
Record any changes that you make to the Adapter card's configuration.

Shared Memory Window Configuration

The shared memory window is the amount of random access memory (RAM) on the Adapter card accessible to the personal computer. The OWS uses this memory space to interface with the Adapter. The shared memory window size for the Adapter is 32K. This value **MUST** be set at 32K. The following figure shows the shared memory window (area E2) jumper settings.



Area E2
Default ND Settings.
Shared Memory Window
Configuration.

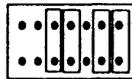
Base Memory Address Configuration

The base memory address determines for the OWS the starting location of the shared memory window. Because of the size of the shared memory window selected, the base address must be set on a 32-Kilobyte boundary and it must not conflict with or overlap the base address location of RAM, ROM, or other adapter cards.

NOTE!

The Adapter memory must never be recognized as RAM by the OWS during power-up diagnostics. To prevent this, you must select a base memory address that is not contiguous with the computer's RAM address space.

The following figure shows the base memory address range and the default jumper settings. The default base address associated with your Adapter card is listed below. For a list of valid alternate base memory addresses, refer to the memory allocation map in the **MS-DOS User Guide**. The following figure shows the base memory address configuration area (E44) and the default jumper plug settings.



E44

Area E44

Default ND Settings.

Base Memory Address
Configuration.

Base Memory Address Configuration			
Area	Pin	Plug Position	Binary Value
E44	19	out	1
E44	18	out	1
E44	17	in	0
E44	16	in	0
E44	15	out	1
E44	14	in	0
E44	13	in	0

C8000 / Hexadecimal:

The seven jumper plug positions represent the OWS's high order address bits (13 through 19). The "Out" and "In" positions of the jumpers indicate the physical position of the plugs on the pins. To alter the base address, you should determine the shared memory window size (32-kilobytes, as described in the previous section) and follow the example below.

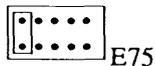
1. On a 32-kilobyte boundary, determine a valid base address from your OWS's technical reference manual.
2. Convert your base address from hexadecimal to binary.
3. Set the seven jumper plug positions in configuration area E44 In (0) or Out (1) to match the seven high order address bits (13-19) of the binary base address. The eighth address bit, 12 (not shown) is disregarded.

Interrupt Level Configuration

To avoid conflicts with other devices in the OWS that use the same interrupt level, the interrupt jumper plugs allow you to select one of several interrupt request levels having different priorities. An interrupt request signals the personal computer processor that the Adapter has information to transfer or requires information from the OWS.

Interrupt request levels 3 through 7 (IRQ3-7) are prioritized from highest (3) to lowest (7).

The following figure lists the interrupt request levels and shorting positions, and shows the default jumper plug settings. Only one plug is used to select the interrupt level.



Area E75
 Default ND Settings.
 Interrupt level Configuration.

Interrupt Level			
Area	Pin	Plug Position	Interrupt Level
E75	3	In	Highest
E75	4	Out	-
E75	5	Out	-
E75	6	Out	-
E75	7	Out	Lowest

Chapter Three: Hardware Troubleshooting

Installation of the Adapter Card is described in manual ND-99.115 **How to install the OpenLAN Adapter Card in the OWS.**

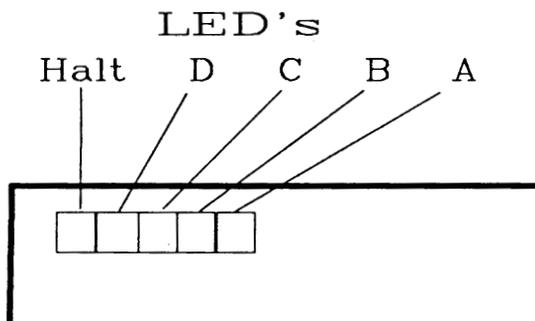
This chapter gives instructions for troubleshooting the installation of the Adapter card in an OWS Workstation 12, 55 or 85. Installing the card in any other PC is not supported by Norsk Data. After you have installed the card, follow the startup and verification procedure in the next chapter.

WARNING!

Removing the system cover exposes you to potential shock hazards. All service should be performed by qualified service personnel and only when equipment is powered off and the power cable is disconnected from the wall outlet.

Startup and Verification

This section describes the procedure for verifying proper installation of your Adapter card. This procedure is performed with the computer cover removed. The state of the LED's located at the top edge of the card is used to verify proper operation of the card. The figure on page 4 shows the location of the LED's on the Adapter card. The following figure shows the placement of LEDs A, B, C, D, and Halt. Refer to Appendix D for more information about interpreting error messages from these LEDs.



Follow the steps below to verify proper installation:

1. Power On

With the system cover off, plug in the power cord and power on the system.

2. Observe LEDs

Observe the LEDs located on the top edge of the card. Each of the LEDs lights briefly and then turns off as diagnostic self-tests are performed on the main processor, network controller, and shared memory sections of the card. During the test procedure, the LED's will flicker for about 30 seconds.

If the LEDs fail to light or remain lit longer than three minutes, or the system fails to operate properly, refer to the next section for troubleshooting procedures. Appendix D also offers a description of the Hardware Diagnostics program.

3. Power Off, Replace Cover

When the card successfully completes its self-tests, all of the LED's turn off and your Adapter card should be operating properly. Power off the system again and replace the cover. If the tests are successfully completed, skip the next 2 sections.

Troubleshooting the Hardware Installation

If you have successfully completed the startup and verification, skip this section and replace the cover. If the Adapter card or personal computer fails to operate properly during startup or verification, it may not indicate that the Adapter card is bad. Before you contact a ND Communications representative for assistance, try the following procedure:

1. Check the Adapter configuration described in Chapter 2.
2. Repeat the software installation procedure as described in ND-99.115.

3. Run the diagnostic program described in Appendix D

Additionally, if any of the following **SYMPTOMS** exist, refer to the following sections for troubleshooting hints:

SYMPTOMS

Personal computer (OWS) does not power on
OWS does not respond to commands
Console-monitor error messages appear
Adapter card LEDs fail to light or remain lit
Monitor screen-display dark or message garbled

The **OWS System Reference Manual (ND-30.094)** contains more troubleshooting information.

SYMPTOM - System Does Not Power On

If the system fails to operate after you power it on, try the following suggestions:

Power off the system. Unplug the power cable from the wall outlet and plug it in again then power on the system. Test for power at the wall outlet by plugging in another device. Select another outlet on a different circuit if necessary.

Power off the computer, disconnect the power cord, and check the line fuse. If the fuse is blown, remove the Adapter card from the personal computer, replace the fuse, and power on the computer. If the computer powers on after removing the card, repeat the installation procedure, checking all cable and card connections carefully. If the fuse blows again, power off the system, unplug the power cord, and call ND.

SYMPTOM - System Does Not Respond to Commands

If the system power is on, but your system fails to respond to commands entered at the keyboard, try the following suggestions:

Power off the computer, wait 30 seconds, and then power it on again.

Power off the system and disconnect the keyboard cable. Reattach the cable and power on the computer.

Remove the Adapter card from the personal computer; then power on the computer. If the personal computer works with the card removed, check the configuration of the Adapter card and resolve any configuration conflicts. Any conflict between the configuration of the Adapter card and other adapter cards mounted in the computer may cause the computer to respond incorrectly or fail to respond at all.

Repeat the installation procedure. Check the configuration of the adapter cards in the personal computer for memory space overlap. For example, if the address space for the Adapter card and the address space for the graphic display card overlap, commands and text entered at the keyboard will not be displayed on the monitor screen. To prevent this overlap, reconfigure the conflicting adapter card according to the instruction manual provided with that device.

Check the state of the LEDs on the Adapter card and look up the related diagnostic test in Appendix D; then contact a ND representative for assistance.

SYMPTOM - Console Monitor Error Messages

Appendix D describes the error messages that appear on a personal computer monitor when running the diagnostic program. For a description of error messages not listed in Appendix D, refer to the **OWS System Reference Guide**.

If you receive an error message, try the following suggestions:

Power off the computer and unplug the power cable. Check all card and cable connections between the computer and monitor. Power it on and check for error messages.

Power off the computer and unplug the power cable

Compare the Adapter card's configuration with the configuration of other adapter cards mounted in the computer. Any conflict between these configurations may cause a diagnostic test failure. Reconfigure the conflicting adapter card and power on the personal computer again.

If the error message remains, verify that the error message is related to the Adapter card by comparing the state of the LEDs with the error messages listed in Appendix D; then call a ND representative for assistance.

SYMPTOM - LEDs Fail to Light or Remain Lit

The LEDs on the Adapter card are used to verify its proper operation. The state of the LEDs indicates the card status and provides a binary representation of the diagnostic self-test in progress.

If the LEDs fail to light or remain lit, try the following suggestions:

Check the state of the LEDs on the Adapter card and look up the related diagnostic test in Appendix D. By using the Diagnostic program diskette you can verify the test failures indicated by the LEDs. The diagnostic program diskette will display test failures directly on the personal computer's monitor.

Appendix D describes the diagnostic facilities available with the Adapter card and explains how to run the diagnostic program.

Power off the personal computer, wait 30 seconds, and power it on again.

Compare the configuration of the Adapter card to the configuration of other adapter cards mounted in the personal computer. Any conflict between these values may cause the personal computer to respond incorrectly.

Check the configuration of the adapter cards for memory space overlap. For example, if the Adapter card's base memory address space overlaps the base memory address space of a graphics adapter card installed in the personal computer, the Adapter card will fail to complete its diagnostic tests.

To resolve the conflict, reconfigure the appropriate adapter card, power on the computer, and check the status of the LEDs.

Repeat the Adapter installation procedure, checking all cable and card connections carefully. Firmly press the adapter cards into the expansion slots.

SYMPTOM - Screen Display Dark or Display Message Garbled

If your system monitor display screen appears unusually light or dark, or the screen message is garbled, you may have dislodged one of the graphics card connections or accidentally bumped the monitor contrast knob while installing the Adapter card. Try the following suggestions to resolve the problem:

Adjust the contrast setting of the monitor.

Compare the Adapter card's configuration with the configuration of other I/O devices mounted in the computer. Any conflict between these values may cause a monitor failure. Reconfigure the Adapter card or conflicting device, power on the system, and check for proper operation of the monitor.

Repeat the installation procedure, checking all connections carefully. Firmly press the adapter cards into the expansion slots.

Check the state of the LED pattern on the Adapter card and look up the related diagnostic test in Appendix D; then contact a ND representative for assistance.

Chapter 4 **Installing the OpenLAN Adapter Software**

This chapter describes the installation of the OpenLAN Adapter software. Installation procedures are also described in the manual ND-99.115.

The software installation is started by executing the SETUP.exe program found on the **OWS OpenLAN Setup Diskette (ND 230033)**.

The initialization software is loaded into your OWS's hard disk. After setting and storing the necessary values, you will use this software to start OpenLAN communications in the future.

Setup Diskette - Files Included

The following files are contained on the OWS OpenLAN Setup diskette. The <dir> command in DOS will display the system files.

CONNECT.EXE Connection program (OWS to HOST)

DIAG.EXE Hardware Diagnostics program

FTP.EXE File transfer program for transferring files to non-ND machines running TCP/IP

FTP.PIF Windows - Program information file for FTP.Exe

ILANA.BIN OpenLAN protocol software

ILANALOD.EXE Loads and initializes the OpenLAN software

ILANADRV.SYS OpenLAN DOS driver

PCSGLOBAL.DAT Configuration information is saved to this file. It contains the Internet addresses, welcome string, and prompt.

PCSDRV.EXE Protocol terminate and stay resident program

PORT.EXE Dynalink library which compiles all parameters and executes Connect.Exe file

SELECT.EXE Utility program which allows you to view and choose any Host machines defined on the network.

SETUP.EXE Setup Program

SETUP.COM Command file for Setup.exe program

SETQUICK.EXE Quick Setup program for OWS machines pre-configured by Norsk Data

The OpenLAN Setup program will do the following:

1. Set the configuration parameters
2. Save any existing CONFIG.SYS and AUTOEXEC.BAT files as CONFIG.OLD and AUTOEXEC.OLD
3. Modify the CONFIG.SYS and AUTOEXEC.BAT files
4. Copy all Adapter files from the master diskette to the specified directory on your hard disk

OWS OpenLAN System Files

This section describes the command lines that the Setup Program inserts into the CONFIG.SYS and AUTOEXEC.BAT files. To manually modify an address, filename, or subnet address, make the changes in the appropriate command line in either of these two files.

DEVICE Command Line

SYNTAX:

```
DEVICE = \<PATH>\ILANADRV.SYS(/B<ADDRESS>)/  
i<INT>)(/W<SIZE>)
```

DESCRIPTION:

The CONFIG.SYS file must include this line defining the Adapter device driver (ILANADRV.SYS). Ensure that this line is present.

The parameters are defined below:

- /b or /B** This parameter specifies in hexadecimal the base address of the Adapter interface shared memory. The address must be within the 1 megabyte of DOS address space. The default value of the address is C8000.
- /i or /I** This parameter specifies the hexadecimal interrupt request level that the Adapter board generates. The following are allowable interrupt values for the Adapter board; 3,4,5,6,7 with 3 being the highest priority and 7 being the lowest. The default is 3.
- /w or /W** This parameter specifies the window size in kilobytes. Only the 32 kilobyte size is available for the Adapter.

ERROR MESSAGES:

"ILANADRV:Illegal parameter"

ILANALOD Command Line

SYNTAX:

\<PATH>\ILANALOD <IPADDRESS> (<SUBNET MASK>)

DESCRIPTION:

The AUTOEXEC.BAT file must contain the ILANALOD command line. Whenever you start DOS, the ILANALOD command loads the Adapter software into the Adapter's memory. This command must be issued before the Adapter interface becomes functional. The file containing the Adapter software is named ILANA.BIN. It must be in the same directory as the ILANALOD.EXE program.

The parameters are defined as follows:

IPADDRESS This parameter specifies the Internet address used by the Personal computer.

SUBNET MASK This parameter specifies the Internet subnet mask to be used by the OWS. If the subnet field is not given, it assumes that the Adapter interface is not a subnet.

NORMAL RESPONSE

"ILANA station address-<address>."

ERROR MESSAGES

"Fatal error - ILANADRV.SYS has not been installed."

"Fatal error - Invalid ILANADRV.SYS."

"ILANA.BIN is already loaded."

"ILANA.BIN has bad file format."

"ILANALOD cannot find file ILANA.BIN"

"ILANALOD cannot open file ILANA.BIN"

"ILANALOD cannot access file ILANA.BIN"

"ILANA failed CPU test."

"ILANA failed Network Controller test."

PCSDRV Command Line

SYNTAX:

\<PATH>PCSDRV

DESCRIPTION:

This command line should be the second line of the AUTOEXEC.BAT file. The PCSDRV is the PCS/1 driver, a Terminate and Stay Resident program that must be invoked after the ILANALOD program and before any network application that utilizes the TCP/IP protocols.

NOTE!

The PCSDRV command line should not be present if you are using a NETBIOS interface. The AUTOEXEC.BAT file should contain either PCSDRV or PCSNBRDRV, or both. The command has no parameters.

ERROR MESSAGES:

"Fatal Error - ILANADRV.SYS has not been installed"

"Fatal Error - Invalid ILANADRV.SYS."

"Fatal Error - ILANADRV.SYS has not been initialized"

"Fatal Error - ILANADRV.SYS failed to initialize."

"Invalid ILANADRV.SYS configuration."

"PCSDRV is already resident"

SETUP.EXE Program Menu

The setup.exe program displays the following menu:

1. PCET Card Level	XT
2. Interrupt Level	3
3. Window Size	32K
4. Memory base address	C8000
5. Internet Address of OWS	000.000.000.000
6. Subnet Mask	000.000.000.000
7. ECM Character	^^
8. Break Action	3 (Send Break)
9. BAPI prompt	"PCS/1"
10. Installation media	Hard Disk
11. Pathname to locate files	C:\ND-OWS\Comms
Enter Command (Esc to Exit)	

Note the default values shown.

Lines 1-4 must correspond to the values set in the configuration area jumper settings. Any differences here will cause the installation to fail. Refer to the previous chapter if you are in doubt.

Lines 5 and 6 concern the IP address of the local OWS machine. See manual **OpenLAN Network Supervisor Guide ND-30.107** for more information about IP addresses and subnet masks.

Lines 8-10 are options not used by Norsk Data and cannot be changed.

Line 11 defines the path where the OpenLAN software will be installed. Norsk Data recommends that this path remains as default (C:\ND-OWS\COMMS).

AIP-Hosts File

Each OWS machine must have a local copy of the AIP-HOSTS:SYMB file. This file lists all the eligible hosts defined on the network, and includes each machine's alias names and IP addresses. This file must reside in the directory C:\ND-OWS\COMMS under filename "HOSTS.". Use of any other name will invalidate installation.

This file must be copied from a Host Computer to the OWS in order for the installation to be complete. It is the responsibility of the Network Supervisor to aid users in installation of the OWS adapter card and software.

In order to copy this file to the OWS, the Network Supervisor must know the IP address and DS port numbers for the Host machine which contains the AIP-HOSTS:SYMB file. This file should reside on the host machine under the user SYSTEM, and must have public READ access. This file (on the Host Machine) **MUST** be stored in 8 bit format (or 7 bit with parity off), so that the Copy Document function in DTM can correctly read the file. Failure to do so will hinder OWS users in obtaining the file. OWS users can avoid this problem if the AIP-HOSTS:SYMB file is copied over to the OWS in another manner (i.e., by using FTP or Diskettes). See manual **ND-30.107 OpenLAN Network Supervisor Guide**, for more information about the AIP-HOSTS:SYMB file.

Appendix A - Hardware Specifications

This appendix describes hardware electrical and environmental specifications for the Adapter cards.

Section A.1 describes Adapter specifications. Section A.2 provides a brief functional description of the hardware architecture.

Section A.1 ADAPTER HARDWARE SPECIFICATIONS

<u>Module</u>	<u>Component Specifications</u>
CPU	Motorola 68000 16-bit microprocessor (8 MHz)
MEMORY	512 KB dynamic RAM (16 256Kb x 1) Maximum access time 150 ns
	32, 64, or 128 KB EPROM (-27128, -27256, -27512) Maximum access time 250 ns
	8, 16, 32, or 64 KB Optional PROM Maximum access time 250 ns
	32-byte network address PROM
	Intel 8253-5 Programmable Timer
	8-bit personal computer bus interface
NETWORK	
INTERFACE	Intel 82586 Ethernet Controller (8 MHz)
	Intel 82501 Ethernet Serial Interface
	Intel 82502 Ethernet Transceiver (Cheapernet interface only)
I/O	Bus Interface Connector (Refer to Appendix C)

ADAPTER CARD ELECTRICAL SPECIFICATIONS

Voltage	Current
+5 Vdc	2.95 Amps Maximum
+12 Vdc	288.7 Milliamps*
+12 Vdc	111.1 Milliamps (Cheapernet)

*transceiver connected

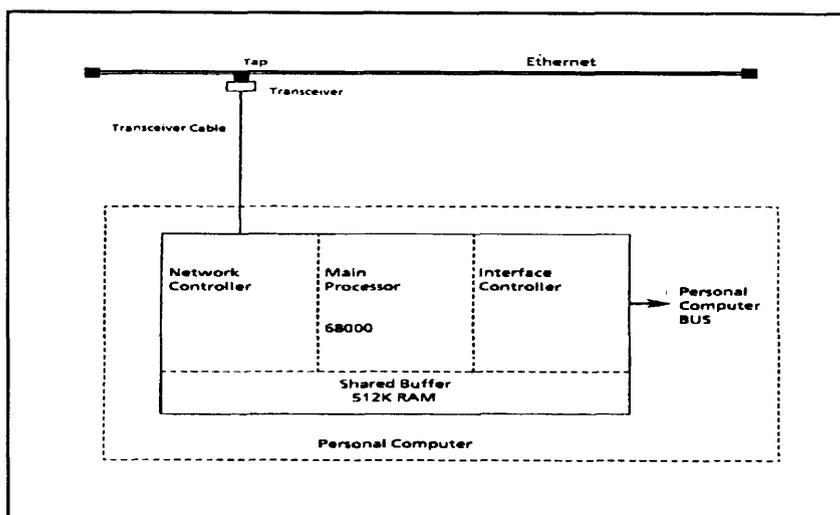
ADAPTER ENVIRONMENTAL REQUIREMENTS

Environment	Minimum	Maximum
Storage Temperature	-13 degF	140 degF
	-25 degC	60 degC
Operating Temperature	41 degF	104 degF
	5 degC	40 degC
Altitude	Sea level	12,000 ft (3,657 m)
Humidity	10%	90%

Section A.2 HARDWARE FUNCTIONS

The Adapter card's high performance results from a combination of hardware and firmware components managing communications services between the personal computer and the network.

This section offers a brief description of the Adapter hardware architecture.



ARCHITECTURE

The card comprises four sections: the Main Processor section, the Interface Controller section, the Network Controller section, and the Shared Memory Buffer section. These sections communicate via internal buses. The following sections describe these hardware modules.

ADAPTER SYSTEM ARCHITECTURE

MAIN PROCESSOR SECTION

The Main Processor section of the Adapter card is responsible for protocol processing and buffer management. This module is based on a Motorola 68000 microprocessor running at 8 MHz. It contains 512 kilobytes RAM; up to 128 kilobytes EPROM; a network station address PROM; a 3-channel 16-bit programmable timer; and support circuits for interrupt control, bus control, and system timing. The timer, USART for modem control, and EPROM reside on the 68000's local bus.

Interrupt control and bus control are implemented with custom logic circuits. Interrupt signals to the 68000 are autovectored and prioritized. The 82586 LAN Coprocessor interrupt to the 68000 has the highest priority, while the channel attention interrupt from the personal computer is attended to next. The software tic interrupt from the timer receives the lowest priority.

The bus controller arbitrates access to the system bus between the memory refresh, network controller, personal computer, and the 68000 microprocessor circuits. The memory refresh circuit receives the highest priority to the system bus, followed by the network controller, personal computer, and finally the 68000 microprocessor.

INTERFACE SECTION

The Interface Section of the Adapter card uses the shared memory buffer, interrupt level, and system bus to interface with the personal computer. You can select the interrupt level by changing the jumper configuration on the card. Section 3 provides configuration information for the card. The personal computer communicates with the Adapter card through the shared memory and three ports set up in the shared memory address space. By writing to one of these ports, the personal computer generates Clear Interrupt,

Channel Attention, and card Reset signals to the Adapter card.

The entire shared memory buffer is accessible to the personal computer. The base address of the shared memory space as seen by the personal computer is jumper selectable. The shared memory window size is also jumper selectable. Through shared memory, the Adapter transfers information to and from the personal computer.

The Adapter card interrupts the personal computer using the interrupt port. A read or write to this port causes an interrupt to the personal computer. Interrupt levels have different priorities with interrupt request levels 3 through 7 (IRQ3-7), IRQ7 being the lowest.

NETWORK CONTROLLER SECTION

The network controller is a high-performance module that implements the network data link functions and buffers incoming packets from the network. The controller provides an interface that is compatible with IEEE 802.3 standards. The controller offers programmable features such as chaining DMA, promiscuous mode, and loopback mode. This section is also capable of receiving back-to-back network packets. In Ethernet systems, the controller module contains an Intel 82586 LAN Coprocessor, running at 8 MHz, connected to an 82501 Ethernet Serial Interface. The Ethernet controller module transmits data over the network at 10 Mbps. When transmitting data to the network, the 82586 retrieves data from RAM, packets the information into frames, and calculates the cyclic redundancy check (CRC) to append to the frame. When receiving data from the network, the 82586 LAN Coprocessor strips the framing, checks the address, and checks the CRC.

The 82501 performs Manchester encoding and decoding of frames transmitted and received over the network. The 82501 also supplies the interface connections to the network transceiver.

On Cheapernet versions of the Adapter card, the network controller has the same physical and electrical specifications as the standard Ethernet controller but with two differences: an integrated network transceiver and smaller (RG-58 type Cheapernet) network cable. The oncard 82502 transceiver chip conducts transmit, receive, collision detection, and anti-jabber functions. The transceiver chip is isolated from the rest of the network controller circuit by several pulse transformers and a DC-to-DC converter. The thin, RG-58 type Cheapernet network cable is connected to the Adapter card via a BNC "T" connector.

SHARED MEMORY BUFFER SECTION.

The shared memory buffer is a high-speed three-port memory array that is accessible to the network controller and main processor sections of the Adapter card as well as the personal computer. The bus controller arbitrates access to the memory buffer. The shared memory buffer provides up to 512 kilobytes of shared RAM.

Appendix B - Cabling Systems

This appendix describes OpenLAN Cabling options which can be connected to the Adapter Card. For more information see **ND-13.037 OpenLAN Product Family** or contact your ND representative.

Section B.1 STANDARD (THICK) ETHERNET CABLING SYSTEMS:

ND-110386 OpenLAN Ethernet Adapter/Ethernet consists of:

1. PCET1 Adaptor card
2. OWS OpenLAN Setup Diskette ND 230033
3. How to install the OpenLAN Adapter (ND-99.115)

Options:

OWS Transceiver drop cables:

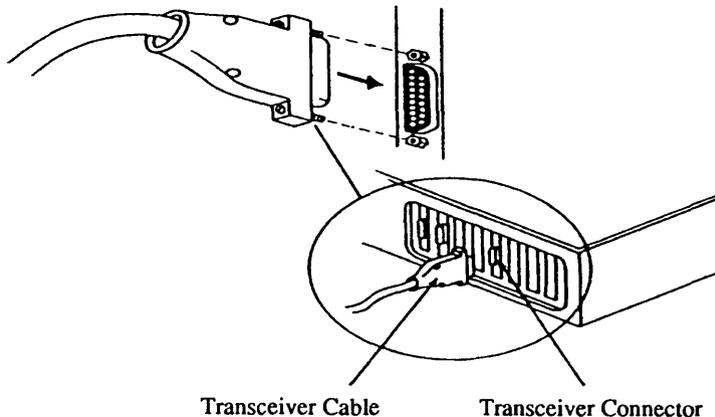
- ND-110403..OWS Ethernet Transceiver Cable, 5m
- ND-110404..OWS Ethernet Transceiver Cable, 15m
- ND-110405..OWS Ethernet Transceiver Cable, 25m

Ethernet Physical Medium Attachment:

Transceivers physically and electrically connect Ethernet nodes to the Ethernet or Cheapernet Coaxial Cable.

ND-107740..Ethernet Transceiver (BICC-1114-1)

ND-110414..Cheapernet Transceiver (BICC-1114-3)



Transceiver Cable

Transceiver Connector

Section B.2 CHEAPERNET (THIN) ETHERNET CABLING SYSTEMS:

ND-110394 OpenLAN Ethernet Adapter/Cheapernet consists of:

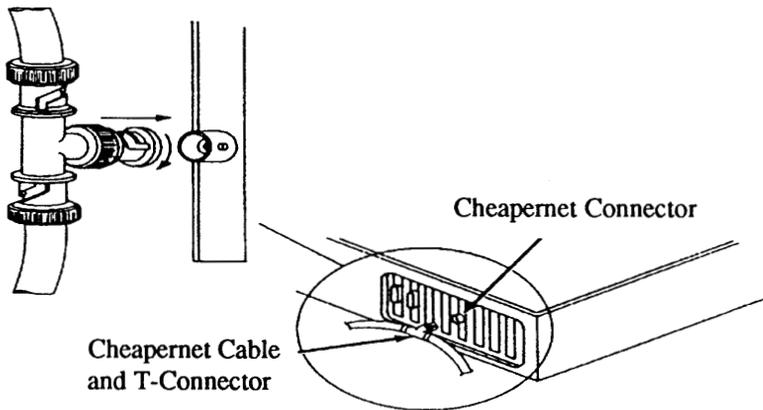
1. PCET2 Adaptor card (Cheapernet)
2. OWS OpenLAN Setup Diskette ND 230033
3. How to install the OpenLAN Adapter (ND-99.115)

ND-110415..Cheapernet T-connector

A Cheapernet T-Connector is required to connect a Cheapernet node to the cheapernet coaxial cable.

Cheapernet Coaxial Cable Lengths:

- ND-110406..Cheapernet Coax Cable, 5m
- ND-110407..Cheapernet Coax Cable, 10m
- ND-110408..Cheapernet Coax Cable, 15m
- ND-110409..Cheapernet Coax Cable, 25m
- ND-110412..Cheapernet Coax Cable, 50m



Appendix C - Interface Connections

Section C.1 ADAPTER BUS INTERFACE CONNECTIONS

Connection	I/O	Signal	Function
A1	--	NC	No connection
A2-A9	I/O	SD7-SD0	Data bits 7-0
A10	O	CHRDY	I/O channel ready
A11	I	AEN	Address enable
A12-A31	I	SA19-SA0	Address bits 19-0
B1	--	GND	Ground
B2	I	RESET DRV	Reset system
B3	--	+5VDC	+5 volts DC
B4	O	IRQ2	Interrupt request 2
B5-B6	--	NC	No connection
B7	--	-12V	-12 volts DC
B8	--	NC	No connection
B9	--	+12V	+12 volts DC
B10	--	GND	Ground
B11-B20	--	NC	No connection
B21-B25	O	IRQ7-IRQ3	Interrupt request 7-3
B26-B27	--	NC	No connection
B28	I	BALE	Address latch enable
B29	--	+15V	+15 volts
B30	--	NC	No connection
B31	--	GND	Ground

Section C.2 BASEBAND CONNECTOR PIN ASSIGNMENTS

Pin No.	I/O	Signal	Function
1	--	NC	No connection
2	I	+COL	+Collision detect
3	O	+XMT	+Transmit data
4	--	GND	Ground
5	I	+RCV	+Receive
6-8	--	GND	Ground
9	I	-COL	-Collision detect
10	O	-XMT	-Transmit data
11	--	GND	Ground
12	I	-RCV	-Receive
13	--	+12Vdc	+12 volts DC
14-15	--	GND	Ground
Connector shell	--	GND	Protective Ground

Appendix D - Hardware Diagnostics

This section describes the oncard diagnostic self-tests and diagnostic program facilities available with the Adapter cards.

All Adapter products contain oncard diagnostic self-tests in PROMs and have associated test status lamps (LEDs). The "on" or "off" state of the LEDs identifies the card level test in progress and indicates if the test has passed or failed. Additionally, each Adapter card intended for use in a DOS environment is shipped with a diagnostic diskette. This diskette contains programs that test the connection between the workstation and the Adapter card and display the test results on your computer's monitor

Section D.1 describes the oncard diagnostic self-test functions. Section D.2 describes the DOS diagnostic program and explains how to use it.

Section D.1 DIAGNOSTIC SELF-TESTS

This section describes the diagnostic self-test operation, and it explains the LED test states. It also explains how to configure the Adapter card's continuous self-test function.

OPERATION

Diagnostic self-tests are performed by the 68000 main processor and diagnostic/boot PROMs when the system is powered on or reset. These tests run independently of host computer system tests and ensure a high level of Adapter card integrity. Diagnostic tests are conducted on the Main Processor (MP) and Network Controller (NC) sections of the card.

The MP section is tested first. MP section tests include EPROM checksum; 8253 timer; 8253 timer interrupt; and RAM ripple, march, and refresh. Testing progresses from the most critical to the least critical components of the section. A component failure in this section halts all further testing of the Adapter card. The following section describes the LEDs.

After completing the MP section tests, the 68000 microprocessor tests the NC section of the card. NC tests cover the 8251 modem USART, the 82501 Ethernet Serial Interface, and the 82586 LAN Coprocessor. A component test failure in this section of the card does not halt the test program as it does in the MP section, but the LEDs related to the failed test remain lit.

When the tests are successfully completed, the system is ready to be booted. The bootstrap operation is application program dependent. For instructions on booting your system, refer to the **OWS System Reference Manual ND-30.094**.

LEDs

There are five LEDs on the Adapter card. The state of these LEDs identifies the diagnostic test in progress. The halt state LED indicates that the main processor has stopped. The section test LED (LED D) indicates whether the card is conducting MP or NC section tests. When LED D is off, it indicates the card is conducting MP tests. When LED D is on, it indicates the card is conducting NC tests. The state of the three remaining LEDs (C, B, and A) is a binary representation of the test being executed by the EPROMs.

The LEDs light momentarily during each test. Should any of the LEDs remain lit longer than three minutes, the test in progress has failed and the card should be replaced. All testing stops if the halt state LED remains lit. When the diagnostic tests finish, all of the LEDs turn off.

Refer to the figure on page 4 for the location of the LEDs on the Adapter card. Table D-1 summarizes the LED states and related diagnostic tests for the MP section of the card. Table D-2 summarizes the tests for the NC section of the card. Section D.1 lists the console screen messages. If the self-tests fail, the monitor retains control of the system and waits for further commands.

Table D-1 MP Diagnostic Self-Test Summary

Table D-1 MP Diagnostic Self-Test Summary						
Test No. (Hex)	LED					Test Functions
	H	D	C	B	A	
	On	x	x	x	x	Halt state
1	Off	Off	Off	Off	On	PROM checksum test
2	Off	Off	Off	On	Off	8253 Timer channel check (channels 0-2)
3	Off	Off	Off	On	On	RAM data bus ripple test
4	Off	Off	On	Off	Off	RAM address bus ripple test
5	Off	Off	On	Off	On	RAM march test
6	Off	Off	On	On	Off	RAM refresh test
7	Off	Off	On	On	On	8253 timer interrupt test
x = any state						

Table D-2 NC Diagnostic Self-Test Summary

Table D-2 NC Diagnostic Self-Test Summary						
Test No. (Hex)	LED					Test Function
	H	D	C	B	A	
	On	x	x	x	x	Halt state
1	Off	On	Off	Off	On	8251 modem UART test
2	Off	On	Off	On	Off	82501 carrier sense check
3	Off	On	Off	On	On	82586 internal self-test
4	Off	On	On	Off	Off	82586 internal loopback test
5	Off	On	On	Off	On	82586 multiplexer test
6	Off	On	On	On	Off	82586 external loopback test (multiple packets)
x = any state						

Continuous Self-Test

To configure the Adapter card for continuous self-testing, connect a jumper plug to pin position F in configuration area E2 on the Adapter card. Operating in this state, the card repeats the tests indefinitely.

A failure halts the diagnostic program and the LED indicators related to the failed test light and remain lit.

Section D.2 DIAGNOSTIC PROGRAM DISKETTE

The diagnostic diskette contains programs that allow you to test the functionality of the Adapter card from your workstation running MS-DOS.

This section describes test operation and explains how to run the diagnostic program.

OPERATION

The diagnostic program checks the connections between the workstation and the Adapter card and reads the results of the Adapter self-tests.

The diagnostic program begins by sending a software reset command to the Adapter card, which causes the card to restart. At startup, the card performs its diagnostic self-tests and writes the test results to its oncard memory. The diagnostic program reads these results from memory and displays test failure messages on the monitor screen. Section D.1 describes diagnostic self-test operation.

Next, the diagnostics program checks the address and data bus connections between the workstation and the Adapter card. To do this, the program writes information to various address locations in the Adapter memory, reads it back, and

checks it for errors. A test failure halts the program and exits to the operating system (DOS). If you select the program's continuous test option, the diagnostic tests will repeat indefinitely until an error is detected.

When the program successfully completes its tests, it exits to the operating system and displays the DOS prompt.

RUNNING THE DIAGNOSTIC PROGRAM

This section describes how to use the diagnostic diskette to verify proper operation of the Adapter card. In this section, complete each command by pressing the CR (return or enter) key.

If you make a mistake while performing any of the following steps, or you simply want to exit the diagnostic program, press the control-character sequence Ctrl-C, then repeat the steps starting at the DOS prompt.

1. Insert the OpenLAN SW Diagnostic Diskette.
2. At the A> prompt (C> prompt for hard disk systems), type the following command:

diag

The diagnostic program displays the following message:

ILANA/AT or ILANA/XT (enter X for XT, A for AT):

3. Enter **X**

The program will then prompt you for the configuration information determined in chapter 2 of this manual:

Shared memory window size:

Base memory address:

Interrupt level:

4. Enter the appropriate configuration value at each prompt.

```
Shared memory window size: 32K
Base memory address:      C8000
Interrupt level:          3
```

After you enter the interrupt level information, the program displays

Continuous testing (Y or N)?

5. Type either Y or N. If you type Y but later wish to discontinue the test procedure, press the control-character sequence Ctrl-C to exit the program.

While the diagnostic programming is running, it displays the following message:

Testing ...

If the test message lasts longer than 60 seconds, follow the original installation procedures again.

After the Adapter card successfully completes the diagnostic tests, the program will exit to the A> prompt, and you can remove the diagnostic diskette from drive A.

Once your Adapter card successfully passes the diagnostic program tests, you can proceed to software installation.

Table D-3 Diagnostic Program MP Test Summary

Table D-3 Diagnostic Program MP Test Summary	
<i>Test No.</i> <i>(Hex)</i>	<i>Test Functions</i>
0	Halt state
1	PROM checksum test
2	8253 Timer channel check (channels 0-2)
3	RAM data bus ripple test
4	RAM address bus ripple test
5	RAM march test
6	RAM refresh test
7	8253 timer interrupt test

Table D-4 Diagnostic Program NC Test Summary

Table D-4 Diagnostic Program NC Test Summary	
<i>Test No. (Hex)</i>	<i>Test Function</i>
0	Halt state
1	8251 modem UART test
2	82501 carrier sense check
3	82586 internal self-test
4	82586 internal loopback test
5	82586 multiplexer test
6	82586 external loopback test (multiple packets)

Table D-5 Diagnostic Program
OWS Interface Test Summary

Table D-5 Diagnostic Program PC Interface Test Summary	
<i>Test No. (Hex)</i>	<i>Test Function</i>
1	Address line test
2	Data line test

Adapter Card Features, 3
Base Memory Address, 7
Cabling System, 33
Card - Interface connections, 35
Configuration - Memory Window, 6
Configuration Hardware ,5
Connecting Cables ,33
Device Command Line ,21
Diagnostics program - HW,37
Diskette - Setup Program ,24
Features - Adapter Card, 3
Hardware Architecture, 3,27
ILANALOD Command Line, 22
Interrupt Level ,8
Interface connections ,39
LED indicators ,38
Memory Window, 6
OpenLAN Cabling Systems ,35
PCSDRV Command Line ,23
Physical Description ,31
Self-test HW ,41
Setup Diskette,24
Shared Memory Window ,6
Software installation ,19
Startup and Verification (HW) ,11
System Files ,20
Troubleshooting Hardware ,12, 37

