MYLEX

LNE390A/B Ethernet LAN Adapter
Installation and Operation Guide
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PREFACE

Thank you for your choice of a Mylex LNE390A/B host adapter. With proper installation and care, this Mylex product will operate for years without any service requirement. This Installation and Operation Guide will guide you In the installation process. The inform&on contained herein Is subject to change without notice.

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FCC NOTIFICATION

This device has been tested and found to comply within the limits of a Class B device, pursuant to Part 15 of FCC regulations. Operation is subject to the following two conditions:

1) This devke may not cause harmful interference, and

2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been designed to provide reasonable protection against harmful interference in a residential area This equipment generates, uses and can radiate radio frequency energy. This device, if not installed and used in accordance with the manufacturer's instructions, may cause harmful interference to radio communications. There is no guarantee, however, interference will not occur in a particular installation. Should it be determined that this equipment is causing interference to radio or television reception, the following suggested actions may be taken.

Reorient or relocate the receiving antenna. Increase the distance between the antenna and the computer. Plug the computer into a different AC outlet so that the two conflicting devices are using a different branch circuit. Contact the dealer that sold this equipment and/or a reputable radio/television service technician for additional suggestions.

Caution:

Only equipment certified to comply with Class B (computer Input/output devices, terminals, printers, etc.) should be attached to this equipment, and must have shielded interface cables.

Finally, any changes or modifications to the equipment by the user not expressly appproved by the grantee or manufacturer could void the users authority to operate such equipment.

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Chapter 1: -Introduction

Basic Description

The Mylex LNE390 series Ethernet Adapters provide a high performance, cost-effective interface for EISA host systems to any IEEE 802.3 compliant Local Area Network. There are two products in the LNE390 series.

Part Number	Date First Shipments	Network Support
LNE390A	October 1989	10Base5 ('Thick" Ethernet) or 10Base2 ("Thin' Ethernet)
LNE390B	June 1992	10Base5 ("Thick" Ethernet) or 10Base2 ("Thin' Ethernet) or 10BaseT (Twisted Pair)

The LNE390B incorporates all the features of the LNE390A, and adds support for Ethernet twisted pair (1 0BaseT).

Other features of the LNE series include:

- 32-bit EISA bus interface

- 32KB shared SRAM memory

- National Semiconductor DP8390 Network Interface Controller

- Fully programmable settings -- no switch settings or option jumpers on-board
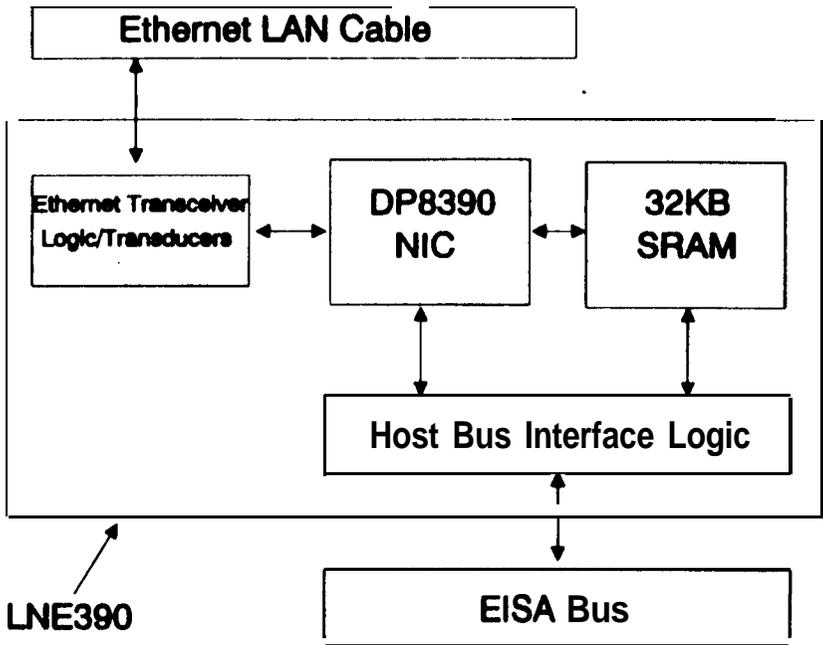
- Supports up to 4 LNE390 units in the same host system

Figure I-I: LNE390 Block Diagram

- Novell Certified Support for Novell Netware as both server and workstation

- SCO UNIX Driver

- ISC UNIX Driver

- NDIS Driver for OS/2 and DOS

Theory of Operation

The LNE390 may be added to any EISA host system in any available EISA I/O slot. One of the connectors on the back of the unit is connected to an 802.3 compatible Local Area Network. The LNE390 acts as a complete interface between the software running of the host system and any other node on the LAN. Figure I-1 shows a basic block diagram of the LNE390.

The LNE390 off-loads most of the low-level LAN management functions from the host system. These functions are performed by the National Semiconductor DP8390 NIC chip, which runs under control of the software in the host system.

Each operating system supported by the LNE390 is provided with a special driver which provides a software interface between the operating system and the LNE390. In the case of DOS, the driver is loaded as a TSR (Terminate and Stay Resident) program which is combined with a 'Network Shell that provides network services to the DOS user. For Novell Netware 3.1 x, the driver is loaded with a LOAD command after the server system has been started. UNIX systems (both SCO and ISC) require the driver to be linked into the operating system kernel before network services can be used.

The resources of the EISA host system used by the LNE390 are:

1. A uniquely assigned Interrupt Request Line (IRQ).

2. Sixteen bytes in I/O address space (EISA slot specific)

3. 64KB in memory address space, non-cached. (Note that although the LNE390 provides 32KB of shared SRAM, 64KB memory addresses are used by each board.)

The software driver communicates to the LNE390 by loading and storing data packets to and from the 32KB shared memory. The management and allocation of the shared memory is under the control of the host program.

In the case of a transmission, the driver then uses I/O instructions to instruct the DP8390 to send the data packet. The DP8390 then runs asynchronously and will attempt to transmit the packet up to 16 times. Upon completion or error, the LNE390 then interrupts the host processor, which can then read status bits, and then handle the resulting condition,

For data reception, the software driver programs the DP8390, indicating the appropriate buffer memory addresses for data packet reception. When a data packet is received, the LNE390 interrupts the host, and can then respond to the received data packet.

Scope of This Document

The manual assumes the reader is familiar wlth normal ISA and EISA style computer operating procedures, and is familiar with the particular operating systems to be used. The procedures detailed will enable the user to install the LNE390 In any EISA host system with any of the supported operating systems.

Chapter 2: Hardware Installation and Configuration

Overview

An LNE390 may be installed in any available EISA I/O slot in a host system. The bask steps for hardware installation are:

1. Install the adapter hardware in the system.

2. Connect the adapters to the LAN.

3. Configure the LNE390 using the host system's EISA Configuration Utility.

This chapter covers these procedures.

To use the LNE390 after the hardware Is in place, it will be necessary to install the host operating system and the appropriate device driver. For operating system installation, refer to the documentation that comes with the operating system software. The installation of LNE390 device drivers is covered by subsequent chapters in this manual.

LAN Media Configuration for the LNE390A

Before the LNE390A can be installed In a system, it must be configured for the type of LAN you are using. This is done by changing the settings of a jumper block on the board, as shown in Fugure 2-1. This operation is now required for the LNE390B.

.   The possible media selections are:

1 0Base5 (Thick Ethernet)	All pins in JB4 set to "E" position
1 0Base2 (Thin Ethernet)	All pins in JB4 set to "C" position

Change the jumpers as appropriate. The factory default settings are for the 10Base2 connector.

Adapter Installation

Referring to your host system's documentation, re-move the system cover and choose the slot to be used by the LNE390. Remove any blank bracket tab, saving the mounting screw.

Carefully insert the LNE390 into the slot, making sure the edge connector property engages with the slot.
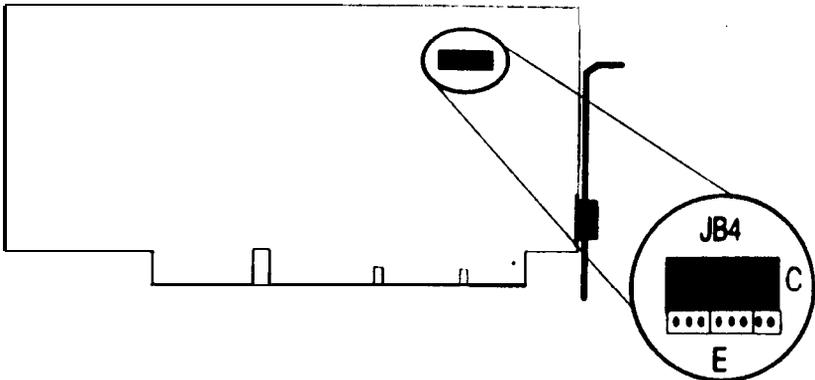

Figure 2-1: Media Jumpers for LNE390A

When the board is in place, the notch in the top of the bracket should line up with the screw hole for the mounting screw. If it does not, check the alignment of the LNE390 and the depth of the connector insertion.

Complete the board installatbn by replacing the mounting screw. Replace the system cover as per the manufacturer's instructions.

As a final step, the LNE390 must be connected to the network media.

For 10Base 5, the 15 pin D-connector Is used to connect a standard Ethernet transceiver unit to the LNE390.

For 1 0Base 2, the BNC connector is used to attach a BNC "T" connector to the LNE390. The other two poles on the "T" connector are attached to coaxial cables which make up a Thin Ethernet LAN.

For 10BaseT (LNE390B only), the RJ45 modular plug is used to connect the LNE390 to a network hub. If the LNE390 is to be connected directly to another 10BaseT Ethernet Adapter (such as another LNE390B), a special cable that reverses the signals is required.

EISA Configuration Utility

Your EISA host system should be provided with an EISA Configuration Utilii diskette by the system's manufacturer. This program allows the user to make all of the configuration settings on the LNE390 board, as well as any other EISA peripheral boards installed in the system, without having to change physical switches and option jumpers,

Note: During the **configuration** *procedure, it is* **advisable to** *make a manual note of the configura-* **tion** *options selected. This information will be required during the installation of various operating system drivers described in the following chapters.*

In order to perform this function, the EISA Configuration Utility refers to a special data base file that describes the LNE390 and the possible options it supports. This data base file (different for LNE390A and LNE390B) is contained on the LNE390 Driver Diskettes (DOS format).

Refer to the host system's documentation for instructions on how to start the EISA Configuration Utility. These instructions also have instructions on how to copy the configuration data base files to the floppy diskette on which they will be used. As a shortcut, however, it is possible to place the LNE390 Driver Diskette in Drive B, and the EISA Configuration Utility diskette in Drive A, and enter the following DOS command:

COPY B:*.CFG A:

This will place all the available files on the Configuration Utility Diskette, which will make them available for use when the program is run.

When the LNE390 board(s) are recognized 'by the EISA Configuration Utility, a configuration screen is displayed. To configure the LNE390 board, move the cursor to the board to be configured and press the ENTER key. You will be given several options for the LNE390 configuration.

Media Type for the LNE390B

If an LNE390B board is being installed. the EISA Configuration Utility will provide the option of select-

ing the LAN Media type to be used on the board. The possible options are:

- 1 OBase5 - Thick Ethernet

- 1 OBase2 - Thin Ethernet

- 1 OBaseT - Twisted-Pair Ethernet

Shared SRAM Address

The LNE390 may be configured for any one of seven memory addresses. The memory address selected must be unique within the system, and not used by any other device or by memory on the motherboard. Also, the LNE390 shared memory locations should not be cached.

The available memory options are in the following table. All numbers are byte addresses in hexadecimal.

Start Address	End Address	Notes
OFFOOOO	OFFFFFF	See Note #1 below.
OFEOOOO	OFEFFFF	See Note #1 below.
OF00000	OFDFFFF	LNE390A only - See Note #1 below
FFFOOOO	FFFFFFF	Very high memory, above 16MB, see Note #2 below
FFEOOOO	FFEFFFF	Very high memory, above 16MB, see Note #2 below
FFCOOOO	FFCFFFF	Very high memory, above 16MB, see Note #2 below

OODOOOO	OODFFFF	Used for DOS Workstations, see Note #3 below
OOEOOOO	OOEFFFF	LNE390B only - Used for DOS Workstations, see Notes #3 and #4 below

Note #1: The addresses that have the top two hexadecimal digits as 'OF' locate the LIVE390 within the first 16MB of physical memory address space. If your system board has 16MB of memory or more, using these options will cause a conflict which will cause the installation to lose the us8 of some memory unnecesarily. Depending on which make of EISA host system is used, the EISA Configuration Utility may not be able to detect and report this condition. *For systems with 16MB or more of physical memory, these addresses are not to be used.*

Note #2: Some systems. notably the Compaq and AST EISA systems in addition to others, have an option (controlled by the EISA Configuration Utility) that limits memory addressing above 16MB. This option must be disabled for the LNE390 to be used at any Of the "Very High' memory addresses. Failing to do so with result in Novell NetWare ABEND when a driver startup is attempted.

Note #3: Address D000/E000 will have to be used by DOS workstations.

Not8 #4: On some motherboards EOOO may not work properly

Interrupt Choices

The LNE390 can be used on any one of eight IRQ lines. Any interrupt may be used as long as it does

not conflict with any other device in the system. The LNE390 does not support shared interrupts. The various supported interrupts are 3, 5, 7, 9, A, B, C, and F.

Conclusion

Once the configuration options have been selected, the EISA Configuration Utility can be instructed to save the configuration data. Each time the system is powered on or reset, the LNE390 board will be re-programmed as part of the standard EISA power-up sequence.

After this procedure has been completed, refer to one of the following chapters for installation of the appropriate software driver.

chapter 3: Software Installation for NetWare

Overview

Included with the LNE390 is a software driver (LNE31.LAN) for Novell NetWare V3.xx (also referred to as NetWare 386). In addition, the LNE390 provides both IPX and ODI (LNE.COM) workstation drivers for DOS. These software modules are found on the LNE390 Driver Diskette (DOS format).

This chapter provides the procedures for using these drivers. It is assumed that the reader is familiar with installing the Novell NetWare system and has already done so.

NetWare 3.11 Server Driver

The LNE390 NetWare Driver is the file named LNE31.LAN on the LNE390 Driver Diskette root directory. To use this driver it is necessary to copy this file to the DOS Disk Directory from which Net-Ware is started. If the installation starts NetWare from a diskette, the LNE31 .LAN file should be copied to that diskette. Load the LNE390 Server Driver at the [:] prompt as follows:

```
:LOAD LNE31 NAME=<name> SLOT=<slot>
FRAME=<frametype>

:BIND IPX <name> NET=<net>
```

For example, if Novell NetWare is installed on hard
disk drive "C" in directory SERVER, and the
LNE390 Driver Diskette is loaded into floppy disk
drive 'A', the following commands may be used to
load the LNE390 Netware 3.1 x Server driver on the
diskette at the DOS prompt.

C:

CD \SERVER

COPY A: *.LAN .

Once this has been done, the NetWare server may
be started by entering the command

SERVER

In order for the LNE390 driver(s) to become active
and usable by the NetWare server, it is necessary
for the server to execute a 'LOAD' command.
There will be one LOAD command for each
LNE390 operating on a unique frame type, being
supported by the network. In addition, each board
installed in the system will require one BIND com-
mand to tie a NetWare service into the specific
rendition of the driver.

The syntax of the LOAD/BIND command to execute
the LNE390 driver is shown above. The variable
symbols are described in the following table.

SYMBOL	SUBSTITUTE WITH
<name>	An arbitrary name assigned to the LNE390/Frame type combination. Note that this eymbol appears both in the LOAD and the BIND commande, and ties them together.
<slot>	The EISA slot number of the board.
<frame type>	The frame type to be supported by this copy of the driver.
<net>	An IPX network identifier number assigned to the Ethernet segment being serviced. Note that this symbol must be the same as other NetWare servers on the same segment.

For a more complete description of the NetWare LOAD and BIND commands (such as different possible frame types), refer to the NetWare documentation.

LOAD and BIND commands are normally located within the AUTOEXEC.NCF file that the NetWare server executes each time it IS started. This file may be edited from within the server by executing the INSTALL program provided with NetWare (started with a LOAD INSTALL) command.

Alternatively. the LOAD and BIND commands may also be typed in at the "dot prompt", as a manual command This method is normally used in experimental servers where the configuration changes frequently, or when debugging a network.

As an example, the commands shown below might be used in an installation with three network adapters, each network adapter supporting two different frame types. After the LNE390 driver is loaded, the server will be ready to respond to requests on the network.

```
LOAD LNE31 NAME=P0 SLOT=2 FRAME=ETHERNET_II
LOAD LNE31 NAME=P1 SLOT=2 FRAME=ETHERNET_802.3
LOAD LNE31 NAME=P2 SLOT=5 FRAME=ETHERNET_II
LOAD LNE31 NAME=P3 SLOT=5 FRAME=ETHERNET_802.3
LOAD LNE31 NAME=P4 SLOT.7 FRAME=ETHERNET_II
LOAD LNE31 NAME=P5 SLOT=7 FRAME=ETHERNET_802.3

BIND IPX P0 NET=A0
BIND IPX PI NET=A1
BIND IPX P2 NET=A2
BIND IPX P3 NET=A3
BIND IPX P4 NET=A4
BIND IPX P5 NET=A5
```

NetWare IPX Workstation Driver

One method of integrating a DOS workstation into a Novell NetWare LAN is by using the IPX network interface program. The IPX program is created by the user by combining an .OBJ file provided with the LNE390 board with me skeleton IPX file provided by Novell. The combining process is performed by the Novell supplied WSGEN program.

WSGEN also modifies the IPX.COM that it generates to tailor it for the configuration of the LNE390 board to be used. This IPX.COM file may be used with any LNE390 that uses the same memory address and IRQ line.

The SEISA.OBJ, SEISA.LAN files . for LNE390 and LNE390B.OBJ, SEISAB.LAN files for LNE390B are located on the LNE390 Driver Diskette (DOS format).

The .LAN files contain the driver configuration information.

To run the WSGEN program, refer to the appropriate Novell documentation. The SEISA.OBJ and SEISAB.OBJ files are expected in the LAN_DRV_.434 directory.

Once the IPX.COM program has been generated by the WSGEN program, it is run as a TSR (Terminate and Stay Resident) program under DOS. If the IPX program is unable to properly communicate with the LNE390 board it was compiled for, an error message will result.

If the IPX invocation is successful, the appropriate NetWare DOS shell provided by Novell is then loaded as an additional TSR program. There are several different DOS shells to use, depending on the version of DOS and me features required. For example, NET4.COM is used for DOS4, and NETXMS.COM is used as a shell that locates itself In XMS memory. Refer to the Novell documentation for details.

NetWare ODI Workstation Driver

Another method of integrating a DOS workstation Into a NetWare LAN is by using the ODI Workstation Shell. The ODI can support more than one LAN adapter on me workstation, and support more than one protocol on each board simultaneously.

instead of requiring compilation, the ODI driver is re-configuredby editing a text file, NET.CFG, which is read by the program when it is started.

For complete information on how to install the ODI driver, refer to the Novell NetWare ODI Shell for DOS reference manual. The examples shown in this section are provided as a general orientation for installing the LNE390.

An example of the NET.CFG for a LNE390 card configured at EISA slot 4 and using ethernet_802.3 frame type file might be as follows:

```
link support
buffers 8 1514
mempool

link driver lne390
slot=4
frame ethernet_II
frame ethernet_802.3
protocol IPX 0 Ethernet_802.3
```

Other options described in the Novell documentation are not required, such as the MEM. INT, DMA channel., If, however, INT and MEM settings are specified, then the value specified in NET.CFG is used. If the slot number is not specified, the LNE390 card is assumed at the first available slot. If the slot number is mentioned, the presence of the card is checked only on that slot.

To load and run the ODI driver there are four TSR programs that are invoked in sequence. All modules except the module specific to the LNE390 are provided by Novell. The LNE390 specific module provided on the LNE390 DOS Driver Diskette, Is named LNE.COM. The total load sequence, which

will normally appear in the workstation's AUTO-
EXEC.BAT fife might be:

lsl

lne

lpxodl

netx or bnetx

These lines load, respectively, the Link Support
Layer, the LNE390 ODI interface module, the IPX
protocol driver for ODI, and the NetWare Shell.
Once these programs are installed, the workstation
will have network access.

Note: *The valid MEM options for NET.CFG are
D0000 (for LNE390) and E0000 (for LNE390B
only).*

Netware 286 Server Driver

For Netware 266 Server, the driver files of the
LNE390 have to be linked into the operating sys-
tem. The driver description file AEISA.LAN and
the driver AEISAOBJ, BEISAOBJ, CEISA.OBJ
and DEISA.OBJ are located in the LNE390 DOS
driver disk. The LNE390 driver fifes may be put in
the LAN_DRV_.434 directory white using the
AEISA.LAN description file. The Netware files are
linked with the LNE driver, and a new NETOS.EXE
file is created by Novell's operating system genera-
tion procedure. For more information on system
generation, refer to the Novell manuals.

Chapter 4: Software Installation for SCO UNIX

Overview

The LNE390 product includes an SCO UNIX driver diskette to allow the LNE390 to be used in the SCO UNIX environment. The driver is a software object module which must be linked into the UNIX kernel before it can be used.

Normal installation of the LNE390 driver is automated by a program supplied by SCO called "custom', which recognizes driver diskettes from third parties such as the LNE390 driver diskette.

Procedure

Before the LNE390 driver can be installed, it is necessary to load the UNIX operating system and link kit. Also, the TCP/IP module must be loaded. Refer to the documentation provided with SCO UNIX for the proper procedures.

After UNIX is installed, place the LNE390 SCO UNIX driver disette in the "A' drive. Log on to the system as 'root' (or another super-user) and enter the command:

    custom

** Use the list option to see if the LNE390 driver has been installed. If it has, use the remove option of custom to remove the LNE390 driver. Then select

the option to install a driver diskette. The system will then read the LNE390 driver diskette, and proceed to execute the installation programs. The installation programs will prompt for the memory address and interrupt line of the LNE390 to be installed. Respond with the values selected for the LNE390 board when it was originally EISA configured (see Chapter 2).

The installation and re-link process will usually take 2 to 10 minutes, depending on the performance of the system being used. Once the LNE390 driver has to be linked into the kernel, it will be necessary to re-boot the computer before it becomes available for service.

Chapter 5: Software Installation for ISC UNIX

Overview

The LNE390 includes an ISC UNIX driver diskette to allow the LNE390 to be used in the interactive Systems UNIX environment. the driver is a software object module which must be linked into the kernel before it can be used.

The installation process is performed by a shell script that is included on the LNE390 driver diskette. Once the driver has been linked into the kernel, it can be accessed by UNIX processes through the device mode created in the installation process.

Procedure

Before the LNE390 driver can be installed, it is necessary to load the UNIX operating system, plus the software required for re-linking the kernel. In addition, the TCP/IP, streams and pseudo tty software modules must be loaded. Refer to the documentation provided with ISC UNIX for the appropriate procedures.

After UNIX is installed and running, place the LNE390 ISC UNIX driver diskette in the "A' drive. Log on to the system as "root' (or another super-user) and enter the command:

    ryudm

Choose the appropriate option to list the packages installed on the system. If the LNE driver is already installed, use the REMOVE package option to remove the LNE driver. Then proceed to install the LNE driver, using the INSTALL package option.

The system will read the driver diskette and initiate the shell script for installation. Under Interactive UNIX 53.2, Ver. 3, the driver configuration is done by running SYSADM and selecting SOFTWARE and NETDRVR options. The kernel will need to be relinked after this only. To relink the kernel use the KCONFIG utility of Interactive UNIX and choose the BUILD A KERNEL option.

The installation and re-linking process may take from 2 to 10 minutes, depending on the performance of the system being used.

After the kernel has been re-linked, the LNE390 driver will become active after the next time the system is boot-strapped.

Chapter 6: Software Installation For NDIS

Overvlew

NDIS is the name of the networking software com-
munication specification that was origianlly created
by Microsoft for the OS/2 Operating System. An
NDIS driver for OS/2 is located on the LNE390
Driver Diskette (DOS format) which can be installed
in any OS/2 Vi .3 orVI.2 system. The LNE390 also
provides an NDIS drlver that provides the same
support on DOS systems.

Normally, NDIS is used in conjunction wlth the
Microsoft LANMAN software, which enables an
OS/2 workstation to operate as a server/worksta-
tion system, and enables a DOS workstation to
operate as a workstation. Any system equipped
with an LNE390 and the NDIS driver under me
appropriate operating system may install LANMAN
and access the resources of the network.

Installatlon Procedure

Although the LNE390 NDIS driver interacts directly
with the operating system and not with LANMAN,
the LANMAN SETUP program is used to install the
driver. Refer to the Microsoft LANMAN Installation
manual for details.

After the LANMAN system is installed, run the
SETUP program and select the IMPORT option on
the configuration menu. Then place the LNE390
Driver Diskette (DOS format) in the indicated floppy
disk drive (usually the "A" drive). The program will

• prompt for informalion as appropriate, including the **slot** number, inlerrupt number, and memory address used by the LNE390 to be installed.

After installation. it will be necessary to reboot-strap the system. When the system is next loaded. the **LNE390** device drivers will be active and ready for service.

LANMAN Implementation Notes

The LNE390 **NDIS** device driver. as Installed by the LANMAN SETUP program, is located in a specifi cally assigned directory. Assuming that the main directory for the LANMAN installation is **C:\LANMAN**, the LNE390 driver directory is:

C:\LANMAN\DRIVERS\ETHERNET\LNE390

In this directory there are two files, **PROTOCOL.INI** and **LNE390.OS2** or **LNE390.DOS**, depending on which operating system is used. In addition, there is **a** file called **LNE390.NIF** in the directory.

C:\LANMAN\DRIVERS\NIF

The **LNE390.NIF** file is a text file that contains information on the location, name, and type of driver to be installed.

The **PROTCOL.INI** file contains the configuration parameters for the driver to use on system start-up This file can be manually edited if, for any reason, it is incorrect or the actual hardware configuration has changed.

Generic Implementation Notes

If the LNE390 is being used with a non-LAN Manager operating system, requiring the NDIS driver, then the NDIS driver LNE390.DOS found in the LANMAN.DOS\DRIVERS\ETHERNET\LNE390 subdirectory of the LNE driver disk for DOS is to be used. Also, the file PROTOCOL.INI is available in the same directory and may be used with the appropriate changes, as required by the target operating system. The file LNE390.NIF, if required, is available in \LANMAN.DOS\DRIVERS\NIF. This also may have to be edited for the target operating system.

In the file PROTOCOL.INI, only the slot number needs to be mentioned. The interrupt and memory options are optional, and need not be used.

Appendix A: Testing the LNE390

A diagnostic utility is provided to aid in installation and configuration of your Mylex LAN adapter.

For the LNE390A the program file is TESTLNE.EXE. For the LNE390B the program file is TESTLNEB.EXE.

Testing the LNE390A

Configure the board according to the user's manual for a thin ethernet (also known as 1 0Base2). Make up a thin ethernet cable such as Belden RG-58/U (at least 15 feet or 5 meters in length) with a BNC tee at each end and a 50 ohm terminator on one port of each tee. Attach one of the tees to the LAN adapter to be tested, leaving the other end free, and run the above program. Thii diagnostic will check the adapter base address and interrupt request line against the configuration, test the dual ported RAM and run a loop-back test with the cable and terminators attached. The test may also be conducted by selecting the AUI or the thick ethernet port. In case of the thick ethernet port, a thick ethernet transceiver needs to be attached to the AUI port on the card. Also, the transceiver needs to be cabled with a thick ethernet cable and terminated at both ends of the cable for the test. Now run the test.

Testing the LNE390B

Configure the board using the EISA configuration for thin ethernet (also known as 10BASE2). Make up a thin ethernet cable such as Belden RG-58/U (at least 15 feet or 5 meters in length) with a BNC tee at each end, and a 50 ohm terminator on one port of each tee. Attach one tee to the LAN adapter to be tested, leaving the other end free and run the program above. This diagnostic will check the adapter base address and interrupt request line against the configuration, test the dual ported RAM and run a loop-back test with the cable and terminators attached. The test may also be conducted by selecting the AUI or the thick ethernet port Select Thick Ethernet Port through EISA configuration. Connect a thick ethernet transceiver to the AUI port on the card. Also, the transceiver needs to be cabled with a thivk ethernet cable and terminated at both ends of the cable for the test. Now run the test. In order to test out the 10BaseT port, select the 10BaseT port in the EISA configuration. Connect the 10BaseT port to a 10BaseT concentrator and run the test.

LNE390B EISA bus 32-Bit Ethernet LAN Adapter

1.0 OVERVIEW

The adapter is an EISA bus compatible slave expansion device that
provides a 10 Megabit/second interface to an Ethernet, Cheapernet or
Twisted pair network. The adapter contains a 32 kilobyte packet buffer
memory. The adapter occupies 64 kilobytes of memory address space for
SRAM. The adapter occupies 64 I/O locations in the EISA I/O address
space and uses one interrupt. Data transfers are made through a shared
memory architecture. The adapter interfaces to the EISA bus through
the EISA bus edge connector.

2.0 CONFIGURATION

2.1 EISA Configuration Port

The adapter uses 64 I/O locations. The I/O locations use the EISA
bus slot locations for non-conflict and are always at the same base
address. The user can configure the location of the shared memory
and configure the interrupt by writing to the Configuration Port.
There are no switches or jumpers for setting the configuration. The
Configuration Port is read/write and is located at 0zC90h, where z
is the slot number. The port has the following bit definitions.

2.1.1 DP8390 NETWORK INTERFACE CONTROLLER

The DP8390 NIC contains 16 registers that are mapped at the start
of the I/O address range. The range for the NIC register is:
0z00Fh, where z is the EISA bus slot number.

2.1.2 ETHERNET ADDRESS PROM

The Ethernet address PROW y D be read at I/O location 0z010h thru
0z01Fh, where z is the EISA bus slot number.

2.2 SHARED SRAM ADDRESSES

The adapter's 32K of SRAM is mapped into the upper address locations
by the configuration port. The address granularity is 64K bytes,
even though the adapter contains 32K.

2.3 INTERRUPTS

The adapter can generate an interrupt to request service from the
PC. The interrupt is initiated by the DP8390 and remains active
until the PC services it. The interrupts are configured by the
configuration port. Supported interrupts are IRQ 3, 5, 7, 9, 10(A),
11(B), 12(C) and 15(F).

2.4 NETWORK SELECTION

The adapter can be configured to operate an Ethernet (Thick, DB15),
Cheapernet (Thin, BNC) or Twisted pair (10BASE-T, RJ4 5 network.
Configuring the adapter for Ethernet enables the 15-pin D shell
Attachment Unit Interface connector. Configuring the adapter for
Cheapernet enables the BNC connector for connection to the network.

Configuring the adapter for Twisted pair enables the RJ45 connector
for connection to the network. Only one configuration at a time is
possible and is selected through EISA configuration.

3.0 DP8390 REGISTER ACCESSES

When the /CSNIC is low, the DP8390 becomes a bus slave. The PC
can then read or write internal registers. All registers are
byte wide. The PC accesses internal registers with the four
address lines. Since the NIC may be a local bus master when the
PC tries to access it, the /ACK line is used to wait state the
PC until the NIC leaves master mode.

3.1 REGISTER ACCESS DESCRIPTION

All NIC internal registers are 8bits wide. The PC address lines
SA3-SA0 are passed to the NIC and select the internal register
during the access. For the Ethernet address/ID PROM no wait states
are ever inserted.

4.0 SYSTEM MEMORY ACCESSES

Data is moved to and from the adapter with shared memory accesses
by the system Only doubleword aligned transfers are permitted.

5.0 PROGRAMMER'S REFERENCE

I/O BASE ADDRESS

(Note: I/O Base is determined by slot adapter is inserted.)

I/O Base	Slot Number
1000h	1
2000h	2
3000h	3
4000h	4
5000h	5
6000h	6
7000h	7
800011	8

REGISTER MAP

Address	Function
I/O Base + 0h	DP8390 Base Register (Command Register)
I/O Base + 1h	DP8390 Register 1
I/O Base + 2h	DP8390 Register 2
.	.
.	.
I/O Base + Fh	DP8390 Register F
I/O Base + 16h	Ethernet Address Byte 0 (Read Only)
I/O Base + 17h	Ethernet Address Byte 1 (Read Only)
I/O Base + 18h	Ethernet Address Byte 2 (Read Only)
I/O Base + 19h	Ethernat Address Byte 3 (Read Only)
I/O Base + 1Ah	Ethernat Address Byte 4 (Read Only)
I/O Base + 1Bh	Ethernet Address Byte 5 (Read Only)

I/O Base + C80h	EISA Configuration IO Byte 0	(Read Only
I/O Base + C81h	EISA Configuration ID Byte 1	(Read Only
I/O Base + C82h	EISA Configuration IO Byte 2	(Read Only
I/O Base + C83h	EISA Configuration ID Byte 3	(Read Only]

I/O Base + C84h   EISA Rest/Enable Port

      WRITE 00h to RESET Board
      WRITE 0lh to ENABLE Board

      (Note: Resetting Board will also hard reset
             DP8390.)
This port is used for Resetting or Enabling LNE390B Adapter.

I/O Base + C90h   Configuration Port (Read/Write,16 bit)
                  Sets/Gets shared memory base
                  address + interrupt + interface type
This port is used for Reading/Writing Memory and IRQ configuration.

Configuration Port Bit Definitions.

    Bits 0,1,2 are for Shared Memory Selection.

    bits 2 1 0 :0 0 0   **=> 00FF0000h**
           :0 0 1   => 00FE0000h
           : 0 1 0   => 000E0000h
           : 0 1 1   => 0FFF0000h
           : 1 0 0   => 0FFE0000h
           : 1 0 1   => 0FFC0000h
           : 1 1 0   => 00000000h
           : 1 1 1   => No Memory Selected.

    Bits 3 4 5 are for Interrupt Selection.

    bits 5 4 3: 0 0 0   IRQ 15
              0 0 1   IRQ 12
              0 1 0   IRQ 11
              0 1 1   IRQ 10
              1 0 0   IRQ 9
              1 0 1   IRQ 7
              1 1 0   IRQ 5
              1 1 1   IRQ 3

    Bit 13 for Interrupt Enabling/Disabling.

        bit 13 = 0   Disable Interrupt.
             = 1   Enable Interrupt.

    Bit 12 for Memory Enabling/Disabling.

        bit 12 = 0   Disable Shared Memory.
             = 1   Enable Shared Henory.

    Bits 8,9,10 for Ethernet Interface type selection.

    Only One of bits 8,9,10 should be set to 1.

        bit 8 = 1   RJ45 (10 Base T)
        bit 9 = 1   BNC (10 Base 2)
        bit 10 = 1   DB15 (10 Base 5)

CONFIGURATION PORT DEFINITION:

| | | d7 | d6 | d5 | d4 | d3 | d2 | d1 | d0 | | |
		x	x	int2	int1	int0	mem2	mem1	mem0		
IRQ 15(F)	=>	x	x	0	0		0	0	0	=>	00FF0000h
IRQ 12(C)	=>	x	x	8	0	1	0	0	1	=>	00FE0000h
IRQ11 (B)	=>	x	x	0	1	0	0	1	0	=>	00FD0000h
IRQ10 (A)	=>	x	x	0	1	1	0	1	1	=>	0FFF0000h
IRQ9	=>	x	x	1	0	0	1	0	0	=>	0FFE0000h
IRQ7	=>	x	x	1	0	1	1	0	1	=>	0FFC0000h
IRQ5	=>	x	x	1	1	0	1	1	0	=>	00000000h
IRQ3	=>	x	x	1	1	1	1	1	1	=>	NONE

| | d15 | d14 | d13 | d12 | d11 | d10 | d9 | d8 | | |
	x	x	INT	MEM	loop	10B5	10B2	10BT		
	x	x	x	x	x	0	0	1	=>	RJ45 o
	x	x	x	x	x	0	1	0	=>	BNC on
	X	X	X	X	X	1	0	0	=>	DB15 on
TP loooback	x	x	x	x	1	0	0	1		
Enable memory	x	x	x	1	x	x	x	x		
Enable int's	x	x		x1	x	x	x	x		

NOTE: Interrupt selection is independent of memory selection.
IMPORTANT: Memory 'accesses to the board must be 32-Bit (dword)
        aligned.

First EISA Config ID address = I/O Base + 0xC80 or 0xzC80
Second EISA Config ID address = I/O Base + 0xC81 or 0xzC81
Third EISA Config ID address = I/O Base + 0xC82 or 0xzC82
Fourth EISA Config ID address = I/O Base + 0xC83 or 0xzC83   .

INITIALIZATION PROCEDURE:

    • Check for LNE390B adapter in slot(s).
    • Enable the LNE390B adapter.
    • Read/Write Configuration Port to get/set memory and interrupts
    • Program the DP8390 NIC Chip to transmit/receive packets.

LNE390B Adapter is recognized by scanning EISA slots on the Motherboard
checking for following 4 EISA configuration IDs on each slot.

    First EISA Config IO = 0x35
    Second EISA Config ID = 0x98
    Third EISA Config ID = 0x00
    Fourth EISA Config ID = 0x11

If above IDs are found in a slot X then LNE390B adapter is present in
slot x.

After LNE390B is located at a particular slot X it has to be enabled by
writing 1 onto Reset/Enable port. This has to be done before accessing
configuration port.

Read Configuration Port to check for the current memory and interrupt
selections in EISA Config.
Write onto Configuration Port to change the memory and interrupt select
ions in EISA Config.

From the I/O base we can get the address assignments for DP8390 NIC.
For programming the NIC Chip follow the steps given in the DP8390 NIC

Data Book.

TRANSMITTING THE PACKET:

* Get the packet buffer to be transmitted.
* Get the number of bytes to be transmitted.
* Set the Shared Memory address for copying data.
* Copy the data from packet buffer to shared memory.
* Program the TransmitByteCount register of NIC with number of
  bytes to be transmitted.
* Give the transmit packet coninand to the NIC.

Interrupt is generated when a packet is received or packet is transmitted.

RECEIVING THE PACKET:

Disable the interrupt from NIC (Program InterruptMask register).
        Do following steps till no receive/transmit event pending.
        • Read the InterruptStatus register.
        • If Packet is received with error
                check for specific error cause and increment the diagn
                ostic counters.
        • If packet is received without error
        • Set the source buffer address to Shared Memory offset used for
          receiving the packet.
        • Read the NIC Receive Packet header to get number of bytes rec
          eived.
        • Check'the number of bytes received with the allowed maximum
          and minimum values.
        • Set the buffer address where received packet is to be copied.
        • Copy the received packet from shared memory into the buffer.
        • Program the registers of NIC to be ready for next receive.
        * If packet is transmitted with error
                check for specific error cause and increment the diagn
                ostic error counters.
        • Check for next packet to be sent.

Enable the interrupt from NIC (Program InterruptMask register).

LNE390 Drivers
October. 1993

This new revision of the 3.2 drivers for the **LNE390A/B** includes the following major changes/additions from the previous released revision 3.1.

The NetWare **4.0x** LNE390 server and workstation drivers have been added.

The NetWare 3.11 ODI workstation driver has been changed for the LNE390 to work with the Mylex **DAC960,** at any EISA slot.

The NDIS DOS driver has been changed to work with **Lantastic** and **WFW.** The new NDIS driver also works with the **WFW** workstation connected to a NetWare server.

Please make sure that these drivers are used only on systems that have been EISA configured with the EISA CFG files present in this disk.

INSTALLATION OF LNE390 DRIVERS FOR NETWARE 4.0x

SERVER DRIVER:

The LNE390 server driver can be found in the NET40 subdirectory of this diskette. The name of the server driver file is **LNE40.LAN. LNE40.LDI** is the companion server driver installation information file, required for the installation of the server driver,

Use the standard third party driver installation technique for installing the Server LNE390 driver.

While in the "Load a LAN Driver" menu, during the NetWare server installation, select the INSERT key and specify the LAN driver to be loaded from **A:\NET40.**

Thereafter, select the "Mylex LNE390 Ethernet Adapter" from the box, specify its EISA slot number and the frame types to be loaded. Proceed with the NetWare server installation.

WORKSTATION DRIVER:

The LNE390 workstation driver can be found in the NET40 subdirectory of this diskette. The name of the workstation driver is **LNE390.COM. LNE390.INS** is the companion workstation driver installation information file required for installation of the workstation driver.

To generate the required DOS workstation boot files, create the **WSDOS_1** diskette using the "load **install->other options->create** optional **diskettes->create WSDOS_1** diskette" options.

Then run the "install" program from the **WSDOS_1** diskette. Move to STEP 4 in the screen displayed, and hit ENTER. Insert this LNE390 driver diskette and specify the **A:\NET40** directory to load the workstation driver files.

From the window displayed, select the **"Mylex** LNE390 Ethernet Adapter" option. Then select the required media types and the EISA slot number of the LNE390 card. Complete the installation and reboot to connect to the Server.

INSTALLATION OF OTHER LNE390 DRIVERS

To install these drivers under DOS, Novell, LANMAN **2.x,** etc. refer to the **LNE390** manual, REV 3.0, and the appropriate operating system manual.

To install the driver under Windows for Workgroup, refer to the **READWKGP.ME** file in this diskette.

INSTALLATION OF NDIS DRIVER UNDER LANTASTIC NOS

Run the LANtastic INSTALL program as instructed in your LANtastic manuals. When you reach the "Adapter Driver" field, select "Other NETBIOS compatible Ethernet Adapter" and then continue with the installation.

The **Lantastic** installation creates a STARTNET.BAT file. Add the following two lines in this file, immediately after the line containing "SHARE **/L:200"**

> AI-NDIS **BIND_TO=LNE390**
> AILANBIO

Copy the file AI-NDIS.EXE from the LANTASTIC diskette labeled, **"NDIS** SUPPORT" to the directory where you installed the LANtastic software (usually C:\LANTASTI). Make sure the **AILANBIO.EXE** file is also present in this directory.

Copy the file **LNE390.DOS** from this LNE390 driver diskette, to the directory where you installed the **LANtastic** software (usually **C:\LANTASTI)** as given below.

C>COPY A:\MSLANMAN.DOS\DRIVERS\ETHERNET\LNE390\LNE390.DOS
C:\LANTASTI

Edit the CONFIG.SYS file to include the commands to load the protocol manager and NDIS MAC driver. The sample CONFIG.SYS below loads the protocol manager, PROTMAN.DOS and the NDIS MAC driver, **LNE390.DOS,** for a Mylex **LNE390** adapter:

> FILES=50
> BUFFERS=32
> LASTDRIVE=Z
> **FCBS=16,8**
> **DEVICE=C:\LANTASTI\PROTMAN.DOS /I:C:\LANTASTI**
> **DEVICE=C:\LANTASTI\LNE390.DOS**

In the LANTASTI directory, create a **PROTOCOL.INI** file to store the settings for the protocol manager and the NDIS driver loaded in the CONFIG.SYS. For example:

> SAMPLE PROTOCOL.INI
> **[PROTMAN]**
> DRIVERNAME = PROTMAN$
> DYNAMIC = YES
> **[LNE390]**
> DRIVERNAME = **LNE390$**
> SLOT = 4   /*Enter the EISA Slot Number of LNE390 ***/**

This completes the installation procedure.

The table below lists all the directories and files in this disk and their description.

!MLX0010 CFG: bytes 3814 dated **08-08-92** needs to be copied into the EISA configuration diskette for configuring the **LNE390A.**

!MLXOOll CFG: bytes 3805 dated 06-16-92 needs to be copied into the EISA configuration diskette for configuring the **LNE390B.**

TESTLNE EXE: bytes 4175 dated 07-13-90   is used for checking the **LNE390A** card. See TESTLNE.DOC for more details on how to run this test.

TESTLNEB EXE: bytes 4427 dated 06-19-92 is used for checking the **LNE390B** card. See TESTLNE.DOC for more details on how to run this test.

TESTLNE DOC: bytes 2816 dated 10-23-92 is the document file that explains how to run the TESTLNE and TESTLNEB programs.

SEISA OBJ: bytes 8782 dated 08-29-91
SEISA LAN: bytes 603 dated 08-29-91

These two files are used for generating the NetWare workstation IPX shells for **LNE390A.** Copy these two files into a floppy with volume label **LAN_DRV_.434** and follow the normal NetWare third party shell generation procedures.

SEISAB LAN: bytes 1134 dated 04-23-92
LNE390B OBJ: bytes 9413 dated 04-22-92

These two files are used for generating the NetWare workstation IPX shells for **LNE390B.** Copy these two files into a floppy with volume label **LAN_DRV_.434** and follow the normal NetWare third party shell generation procedures.

READ   ME: This file.

AEISA   OBJ: bytes 6194 dated 08-26-91
BEISA   OBJ: bytes 6194 dated 08-26-91
CEISA   OBJ: bytes 6194 dated 08-26-91
DEISA   OBJ: bytes 6194 dated 08-26-91
AEISA   LAN: bytes 625 dated 08-26-91

These five files are used for generating the NetWare 286 server Operating System. Once the OS is linked with these drivers, the LNE390 card will function properly on a NetWare 286 server. Copy these five files into a floppy with volume label **LAN_DRV_.434** and follow the normal NetWare third party server lan driver installation procedures.

LNE31 LAN: bytes 15616 dated 03-03-93 is the ODI compliant NetWare 3.11 server driver. This driver also supports packet burst protocol.

LNE COM: bytes 16386 dated 04-03-93 is the ODI compliant NetWare 3.11 workstation driver. This driver also supports packet burst protocol.

OEMSETUP INF: bytes 287 dated 02-17-93 is the file required by Windows for Workgroup for installing the LNE390 NDIS driver.

READWKGP.ME: Document file that describes the installation procedure for Windows for Workgroup.

NET40\LNE40.LDI: bytes 952 dated 10-04-93
                The server LAN driver information file for NetWare **4.0x.**

NET40\LNE40.LAN: bytes 6838 dated 10-04-93
The server driver for NetWare **4.0x**

NET40\LNE390.INS: bytes 346 dated 10-04-93
The installation file required by the workstation driver installation program of NetWare **4.0x.**

NET40\LNE390.COM: bytes 24530 dated 10-04-93
The ODI workstation driver for NetWare **4.0x.**

MSLANMAN.DOS: is the directory having the NDIS DOS driver **LNE390.DOS,** PROTOCOL.INI and the **LNE390.NIF** file under various subdirectories.

MSLANMAN.DOS\DRIVERS\README.TXT: ReadME file for Installation of LANMAN 2.X DOS client Driver.

MSLANMAN.DOS\DRIVERS\ETHERNET\LNE390\LNE390.DOS:
bytes 10672 dated 10-04-93. This is the DOS NDIS driver, used with LANMAN 2.X, WFW, **LanTastic** and other DOS based OS.

MSLANMAN.DOS\DRIVERS\ETHERNET\LNE390\PROTOCOL.INI:
bytes 120 dated 12-10-92. This is the sample PROTOCOL.INI file for DOS NDIS driver.

MSLANMAN.DOS\DRIVERS\NIF\OEMSETUP.INF:
bytes 129 dated 12-10-92 required for LANMAN NDIS driver installation.

MSLANMAN.DOS\DRIVERS\NIF\LNE390.NIF:
bytes 129 dated 12-10-92 required for LANMAN NDIS driver installation.

MSLANMAN.OS2: is the directory having the NDIS OS/2 driver **LNE390.OS2,** PROTOCOL.INI and the **LNE390.NIF** file under various subdirectories.

MSLANMAN.OS2\DRIVERS\README.TXT:
ReadME file for Installation of LANMAN 2.X OS/2 client Driver.

MSLANMAN.OS2\DRIVERS\ETHERNET\LNE390\PROTOCOL.INI:
bytes 120 dated 12-10-92. This is the sample PROTOCOL.INI file for DOS NDIS driver.

MSLANMAN.OS2\DRIVERS\ETHERNET\LNE390\LNE390.OS2:
bytes 18167 dated **11-05-92.** This is the **OS/2** NDIS driver, used with **LANMAN** 2.X, and other similar OS.

MSLANMAN.OS2\DRIVERS\NIF\LNE390.NIF:
bytes 129 dated 12-10-92 required for **LANMAN** NDIS driver installation.

Release Notes
LNE390 SCO UNIX Driver
September, 1993

A new release (Rev 2.05) of SCO UNIX driver for the LNE390 Ethernet controller is
now available. Users are advised to read through this document before using the new
SCO UNIX driver. This new driver supports "NETCONFIG" of SCO UNIX and
multiple LNE390 cards per SCO UNIX system. This driver works with all the LNE390
products.

Prerequisites:

All LNE390A boards should have been EISA configured with file !MLX0010.CFG
dated 8-8-92 or later.

All LNE390B boards should have been EISA configured with file !MLX0011.CFG dated
6-6-92 or later.

Installation:

The release diskette is a CUSTOM format diskette. Use the "Custom" command of SCO
UNIX to install or delete the LNE390 drivers.

1.   Make sure the system is EISA configured with the correct version of
      !mlx001?.cfg file. Make sure the SCO TCP/IP is installed on the system.

2.   If you do NOT have an installed LNE390 SCO UNIX driver on your
      system, proceed to step 4.

3.   If you have a previously installed version of LNE390 driver, then use "custom"
      to remove the installed LNE390 driver. After removal of the driver make sure
      the following file/directory is NOT present.

      /etc/conf/pack.d/lnc   This is a directory.
      /etc/conf/sdevice.d/lnc   This is a file.
      /etc/conf/node.d/lnc   This is a file.

      If present, then delete them immediately.

      # rm -rf /etc/conf/pack.d/lnc*
      # rm /etc/conf/sdevice.d/lnc*

rm /etc/conf/node.d/lne*

Also, edit /etc/conf/cf.d/mdevicefile using "vi" and remove any line containing any "lne" entry.

4.   Use "custom" to install the Ver 2.05 LNE390 drivers. This will install the driver for using upto four LNE390 cards on this system.

During installation the following messages are displayed:

Installing Mylex 390 driver package V 2.05
Installing Lnc driver lnc0
Installing Lnc driver lnc1
Installing Lne driver lnc2
Installing Lnc driver lnc3
Checking for mkdev/netconfig existence
Updating netconfig menu for device lnc
Press return to run "netconfig" command

5.   At this moment, if the installed version of SCO TCP supports "netconfig" package, then "netconfig" command is invoked. If "netconfig" command is not invoked, then the normal installation of **LNE390 driver is done.**

6.   "Netconfig" command is used to link various drivers to support multiple protocol stacks. Once invoked by the installation utility, the "netconfig" command displays the existing chains and prompts with the four following options:

1.   Add a chain
2.   Remove a chain
3.   Reconfigure an element in the chain
4.   Quit

Select option 1 (add to chain). This will display the top level chains. Select the option "sco_tcp".

Once this is selected, the program displays all the possible installed LAN drivers. Select the driver "lnc0".

Note: lne0, lne1, lne2, lne3 are drivers are for the first, second, third and fourth LNE390 controllers respectively on the system

Once the "lnc0" driver is selected and added to the sco_tcp chain, the hardware configuration on the LNE390 is done. The program will prompt for Memory Address and IRQ for the LNE390. Enter the value of Memory and IRQ as defined in the EISA configuration.

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Then the Internet address (IP address), **Netmask,** broadcast address, host name etc. of the **"lne0"** driver is specified.

Now, the main menu of "netconfig" is displayed. If more **LNE390** cards are to be configured, repeat the procedure by **selecting** "add a chain" option and **"lne1"** driver. If no more cards are to be **configured,** quit out of "netconfig" to relink the kernel. Specify **"y"** for the next two prompts to boot from the newly generated kernel and to build the kernel **environment.**

7.   If using 16MB or less memory on **the system,** and the **LNE390** is **EISA** configured for a shared memory **address** of FFFOOOO, FFEOOOO or **FFC0000,** specify the exact **system memory** at boot **time** as follows, at **the** boot prompt.

> :hd(40)unix mem=1m-8m   for a **8MB** system.
> :hd(40)unix mem=1m-16m   for a 16MB system.

This should be hard coded in the file **/etc/defaults/boot.** Append at the end of the DEFBOOTSTR line, the string **"mem=1m-8m"** or **"mem=1m-16m"** depending upon the amount of memory on **the system.**

This completes the **LNE390 driver** installation.

Reconfiguring LNE390 Drivers:

Use "netconfig" command to **reconfigure the shared** memory address and **IRQ** of LNE390 card. After reconfiguring, a **kernel** must **be relinked** and system booted. Always make sure the memory address and **IRQ specified** in the "netconfig" are the same as the one chosen in the EISA configuration.

Removal of LNE390 Drivers:

Before removing the V 2.05 **LNE390** drivers, **remove the** LNE390 chain using the "netconfig" command. Then USC "custom" utility **to remove** all the **"LNE390** drivers" at any point. After removal of drivers, kernel should **be relinked** and system booted.

Reinstallation of 90 Drivers:

Use "netconfig" to remove all the **LNE390** chain, if any. **Then** use "custom" utility to remove LNE390 drivers, followed by installation of the LNE390 drivers. Relink the new kernel and boot from the same.

Test Report:

SCO ODT 2.0 and **SCO** ODT 3.0 have **been tested** with **TCP/IP** and NFS with a Netware 3.11 server, Interactive Unix 3.2.3 **system** and **another SCO** ODT system. **SCO** ODT 3.0

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has been tested as **LanManager client connecting** to a LanManager 2.1 Server. Also, multiple LNE390 card configuration has **been tested.**

Known Bugs/Limitations:

1.   The LNE390 A/B must **be** EISA **configured** to have the same shared memory address and IRQ as **specified** at the **"netconfig" time.**

2.   If using **16MB** or less **memory** on **the system,** and the **LNE390** is EISA configured for a shared **memory address of FFF0000, FFE0000** or **FFC0000,** the system may panic when an **ethernet packet** is received. This is taken care by specifying the **exact system memory** at boot time as follows, at the boot prompt.

          :hd(40)unix mem=1m-8m   for a **8MB** system.
          :hd(40)unix mem=1m-16m   for a 16MB system.

       This should be hard **coded** in **the file /etc/defaults/boot.** Append at the **end** of the DEFBOOTSTR **line, the** string **"mem=1m-8m"** or **"mem=1m-16m"** depending upon the amount of memory on **the system.**