Boca's Family of Ethernet Products

BOCALANcard-VL

PRODUCT CODE: BEN1VL

Before You Begin your Installation

The product you have purchased is designed to be easily installed into most IBM PC or compatible systems. Many products have large, easy-to-read legends to allow for the easy configuring of the product. This installation manual contains detailed instructions. Most included software has automatic installation programs to place the software correctly onto your computer. However, as all computers are configured differently, you may be required to perform some basic DOS or Windows tasks. If you are not familiar with basic DOS commands such as DIR, CD, or EDIT, you should check your DOS manual, or seek assistance from you local computer dealer to install the product.

How to get Technical Assistance

The dealer that you purchased this product or your computer from is the first place you should go for technical assistance. The dealer is usually the most qualified source of help, and is most familiar with your system and how this product should be installed. Many dealers have customer service and technical support programs, with varying levels of support offered, depending on your needs and computer knowledge. ***Please contact the dealer first whenever a problem occurs.***
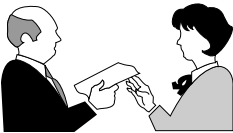
If your Dealer Can't Assist you

If you can't get assistance from your dealer, the manufacturer provides varying levels of technical assistance as summarized on the following page.

Boca BBS **407-241-1601**	*Technical Support Fax* **407-997-0918**
CompuServe **GO BOCA**	*Standard Free Technical Support* **407-241-8088**
QuickFax **407-995-9456**	*Priority Service* **900-555-4900** **($2 per minute)**

The Standard Free Technical Support number is for quick answers to specific inquiries on product features and technical questions (call **407-241-8088**; M-F, 8 am to 6:30 pm EST). Direct access to technical support representatives is provided on a limited basis.

If you require immediate attention or in-depth help with the installation of the product, please call our 900-priority support number for service. This number gives you immediate access to senior-level technicians. The number is **900-555-4900**. You will be charged $2.00 per minute. The charges will appear on your next phone bill.

Damaged or Missing Items

We use many world-class quality assurance programs to ensure the product you purchased is of the highest caliber. Sometimes, however, a component may be missing from the box, or is damaged or corrupt in some way. If this happens, immediately return the entire package to your place of purchase so you may exchange it for a new one. Your dealer should be able to provide you with an exchange far more quickly than by contacting us directly. If for some reason you are unable to return the product directly to its place of purchase, refer to the "Servicing Your Product" and "Warranty" sections in this manual for instructions.

Contents

Getting Started

Congratulations on the purchase of your BOCALANcard-VL from Boca Research, Inc., a leader in high-tech computer enhancement products. Get started by reviewing the package contents as shown below. Get started with the streamlined *EXPRESS* Install on pages 7-9, which is intended for more experienced and knowledgeable users who will using default settings.

Package Contents

Make sure you have received the following items:

BOCALANcard-VL

installation guide
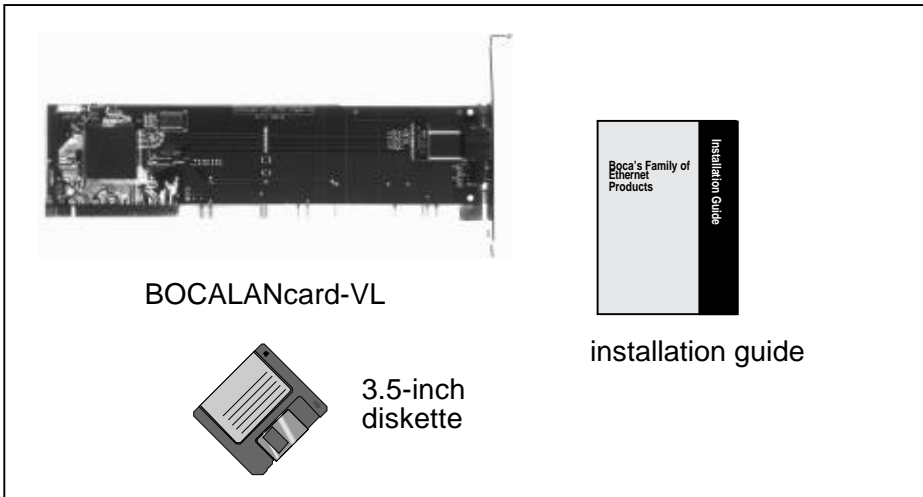
3.5-inch
diskette

If any items are missing or appear damaged, contact your dealer for assistance.

EXPRESS Hardware Installation

START HERE!

Turn OFF your computer.

⬇

Remove your system cover.

⬇

Insert the board into a VESA Local Bus slot.

⬇

Replace your system cover.

Make network connections

RJ-45
Connector*

Wall
Jack

or 10Base-T
concentrator

RJ-45 Cable

⬇
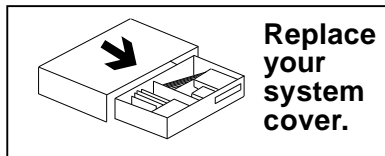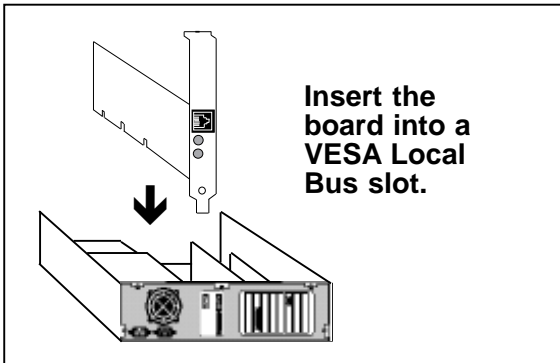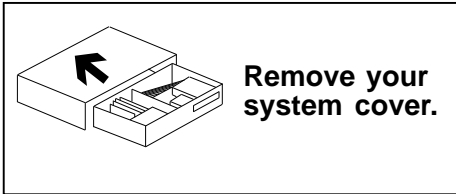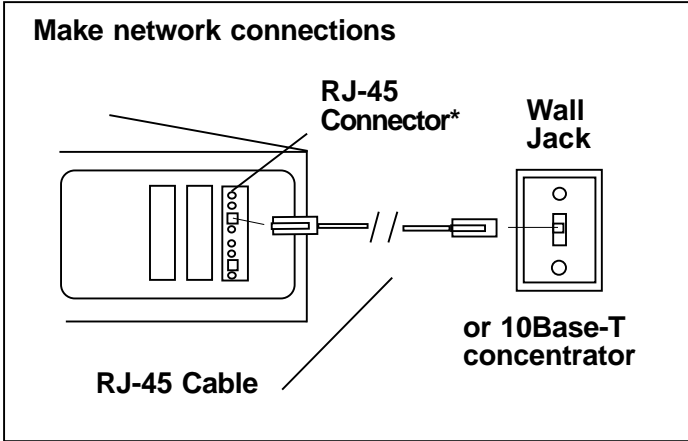
Turn ON your computer.

⬇

Install drivers.
Go to EXPRESS
software
installation.

➜

EXPRESS Software Installation

BOOT YOUR SYSTEM AND GO TO THE C:\ DOS PROMPT.

INSERT THE BOCA RESEARCH BEN1VL DISKETTE IN THE A: (or B:) DRIVE.

TYPE A:\INSTALL (or B:\INSTALL) AND PRESS ENTER.

SELECT BOCALANcard-VL UTILITIES; RUN BENCFG TO SET PROGRAMMABLE LED OPTIONS.

SELECT THE NETWORK DRIVERS YOU WISH TO INSTALL BY PRESSING THE SPACEBAR FOR EACH. FOLLOW ALL ON-SCREEN INSTRUCTIONS.

PRESS ENTER TO COPY THE DRIVERS TO YOUR HARD DRIVE.

NOW, GO TO SECTION TWO, PAGE 15, FOR INSTRUCTIONS ON HOW TO CONFIGURE YOUR NETWORK OPERATING SYSTEM FOR USE WITH THE BEN1VL DRIVERS.

Section One: Product Overview

Congratulations on your purchase of a Boca Ethernet Adapter product. These products allow you to connect a VESA local bus computer to a 10Base-T network. The BOCALANcard-VL (product code: BEN1VL) provides a twisted-pair transceiver with RJ-45 cabling for connecting to an unshielded twisted-pair network (10Base-T).

Features of the Boca Ethernet Adapter:

• Compliant with ISO/ANSI IEEE 802.3 specifications

• Compliant with the Video Electronics Standards Association (VESA) VL-Bus specifications

• High-performance, highly integrated one-chip solution

• On-board support for connecting to a 10Base-T network

• Employs bus-mastering technology

• Designed to work with high-speed 486-based VESA local bus systems

• 32-bit wide access to memory and 8/16/32-bit I/O transfer occur over the VL-Bus

- Jumperless adapter—all features such as interrupt channel and I/O address are software-selectable.

  NOTE: The BOCALANcard-VL does not use DMA.

- Easy installation and maintenance.

- Extensive software driver support for popular network operating systems.

- NE2100 and NE1500T driver-compatible.

- Low-cost solution for networks requiring 10Base-T connection.

- One programmable diagnostic LED indicator and one link status LED indicator.

Other Items You May Need to Complete the Installation

- Suitable tools to install the BOCALANcard-VL Bus Adapter in your computer.

- Some network operating systems require some of their original installation diskettes. See your network installation manuals.

Hardware Installation

The default settings for the adapter are as follows:

IRQ	**9**
Base I/O Address	**300h**

If you need to change any of the default settings, refer to Section Two for instructions. Otherwise, insert the adapter into a VL-Bus compatible slot. There are usually two VL-Bus slots, depending on the model of your system.

Driver Installation

It will be necessary to install drivers after you've inserted the Ethernet adapter into your system. Drivers for the more popular network operating systems are included in sub-directories on the device driver diskette which came with this package.

These drivers are standard implementations for their respective systems. If you have any difficulty installing the drivers, then refer to *Section Three: Driver Installation* for particular instructions for your system. Also refer to the README files on the device driver diskette. There is one README file in the root directory, as well as one in each product-specific directory. Review these files for the latest information about drivers and installation instructions.

Novell Compatibility

Boca Research Ethernet adapters are hardware compatible with the NE2100 and NE1500T. Check if your network operating system has drivers for the NE2100 or NE1500T included with it and use these drivers if they are newer than those on the Boca diskette. **NOTE: The BOCALANcard-VL is not NE2000-compatible.**

Troubleshooting

If the adapter does not function after you have installed it with the necessary software, be sure the adapter is seated firmly and that you have set all options correctly. If you still have difficulty, refer to Section Four: Troubleshooting.

RJ-45

**LNK
(GREEN)**

**RCV
(RED)**

BOCALANcard-VL:
Sample Configuration

**Punch-
down
Block**

**RJ-45
Connector**

**Wall
Jack**

**RJ-45
Cable**

**Hub or
Concentrator**
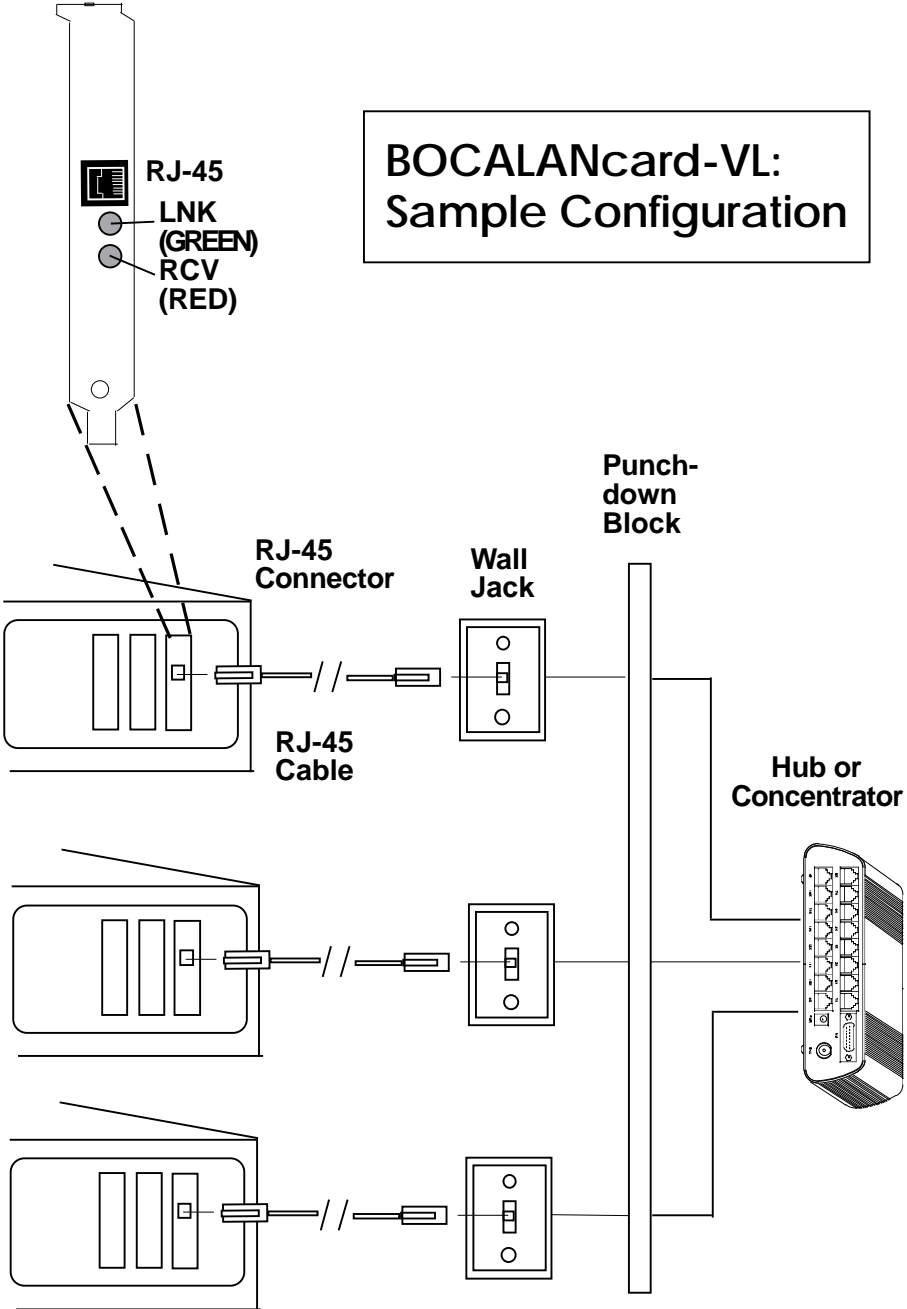
Section Two: Installation and Configuration

The Boca Ethernet adapters are compatible with network hardware which complies with IEEE Ethernet 802.3 standards. The BOCALANcard-VL offers a twisted-pair connector (transceiver).

STEP 1: Remove the System Cover

These instructions assume an AT-style or compatible VESA local-bus machine.

A. Power-down your system, remove the power cord, and unplug the keyboard cable.

B. Use a screwdriver to remove the screws which hold the cover in place. Obviously, locations and types of screws as well as type of case cover will vary based on your particular system. Refer to your computer system documentation for assistance.

C. Carefully slide the cover forward—away from the rear panel. Be careful not to let the cover catch on internal cables to disk drives, controllers, or the power supply.

STEP 2: Insert the Board

A. Select an empty VL-Bus compatible slot (usually there are two) and remove the screw and metal plate that covers the external access to the slot you have selected.

B. Insert the board in the slot you have selected so that the edge connectors on the bottom of the board mate with the slot on the motherboard. Press down firmly on the board and secure it with the screw you removed in step A.

STEP 3: Replace the System Cover

Slide the cover back over the chassis, again exercising care not to let it catch on any cabling. Once the cover is back in place, replace all the screws you removed in step 1B.

STEP 3: Make Network Connections

A. Connect one end of the 10Base-T cable to the BOCALANcard-VL (see illustration on page X). The remaining end of the cable should be attached to a hub or concentrator.

Boca's Ethernet products use standard pinouts. Refer to Appendix E for pin assignments.

B. Re-attach all other external cables and power cords to their original position. Installation of the hardware is now complete. *Continue now with Step 4.*

STEP 4: Configure the BOCALANcard-VL

The BOCALANcard-VL is a software configurable Ethernet adapter. No hardware jumpers are necessary. In order to change parameters, run the configuration utility, BENCFG.EXE, to specify the following options:

Address I/O Port
IRQ Setting
Programmable LED options.

> **NOTE: The BOCALANcard-VL does not use DMA**

BENCFG is installed when you select "BOCALANcard-VL Utilities" from the installation program.

Once the adapter is configured, it is no longer necessary to run BENCFG.EXE. The LED options, however, reset to their default values whenever your computer is powered down. For more information, see the section on the BENLED program. To start the configuration utility, go to the directory where you installed the BOCALANcard-VL utilities, and type: BENCFG [ENTER]

You will see a Main Menu and a settings window. The settings window allows you to view the current settings stored in the BOCALANcard-VL adapter card. As you change the settings, the new settings will be displayed under the 'modified' column of the settings window. Use your arrow keys to select one of the main menu options. The Main Menu options are displayed and described on the next page.

```
        Main Menu                                       Current   Modified
Address I/O                                             320       300
IRQ                    Address I/O                      5         5
LED Options            IRQ                              N         N
Standard Settings      LED Link Enabled                 N         N
Save Changes & Exit    LED Transmit Activity            Y         N
Exit Without Saving    LED Receive Activity (Network)   N         N
                       LED Polarity                     N         N
                       LED Jabber Indicator             N         N
                       LED Collision Status             Y         Y
                       LED Enabled
```

Standard Settings: Allows you to select one of 16 basic configurations. By selecting standard settings, you will specify both the Address I/O and the IRQ at the same time.

Address I/O: Selects the base I/O address for the BOCALANcard-VL.

IRQ: Selects one of the four hardware IRQ settings for the BOCALANcard-VL: 5, 9, 11, or 12.

LED Options: Allows you to specify events on the BOCALANcard-VL that will cause the programmable (RED) LED to light. This is a helpful diagnostic tool for determining possible network problems. Put a 'Y' for each event you want the LED to light.

Save Changes & Exit: 'Reprograms' the BOCALANcard-VL with the settings you have selected in the 'Modified' column.

Exit Without Saving: Exits BENCFG without reprogramming the BOCALANcard-VL.

BENLED Program

This utility reprograms your LED options each time your computer is powered up. Each time you power up your computer, the programmable LED reverts back to its default configuration as shown and defined below:

1	LED Link Enabled	N
2	LED Transmit Activity	N
3	LED Receive Activity (Network)	Y
4	LED Polarity	N
5	LED Jabber Indicator	N
6	LED Collision Status	N
7	LED Enabled	Y

1. Receiving a valid signal from a network.

2. The BOCALANcard is transmitting data onto the network.

3. The BOCALANcard-VL is receiving data from the network.

4. Turn on this indicator to view polarity status. When ON, the BOCLANcard-VL is cabled correctly. When OFF, the negative and positive signals for the receive pair have been swapped. The BOCALANcard-VL automatically adjusts for this condition. This is used for troubleshooting purposes only. **NOTE: these conditions apply ONLY when the normal polarity indicator is ON.**

5. This indicates that the BOCALANcard-VL is jabbering[1] on the network.

6. A collision occurs when more than one workstation on the network is transmitting simultaneously.

7. Turning this option ON enables the red LED.

To program the LED for your custom options each time you start your computer, a command has been provided that you can insert into your AUTOEXEC.BAT, or any other batch file. The command is BENLED.EXE. The syntax for BENLED is

BENLED XX

where XX is the hexadecimal value to be placed into the LED register on the BOCALANcard-VL. The easiest way to determine this number is by running BENCFG as described earlier in this section. When selecting "Save and Exit", BENCFG tells you the command, including the register number.

Configuration is complete. Go to *Section Three: Driver Installation.*

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[1] Jabber occurs when there are excessively long data packets being transmitted from the node (i.e., workstation, server). At that point, the hub, or concentrator, partitions (isolates) the node from the network until the condition is corrected.

Section Three: Driver Installation

3.1 Installing Drivers to Your Hard Disk

To install drivers from the driver diskette to your computer's hard-disk, run the install program that is on the diskette. To run the install program, type in the following commands (depending on your system):

A:INSTALL or B:INSTALL [ENTER]

After an introductory screen, you are asked which drivers you wish to install. Follow all on-screen instructions. Please note that all drivers available may not be listed on this screen. For some applications, such as Windows For Workgroups, you will use the setup utilities provided with those applications to load the drivers from the driver diskette.

Note: You will always want to install the BOCALANcard-VL utilities (BENCFG and BENLED).

3.2 Novell NetWare Drivers

NetWare drivers include the following:

• Server drivers: v. 3.x, 4.x
• Client drivers: DOS ODI, OS/2 ODI

Novell's ODI (Open Datalink Interface) based drivers along with NetWare 3.x and 4.x are the prevalent Novell network operating system revisions in the market today. The driver diskette includes support for NetWare 3.x and 4.x with IPXODI client and server drivers. The ODI Client drivers included on the driver diskette can be used for workstations running on NetWare v. 3.x and 4.x. Be sure to check your distribution diskettes for current drivers. We recommend that the latest available drivers be used.

3.2.1 NetWare DOS ODI Client Driver

You can load the NetWare PCNTNW.COM DOS ODI driver through the DOS command line or through a batch file such as AUTOEXEC.BAT.

1. Create a subdirectory in your boot drive with the following files:

   NETX.COM: NetWare shell (used with conventional memory workstations)

   VLM.EXE: Use this instead of NETX.EXE to make use of NetWare Directory Services (NDS) for NetWare 4.x and above.

   LSL.COM: Link Support Layer

   PCNTNW.COM: The Boca Ethernet Adapter DOS ODI Driver

The IPX protocol stack file (IPXODI.COM, for example)

NET.CFG: this is required for configuring options.

NETX.COM, LSL.COM, IPXODI.COM, and VLM.EXE can be obtained from the Workstation Driver diskette in the Novell Client Software package. Copy the client files PCNTNW.COM and NET.CFG from the DOS ODI directory of the driver diskette to the subdirectory.

2. To manually load these files from the DOS prompt each time the system is restarted, type the following commands in the given order to initialize DOS ODI driver support and the IPX protocol stack:

LSL.COM [ENTER]
PCNTNW.COM [ENTER]
IPXODI.COM [ENTER]
NETX.COM [ENTER]

> **You must call the NETX file in the same directory that the NET.CFG is located.**

NETX.COM is compatible with the versions of DOS 3.x, 4.x, and 5.x. You must load SETVER.EXE in the CONFIG.SYS file if you are using DOS 6.0.

3. To automatically load these files, use a DOS text editor to create and/or modify a batch file, then save it to disk. You may use your AUTOEXEC.BAT if you desire. Load the files in the following order: link support layer, LAN Driver, protocol stacks, then the shell. Your batch file should look similar to the following:

```
\<subdirectory>\LSL.COM
\<subdirectory>\PCNTNW.COM
\<subdirectory>\IPXODI.COM
\<subdirectory>\NETX.COM
      or VLM.EXE*
```

*NOTE: use VLM.EXE instead of NETX for NDS options.

4. To change any default settings when the driver is loaded, you must create a NET.CFG file on the workstation diskette. You can use NET.CFG to change the Boca Ethernet adapter's operating characteristics.

5. Reboot the workstation. After NETX is executed, and if a server is present, it will attach to the server. At this point you can log into the network using your NetWare utilities. Logging in can be accomplished by:

   Type F: [ENTER], then LOGIN [ENTER]

   Refer to the NetWare ODI DOS installation documentation for more information on installing the DOS ODI driver.

3.2.2 NetWare OS/2 Client Driver

Load NetWare OS/2 ODI Driver from the OS/2 CONFIG.SYS file as shown below. For more information, refer to the *NetWare Requestor for OS/2* installation documentation.

1. Using NetWare OS/2 disks provided by Novell, install the NetWare OS/2 requestor files on the target hard disk and the file server. Follow the instructions on screen to configure the NetWare OS/2 requestor for a network-supported LAN adapter board. If the NetWare-supported LAN adapter contains the PCNET adapter option, then select that option, otherwise select any other LAN adapter.

2. Copy the OS/2 ODI Driver, PCNTNW.OS2, from the Boca diskette to the C:\NETWARE directory of the boot drive.

3. Edit the CONFIG.SYS file and replace the NetWare-supported LAN adapter driver with the name of the OS/2 ODI driver, PCNTNW.OS2. For example:

   DEVICE=C:\NETWARE\PCNTNW.OS2

The following is an example of the CONFIG.SYS load sequence for OS/2 ODI driver support for the IPX protocol stack:

```
REM --- NetWare Requestor Statements Begin ---
DEVICE=C:\NETWARE\LSL.SYS
RUN=C:\NETWARE\DDAEMON.EXE
DEVICE=C:\NETWARE\PCNTNW.OS2
(located in OS2ODI directory on driver diskette)
DEVICE=C:\NETWARE\IPX.SYS
DEVICE=C:\NETWARE\NWREQ.SYS
IFS=DEVICE=C:\NETWARE\NWFIS.IFS
RUN=DEVICE=C:\NETWARE\NWDAEMON.EXE
REM --- NetWare Requestor Statement End ---
```

The OS/2 ODI Driver supports multiple protocol stacks and Ethernet frame types. Refer to the *NetWare Requestor for OS/2* installation documentation for more information on using protocol other stacks or frame types.

You can change any default settings when the driver loads by creating the file NET.CFG. Refer to the NetWare Requestor for OS/2 installation documentation for more information on configuring the NET.CFG file.

NOTE: NET.CFG is required for all settings. Do not operate the BOCALANcard-VL without a NET.CFG file.

3.2.3 NetWare Server 4.x Driver

For a NetWare 4.x server configuration, the Server 4.x driver is included on the Boca driver diskette. The driver is located under the 4.x subdirectory in the Novell directory of the disk.

The directory structure provided on the driver diskette has been setup for automatic installation. Follow the guidelines in the Novell NetWare documentation for more details to install the driver from the driver diskettes.

Use the LOAD and BIND commands to load the NetWare 4.x open datalink interface (ODI) server driver as described below. For more information on these commands, refer to the NetWare 4.x LAN driver installation documentation. Located in the Driver Disk is the version 4.x server driver labeled PCNTNW.LAN. Two methods to loading this driver are to use the server command line prompted by ":" or to edit AUTOEXEC.NCF. If you use the server command line, you will need to load the driver each time the system is booted. If you edit AUTOEXEC, it will automatically load the driver each time your system is booted.

To install the NetWare Server 4.x, follow the instructions given below:

1. Install NetWare 4.x on your system.

2. Copy the ODI server driver, PCNTNW.LAN, from the BOCALANcard-VL driver diskette to the hard disk directory where the NetWare 4.x system files are located. The path on the diskette should be as follows:

        A:\NOVELL\SERVER\4.X

3. Boot NetWare by executing SERVER.EXE. Refer to NetWare documentation on loading disk drivers and mounting volumes.

4. To load the driver manually, simply follow the instructions given below.

Type the following command at the file server console:

        LOAD PCNTNW <ENTER>

(You will need to specify DOS path if the driver is located in a DOS partition). Do not use keyboard Port, INT, and DMA keywords. The BOCALANcard-VL requires no keywords to be specified for interrupt channel, DMA channel, and I/O address.

Make sure that MSM and ETHERTSM files are present in the same directory as PCNTNW. The PCNTNW driver will autoload these files. These files should be copied from the diskette from the 4.x subdirectory under the Novell directory. Then, bind the driver to the IPX protocol stack by typing:

BIND IPX TO PCNTNW NET=xxxx <enter>
(Bind to ipx or any other protocol stack).

5. To load the driver using AUTOEXEC, you must edit AUTOEXEC.NCF. First, type "LOAD INSTALL" at the server prompt ":" to access the install utility. Open the MAINTENANCE/SELECTIVE INSTALL to select the "NCF File Options" from the menu to access the "EDIT AUTOEXEC". Add the following command lines in AUTOEXEC.NCF file as shown below. However, for the BOCALANcard-VL requires no keywords to be specified for interrupt channel, DMA channel, and I/O address.

BIND IPX TO PCNTNW NET=xxxx
(Bind to ipx or any other protocol stack).

Multiple FRAME type support

The FRAME keyword should be used with the LOAD command to designate the desired frame type. In addition, the BOARD keyword must be used in conjunction with the FRAME keyword if no IO Address is specified to support multiple FRAME types. The available frame values are the following:

Ethernet_802.2   Ethernet_802.3
Ethernet_SNAP   Ethernet_II

Please refer to the Novell NetWare documentation for details regarding each frame type. The BOARD keyword value is designated by the user. The range available for BOARD is 0 - 99999999.

For example, to load multiple frame types for one physical BOCALANcard-VL, the following should be entered:

LOAD PCNTNW FRAME=Ethernet_802.2 BOARD=1
LOAD PCNTNW FRAME=Ethernet_802.3 BOARD=1
LOAD PCNTNW FRAME=Ethernet_II BOARD=1
LOAD PCNTNW FRAME=Ethernet_SNAP BOARD=1
<ENTER>

Finally, the driver must be bound to the IPX protocol to each frame type based on the procedure provided in the Novell documentation. Please note that if memory is low to support multiple frames, the buffer size must be increased in the STARTUP.NCF in NetWare. For example, the SET RESERVED BUFFERS should be set to below 32 from the default setting of below 16. The correct syntax is the following:

Set ReservedBuffersbelow16Meg=32

Single FRAME type support

The FRAME keyword should be used with the LOAD command to designate the desired frame type. For single FRAME support, no BOARD keyword is needed to designate one frame type. The available values and description to load FRAME types is explained above in the Multiple FRAME type support section.

Using BOARD keyword

The BOARD keyword may be used with the LOAD command to specify the board number to the selected adapter board. This keyword is used to load a different frame type to the same board. See the Multiple FRAME support section above for examples using the BOARD keyword.

Note: If IOP, IO Port Address, is specified, then BOARD keyword should not be used. In this case, the same IOP should be used to load the different frame type.

3.2.4 NetWare Server 3x Driver

For a NetWare 3.1x server configuration, the Server 3.1x driver is included on the Boca diskette. The driver is located under the 3.1x subdirectory in the Novell directory of the disk. Please refer to Appendix A for details on the directory structure.

Use the LOAD and BIND commands to load the NetWare 3.1x open datalink interface (ODI) server driver as described below. For more information on these commands, refer to the NetWare 3.1x LAN driver installation documentation. Located in the Driver Disk is the version 3.1x server driver labeled PCNTNW.LAN. Two methods for loading this driver are to use the server command line prompted by ":" or to edit AUTOEXEC.NCF. If you use the server command line, you will need to load the driver each time the system is booted. If you edit AUTOEXEC, it will automatically load the driver each time your system is booted.

To install the NetWare Server 3.1x, follow the instructions given below:

1. Install NetWare 3.1x on your system.

2. Copy all the files from 3.1x server directory of the Boca diskette to the hard disk directory where NetWare 3.1x system files are located. The following path should be used to access the files from the diskette:

A:\NOVELL\SERVER\3.X

3. Boot NetWare by executing SERVER.EXE. Refer to NetWare documentation on loading disk drivers and mounting volumes.

4. To load the driver manually, simply follow the instructions given below.

Type the following command at the file server console:

```
LOAD LSLENH.NLM
LOAD MSM31X.NLM
LOAD ETHERTSM.NLM
LOAD PCNTNW
LOAD MONITOR (only needed for NetWare 3.11 and
must use version included on disk)
<ENTER>
```

(You will need to specify DOS path if the driver is located in a DOS partition).

No keywords need to be specified for interrupt channel, DMA channel, and I/O address.

Make sure that LSLENH, MSM and ETHERTSM files are present in the same directory as PCNTNW. The PCNTNW driver will autoload these files. These files should be copied from the Boca diskette from the 3.1x subdirectory under the Novell directory.

Then, bind the driver to the IPX protocol stack by typing:

BIND IPX TO PCNTNW NET=xxxx <enter>
(Bind to ipx or any other protocol stack).

**NOTE: Please make sure that you use the monitor
program which is distributed on the Boca driver
diskette. The original monitor shipped with NetWare
3.11 has a bug and will crash the system.**

5. To load the driver using AUTOEXEC, you must edit
   AUTOEXEC.NCF. First, type "LOAD INSTALL" at the
   server prompt ":" to access the install utility. Open the
   "SYSTEM OPTIONS" menu to access "EDIT
   AUTOEXEC". Add the following command lines in
   AUTOEXEC.NCF file.

   LOAD LSLENH.NLM
   LOAD MSM31X.NLM
   LOAD ETHERTSM.NLM
   LOAD PCNTNW
   LOAD MONITOR (only needed for NetWare 3.11; must
   use version included on disk)
   BIND IPX TO PCNTNW NET=xxxx
   (Bind to ipx or any other protocol stack).

If you need to load multiple boards, consult your Novell
documentation.

3.3 Microsoft Windows NT (NDIS 3.0)

The BOCALANcard-VL driver diskette also includes the NDIS 3.0 driver for the Windows NT environment. The directory structure provided on the Boca driver diskette has been setup for automatic installation. Follow the guidelines in the Microsoft Windows NT User's Guide for more details to install the driver.

Note: Some of the custom installation procedures provided here are either an abbreviated or a duplication of the OEM installation guidelines.

To install the NDIS 3.0 driver, simply follow the instructions given below to navigate through the menu driven functions in Windows NT.

1. Insert the Boca diskette into the system's floppy drive.

2. From the Control Panel in the Windows NT Main window, double click on the Network icon.

3. In the Network Settings dialog box, choose "Add Adapter."

4. In the Add Network Adapter dialog box, pull the adapter card list menu and select "<Other> Requires disk from manufacturer" from the list.

5. In the next window, specify the drive and path for the Boca files. The Windows NT files reside in the WINNT subdirectory. So, for example, enter A:\WINNT.

6. Then, select the AMD PCnet Family Ethernet Adapter from the dialog box to install the BOCALANcard-VL.

7. Now, while in the AMD PCnet Family Ethernet Adapter Card Setup dialog box, select the bus type to "All" (defaults to All if nothing is selected).

The BOCALANcard-VL does not require IRQ or DMA channel values to be specified.

8. Finally close the Setup dialog box and exit from the Add Network adapter dialog box to complete the installation. Follow any remaining instructions from Windows NT to reboot your system, if required.

For additional guidelines, please refer to the Microsoft Windows NT documentation. In addition, you may review the README.TXT file in the WINNT directory of the Boca diskette.

3.3.1 Microsoft LAN Manager

To install the NDIS driver, follow the instructions given below:

1. Insert the Boca driver diskette into the floppy drive.

2. From the LAN Manager subdirectory on your hard disk, run SETUP to begin installation.

3. Use the ALT key on your keyboard and the highlighted letter to pull down the Configuration menu (ALT + C).

4. From the Network Adapter Drivers dialog box, select the AMD PC-Net Family Driver from the menu, if shown. Otherwise, select Other Driver to import the driver from the Boca diskette.

5. Then, enter the disk drive letter for the Boca diskette. No path is required because the Boca diskette is structured for the Microsoft LAN Manager OEM setup.

6. Select the PCnet Family Ethernet adapter and choose OK.

7. Select the desired protocol from the Network Protocol dialog box and choose OK.

8. In the Workstation Configuration dialog box, select the PCnet Family Ethernet adapter and choose OK.

9. Follow the remaining instructions from LAN Manager to complete installation.

NOTE: There are two keywords for changing the transmit and receive buffers via the PROTOCOL.INI driver entry. These keywords are:

RXBUFFERS=4
TXBUFFERS=4

If you insert these keywords in the PROTOCOL.INI file in the PCNTND driver section, it will change the number of transmit and receive buffers.

Designating the BUSTYPE Keyword

Remove the I/O address and insert the BUSTYPE keyword in PROTOCOL.INI under the PCNTND driver section. For example, to designate the BOCALANcard-VL on the local bus, insert the following:

BUSTYPE=VESA

3.3.2 Loading the Windows for Workgroups Drivers

Installing the Windows for Workgroups 3.1 Driver

The BOCALANcard-VL driver also supports the Windows for Workgroups 3.1 environment. The installation for the NDIS 2.0.1 driver is menu driven through the Windows interface. The Boca driver and other relevant files are located in the WFW31 subdirectory.

The directory structure provided on the driver diskette has been setup for automatic installation. Follow the guidelines in the Microsoft Windows for Workgroups User's Guide for more details to install the BOCALANcard-VL driver from the driver diskettes.

To install the NDIS 2.0.1 driver, follow the instructions given below:

1. Insert the Boca driver diskette in the system's floppy drive.

2. From the Main group in Windows, choose the Control Panel icon.

3. In the Network Settings dialog box, choose the Adapters button and the Network Adapters dialog box should appear.

4. Choose the Add button to install the driver from the Boca diskette.

5. In the list of network adapters, select the "Unlisted or Updated Network Adapter" option.

6. Enter the drive letter and the WFW31 path to load the NDIS driver. For example, A:\WFW31.

7. Select the AMD PC-Net Driver and choose OK.

8. A setup dialog box appears displaying the default settings. For BOCALANcard-VL adapters, no settings need to be specified for one installed adapter.

9. Then, in the Network Adapters dialog box, choose the Close button. Then choose the OK button in the Network Settings dialog box.

10. Follow the remaining Window instructions, to restart the computer to have the driver to take effect.

Installing the Windows for Workgroups 3.11 Driver

Microsoft's Windows for Workgroups 3.11 supports both NDIS 2.0.1 and NDIS 3.0 drivers. Boca Research provides both NDIS drivers to run under the Windows for Workgroups 3.11 environment. Please note the format and procedure to install the NDIS drivers for Windows for Workgroups 3.11 is different from that of Windows for Workgroups 3.1.

The directory structure provided on the Boca driver diskette has been set up for automatic installation. Follow the guidelines in the Microsoft Windows for Workgroups 3.11 User's Guide for more details to install the BOCALANcard-VL driver from the driver diskettes. To install the NDIS 2.0.1 and/or NDIS 3.0 drivers, simply follow the instructions given below:

NOTE: During this installation, you will need some files from your Windows for Workgroups diskette.

1. Insert the driver diskette into the system's floppy drive.

2. In the Windows for Workgroups 3.11 Program Manager, double click on the Windows Setup icon from the MAIN window.

3. While in the Windows Setup dialog box, select the Change Network Settings from the Options menu.

4. From the Network Setup dialog box, select the "Drivers..." button to install the NDIS 2.0.1 and NDIS 3.0 drivers.

5. Then, in the Network Drivers dialog box, select Add Adapter button.

6. Now, in the Add Network Adapter window, choose the "Unlisted or Updated Network Adapter" from the menu and then select OK.

7. The Install driver dialog box will appear. Enter the floppy drive with the Boca driver diskette and specify the WFW311 path to install the drivers. For example:

A:\WFW311

Then select OK.

8. The BOCALANcard-VL selection will appear under the Network Adapters list. Simply select OK to continue. No values need to be specified for the Interrupt channel and DMA channel since the BOCALANcard-VL is software-configurable.

9. Select Close.;

10. Then, select OK to exit. Windows for Workgroups 3.11 will ask you to reboot the machine once installation is completed The installation for Windows for Workgroups 3.11 is now completed.

3.4 Installing the Banyan VINES Client Driver

The BOCALANcard-VL driver may configured to run in the Banyan VINES environment for client based systems only. The steps to load the driver are as follows:

1. Compile all the files necessary (see enclosed list) for VINES. For ease of use, all of these files were placed in one subdirectory - C:\NDIS

2. Create PROTOCOL.INI, CONFIG.SYS, and AUTOEXEC.BAT (see below as an example)

   a. Modify the PROTOCOL.INI to reflect the changes necessary for the appropriate LAN card section.

   b. Modify the AUTOEXEC.BAT and CONFIG.SYS to reflect changes in the DIRECTORY of where the files are to be placed.

3. Run the VINES PCCONFIG to configure the NDIS Ethernet Driver.

4. Reboot the machine and run the AUTOEXEC.BAT.

5. Run BAN.

Files required:

BAN.EXE	32835	02-12-92	6:07p
BAN.MSB	2058	02-12-92	6:07p
REDIR.MSB	982	02-12-92	6:07p
NEWREV.EXE	47933	02-12-92	6:07p
NEWREV.MSB	5139	02-12-92	6:07p
PCCONFIG.DB	19656	02-12-92	6:07p
REDIRALL.EXE	51546	02-12-92	6:07p
PCCONFIG.EXE	61155	02-12-92	6:07p
PCCONFIG.MSB	5785	02-12-92	6:07p
NDISBAN.COM	35356	02-12-92	6:07p
NETBIND.EXE	15639	02-12-92	6:07p
NDISBAN.DOC	3072	02-12-92	6:07p
NDISBAN.OVL	15639	02-12-92	6:07p
PROTMAN.DOS	10649	02-12-92	6:07p

User Must Create:

PROTOCOL.INI	3510	5-28-92	11:07a
CONFIG.SYS	226	05-29-92	10:05a
AUTOEXEC.BAT	112	05-28-92	05:25p

User Must Find:

PCNTND.DOS

The following path should be used to access the driver from the Boca diskette:

A:\MSLANMAN.DOS\DRIVERS\ETHERNET\PCNET

The modifications to CONFIG.SYS, AUTOEXEC.BAT, and PROTOCOL.INI are shown below as an example:

CONFIG.SYS
```
FILES=20
BUFFERS=20
DEVICE=C:\NDIS\PROTMAN.DOS  /I:C\NDIS
DEVICE=C:\NDIS\PCNTND.SYS
```

AUTOEXEC.BAT
```
PATH=C:=DOS
PROMPT $P$G
C:
CD\NDIS
BAN
```

PROTOCOL.INI
```
[PROTOCOL.INI]
DRIVENAME= PROTMAN$
```

[PCNTND_NIF]
```
DRIVENAME    =   PCNTND$
IOBASE       =   0x300
INTERRUPT    =   3
```

[VINES_XIF]
```
DRIVENAME    =   NDISBAN.DOS$
BINDINGS     =   PCNTND_NIF
```

3.5 Artisoft LANtastic/AI Driver

The PCNTLCEXE AI-LANBIOS driver, included on the Boca driver diskette, allows you to operate a Boca Ethernet adapter-based node in a LANtastic network. The driver is compatible with Artisoft's LANtastic/AI Network Operating System v. 4.x and 5.x. You will also need the AILANBIO.EXE file (included in the LANtastic/AI Software package) to provide high-level communications across the LAN. You will not be able to run any network software until the Boca driver and the AILANBIO.EXE are run. Refer to the LANtastic documentation for additional details.

1. Copy the Boca driver to the appropriate directory. Make sure that AILANBIO.EXE is also resident. The command line for installing the driver is as follows:

```
PCNTLC.EXE
AILANBIO.EXE (must be obtained from Artisoft's
    LANtastic/AI package)
```

The default values are invoked if none are entered at the command line. These defaults are:

```
IRQ        = 5
I/O Port   = 300h
Adapter #  = 0
MPX        = C7
```

The MPX switch specifies the DOS multiplex (MPX) number to use for communication with AILANBIO.EXE. You will need to change this number ONLY if the default MPX number is in use by another application or NETBIOS. Multiplex numbers 00h through BFh are reserved for DOS use; therefore, you must use a multiplex number between C0h and FFh.

2. Using command line switches, you can assign different values for the Boca Ethernet adapter driver. Example:

```
PCNTLC.EXE/MPX=D7/IRQ=4/IOBASE=320
AILANBIO.EXE/MPX=D7/ADAPTER=1
```

The command line switches instruct the NETBIOS to load the BOCALANcard-VL as Adapter number 1 using interrupt request 4, I/O Base Address 320h, and DOS MPX number D7.

3. If the driver is installed successfully, the PCNTLC.EXE driver will produce the message:

```
---- PCNTLC DRIVER INSTALLED ----
```

4. Other switch commands that are available:

•@SWITCH-FILE. Specifies that additional switches are to be taken from a switch file. Any switches after the switch-file name will be used, and the switch settings take

precedence over any settings in the switch file. You may invoke switch files from within switch files as often as you wish. The file should contain valid switches and may contain comment characters (type ";" at the beginning of each line or after switches). For example: PCNTLC / @SETUP. The file SETUP contains:

```
;Boca Research Ethernet Adapter driver setup file
;
IOBASE=360        ; Use I/O port address 360h
IRQ4              ; Use interrupt request 4
VERBOSE           ; Display verbose information
```

• HELP instructs PCNTLC.EXE to display information about the configuration of the PCNTLC.EXE driver to be displayed. See message section of the LANtastic manual for a detailed description of the VERBOSE output.

• REMOVE command removes the PCNTLC.EXE driver from memory. You must remove TSR (terminate and stay resident) programs in the opposite order in which they were loaded. For example, if you loaded PCNTLC.EXE and then loaded AILANBIO.EXE, you must remove AILANBIO before PCNTLC.EXE.

For more details regarding switches and PCNTLC.EXE messages, consult the appropriate README file in the LANtastic subdirectory on the Boca diskette and the LANtastic manuals.

3.6 Installing the Packet Driver

The Boca Packet Driver for the Boca Ethernet Adapter contains the DOS version of the packet driver. The driver diskette includes a number of other utilities which run above the Packet Driver. A number of documentation files are also included. These should all be read. Start with the file INSTALL.TXT.

Copy the Boca packet Driver, PCNTPK.COM, in the appropriate directory. The packet driver can be loaded from the DOS prompt or through an AUTOEXEC.BAT file. The command line format for the Packet Driver is:

PCNTPK[-n] [-d] [-w] <int=packet_int_no> [IRQ=int_irq] [IOADDR = io_addr] [DMA = dma_no]

[-n]
The -n option converts Ethernet type 8137 and Novell PSO-like packets. This is required if you use a standard boot ROM from Boca and use the Packet Driver and IPX included in the Packet Driver package as the drivers loaded from the boot image file.

[-d]
The -d option delays initialization, but maintains the initialization code after loading.

[-w]
The -w switch is used for Windows. Install the Packet Driver before running MS-Windows. The switch does not prevent Windows from swapping the network application out of memory; it simply detects when this occurs and drops the packet.

<int=packet_int_no>
This is the software interrupt used to communicate with the packet driver. The range of this parameter is between 0x60 and 0x80. Refer to Appendix A of INSTALL.TXT for more details.

[int_no]
This is the hardware interrupt number. This can be 5, 9, 11, or 12.

[io_addr]
This is the base I/O address. This can be 300h, 320h, 340h, or 360h.

If the [int_no] and [io_addr] are not specified, the Packet Driver assumes the following default values,:

[int_no]   = 5
[io_addr]   = 300h

Section Four: Troubleshooting

If you encounter difficulties with your Boca Ethernet product, the problem may be a faulty installation or configuration settings which conflict with other devices. Check the following:

• **STATUS LEDs**. The Boca Ethernet adapters have two LEDs that are visible from the rear of the board. These status indicators show whether or not the cable is connected along with a programmable LED. The default indicates when data is received from the network.

GREEN: Link
RED: Receive data (default)

Power on the system, connect the network cable, and observe the LEDs. The green LED shows that it is connected with another 10Base transceiver. If the green light is ON, then the system is connected. See chart explaining LED status on next page.

GREEN	RED	STATUS
ON	ON or OFF	LINK established
OFF	OFF	No LINK (connection)
ON	*OFF	No data is currently being received from the network.
ON	*FLASHING	Data being received. This is the normal state of an active network.
ON	*ON steady	Heavy network traffic or possible bad cable.

* **IF RED IS SET TO DEFAULT**

• **BOARD SETTINGS.** If you are using a Novell network, make sure that the settings in the NET.CFG file are correct. Also, when NE2100.COM is executed, NET.CFG must be in the current default directory.

If you are using another type of network (NDIS, etc.), read the driver installation instructions again to be sure that I/O address and IRQ settings are correct.

Review the installation again and check software setup.

Also make sure that any of the setting selections you have made do not conflict with devices that are currently in your system. You may want to vary the settings on your board to see if it makes a difference. Remember to modify the NET.CFG or your batch files as well.

- **MAKE SURE THAT THE NETWORK YOU ARE CONNECTED TO IS FUNCTIONING.**

- **REPLACE THE ADAPTER WITH ANOTHER KNOWN TO FUNCTION AND TRY TO LOGIN AGAIN.**

- **TRY THE ADAPTER IN A DIFFERENT COMPUTER.**

- **MAKE SURE THE ADAPTER HAS BEEN INSERTED IN A LOCAL-BUS CONNECTOR SLOT.**

- **MAKE SURE YOU ARE NOT USING DRIVERS MADE FOR NE2000 COMPATIBILITY. THE BOCALANCARD-VL IS NE2100, _NOT_ NE2000-COMPATIBLE.**

- **REFER TO THE README FILE FOR A COMPREHENSIVE LIST OF POSSIBLE ERROR MESSAGES AND SUGGESTED REMEDIES.**

If none of the above isolates and solves the problem, refer to Appendix C: Servicing Your Boca Product.

Appendix A: Specifications

BOCALANcard-VL

- 10Base-T twisted pair transceiver with RJ-45 connector
- 10Base-T operating distance 100 meters (328') maximum hub to node length
- Diagnostic LEDs: link integrity- and receive-selectable (default)
- Software-Selectable interrupts and a base I/O address.

Appendix B: FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense."

CHANGES OR MODIFICATIONS TO THIS EQUIPMENT NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID YOUR AUTHORITY TO OPERATE THE EQUIPMENT.

Appendix C: Servicing Your Boca Product

If your Boca product requires service, first contact the authorized dealer from whom you purchased the product. If the dealer is unable to assist you, and you must contact Boca Research, Inc., please follow the instructions below. Our electronic BBS is available 24 hours a day at (407) 241-1601 and will support data transmission speeds up to 28.8Kbps with settings of N, 8, 1. If you have a modem, the BBS may be helpful (especially during off hours) if you have a question about product settings or compatibility, or if you wish to download driver software or utilities.

If the Troubleshooting section did not resolve your problem, you may call our technical support staff for assistance. If you haven't referred to the Troubleshooting section, there's a good chance the solution to your problem is there.

NOTE: CALLING TECHNICAL SUPPORT WITHOUT COMPLETE AND ACCURATE INFORMATION CONCERNING YOUR PROBLEM MAY BE BOTH TIME-CONSUMING AND FRUSTRATING FOR YOU.

1. When calling Boca Research Technical Support, have the following information available:

Board name and part #
   (located on the board)
Computer manufacturer
Computer model
Peripherals in system
Operating system and version

> **If you suspect a problem with a specific program or software package, make note of the name, version or release number, and manufacturer of the software.**

2. Call Boca Research Technical Support Department between the hours of 8:00 a.m. and 6:30 p.m. Monday through Friday EST at (407) 241-8088. A technical support specialist will be available to discuss the problem(s) you are experiencing. If factory service is required, you will be given a Return Merchandise Authorization (RMA) number. **PLEASE PLACE THIS NUMBER ON THE OUTSIDE OF THE PACKAGE** when you return the item(s) for service and reference it on any correspondence included in the package. Boca Research, Inc. will return any product which is not accompanied by an RMA number.

3. Refer to the Warranty Statement if the product is covered under the five-year Boca Research, Inc. Limited Warranty.

4. Certain parts will not be covered under the Boca Research, Inc. Limited Warranty. Dealer installed parts are warranted by the dealer. Parts which you have installed yourself are covered only by the suppliers warranties. In these cases, Boca Research, Inc. can identify which parts are defective, but will not replace such parts until we receive written authorization from you. Cost of parts and labor involved in making such repairs will be billed to you C.O.D.

5. When returning the product to Boca Research, Inc. for repairs, please be sure to include:

   - **the BEN1VL product (board only)**
   - **copy of your original invoice**
   - **your return street address (for UPS purposes), your phone number, and the RMA number mentioned above.**

   Package the product securely in a container equivalent to the original packaging, and insure the package to protect against loss or damage during transit. Shipping charges must be prepaid; C.O.D. shipments will not be accepted. Please use the address below for all correspondence:

   Boca Research, Inc.
   RMA Department - RMA # _____
   1601 Clint Moore Road
   Boca Raton, FL 33487-2841

6. If the repairs performed on your product were covered by the warranty, Boca Research, Inc. will return it prepaid via UPS.

Appendix D: Pin-Out Assignments

Pin-out assignments for the 10Base-T connector are as
follows:

8-pin
RJ45
Connector

Pin 1   *Pin 8*

Bottom of
plug
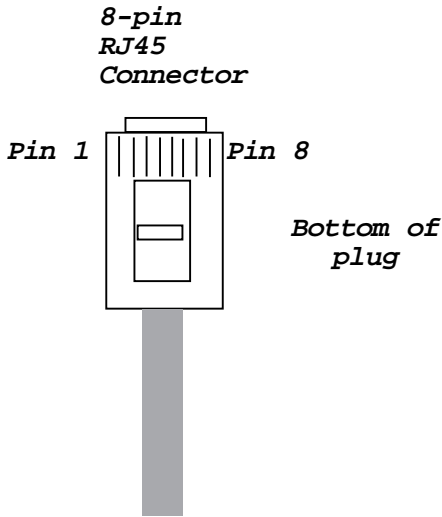
Appendix E: NET.CFG Options for NetWare

Included on the driver disk in the Novell ODI sub-directory is a file that establishes the base settings for your adapter. This file is called NET.CFG, and is a text file that describes these settings. If a configuration is different from the default settings or if you are using multiple protocols, you need to modify this NET.CFG file. This appendix explains how.

The NET.CFG file is a configuration file that contains section headings and options of the ODI software.

You may also need to see the documentation specific to your protocol for additional NET.CFG information. Use any DOS text editor to modify the file.

Conventions

Main section headings must be left-justified and are not case sensitive. The heading must precede the options you want to include in that section. Options are not case sensitive and must be preceded by a tab or hard spaces.

Precede comments with a semicolon (;). End each line with a hard return. Write all numbers in decimal notation except where noted otherwise.

Options

The following chart lists the driver options defined by the DOS ODI software. The options available for the Boca Ethernet Adapter driver and IPX protocol stack are shown in a sample NET.CFG file. Protocol stacks other than IPX may have additional options not listed here. Refer to the other protocol's documentation for more information. In this chart, the main NET.CFG section headings are shaded and flush with the left margin. NET.CFG options are listed under each heading and indented.

Link Driver *BOCANW*

```
DMA (#1 | #2) channel_number
PORT [#1 | #2] hex_starting_address [hex_number_of_ports]
NODE ADDRESS hex_address
SLOT number
FRAME frame_type
PROTOCOL name hex_protocol_IDframe_type
SAPS number
LINKS STATIONS number
ALTERNATE
MAX FRAME SIZE number
CONNECTOR DIX
INT[#1|#2]channel_number
LED2 (programmable_value)
```

Link Support

```
BUFFERS communication_number [size]
MEMPOOL  number[k]
```

Protocol   *protocol name*

```
BIND #board_number
```

The Boca Ethernet driver has these NET.CFG options available:

- INTERRUPT# (required)
- NODE ADDRESS
- FRAME
- PROTOCOL (such as IPX)
- LINK DRIVER

The following figure is a sample of the structure of any given NET.CFG file:

```
LINK DRIVER PCNTNW

     FRAME ETHERNET_802.3
     PROTOCOL IPX 00 ETHERNET_802.3
```

Appendix F: Programmable LED Options

The red LED on the BOCALANcard VL can be programmed to respond to specific activities on the network cable. Transmit, receive, jabber, collision, and polarity functions can be detected using the programmable red LED. This LED is programmed using a software keyword in the network configuration file. The keyword is LED1. The syntax is LED1 NN, where NN is a hexadecimal number that denotes the red LED function.

Listed below are the functions, their assigned value, and some examples of different configurations.

Activity	Statement
Transmit Activity	LED1 90
Receive Activity	LED1 84
Normal Polarity	LED1 88
Jabber Indicator	LED1 82
Collision Status	LED1 81

For Novell DOS and OS/2 ODI client drivers, use any text editor to edit the NET.CFG file.

Sample NET.CFG for DOS ODI:

```
Link Driver    BOCANW
               FRAME ETHERNET_802.2
               LED1 90
               PORT 300
               IRQ 3
```

Glossary

10Base-T. Twisted pair cabling using an RJ-45 connector.

10Base-5. Original Ethernet using coaxial cable.

10Base-2. Also known as "cheapernet". Another name for Thin Ethernet using a BNC connector.

AUI Connector. Attachment Unit Interface; 15-pin "D" connector for use with external transceivers, such as 10Base-5 or fiber optics.

BNC Connector. BNC jacks and plugs connect network hardware via thin Ethernet cable. A BNC barrel connector joins two lengths of thin Ethernet cable with its T-connector.

CSMA/CD. Carrier Sense Multiple Access with Collision Detection. CSMA/CD is the access method used in Ethernet.

DMA. Direct Memory Access. DACK stands for Dma ACKnowledge and DRQ for Dma ReQuest. DMA provides direct access to system memory without adding to CPU overhead. The DACK and DRQ channels govern that communication.

File Server. A device on a LAN that provides mass storage of files.

Hub. Another term for repeater.

Repeater. Used to extend the topology, allowing two or more cable segments to be joined. In a 10Base-T network, the repeater provides the central connection point where the gathering of statistics and network management functions take place.

Topology. The physical layout of a network. The principal LAN topologies are bus, ring, and star.

Limited Warranty

Boca Research, Inc. (BRI) warrants to the original buyer of this BRI product that the hardware is free of defects in materials and workmanship for a period specified in the original sales contract ("the Warranty Period"). Should the product fail to be in working order at any time during the specified period, BRI, will at its option, repair or replace this product as described below, provided that in BRI's sole determination the part or product has not been abused, misused, repaired, or modified.

All products will be serviced and returned via ground at no charge to customers DURING the first year of service.

All returns for limited warranty service require a Return Merchandise Authorization (RMA). All customers are required to demonstrate proof of purchase when requesting an RMA. The period of warranty commences on the date of purchase. A dated copy of the sales slip must be included with the returned merchandise.

Products which require Limited Warranty service during the warranty period should be delivered to BRI at the address shown below in the Appendix (Servicing Your Boca Product) with proof of purchase, copy of canceled check (if any), and the Return Merchandise Authorization (RMA) number provided by BRI Technical Support. Refer to the Appendix in this manual. Replacement parts or complete products will be furnished on an exchange basis only. Replaced parts and/or products become the property of BRI.

If the returned product is sent by mail, the purchaser agrees to prepay shipping charges, insure the product or assume the risk of loss or damage which may occur in transit, and to use a shipping container equivalent to the original packaging. BRI does not make any warranties in respect to the product, either expressed or implied, including no implied warranties of merchantability or fitness for a particular purpose, except as expressly provided in this agreement. If any labor, repair, or parts replacement is required because of accident, negligence, misuse, theft, vandalism, fire, water or other peril; or because of conditions outside of specifications, including, but not limited to, electrical power,

temperature, humidity or dust; or by moving, repair relocation, or alteration not performed by BRI, or by any other cause other than normal use, the warranty and maintenance obligations provided herein shall not apply.

BRI SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR FOR LOSS, DAMAGE, OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM CUSTOMER'S USE OF OR INABILITY TO USE THE EQUIPMENT EITHER SEPARATELY OR IN COMBINATION WITH OTHER EQUIPMENT, OR FOR PERSONAL INJURY OR LOSS OR DESTRUCTION OF OTHER PROPERTY, OR FROM ANY OTHER CAUSE.

This warranty shall not be applicable to the extent that any provision of this warranty is prohibited by any Federal, state, or municipal law which cannot be preempted. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Software License Agreement for the Boca Research BRI Products

Boca Research, Inc. (BRI) grants the owner permission to use BRI software upon adherence to the terms and conditions of this agreement.

1. The use of BRI software will be limited to computers that contain the BRI board.

2. Any reproductions of the BRI software are also subject to this agreement.

3. BRI software is not to be modified in any way; it should be used in its original form.

4. Should a change in ownership occur, these three conditions MUST be met:

• the BRI board must also be transferred to the new owner.

• any copies of the BRI software which are not being transferred must be destroyed.

• the new owner must abide by the terms presented in this agreement.

5. BRI remains the copyrighted owner of the BRI software. The ONLY rights given to the licensee are those which have been provided for under this agreement.

6. UNDER NO CIRCUMSTANCES WILL BRI BE HELD LIABLE IN ANY WAY TO ANY PURCHASER FOR DAMAGES, LOST REVENUE, LOST WAGES OR FOR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHETHER COVERED UNDER THIS AGREEMENT OR OTHERWISE. THE BRI SOFTWARE IS NOT WARRANTED IN ANY WAY AND ITS USE IS THE SOLE RESPONSIBILITY OF THE LICENSEE FREE FROM ANY EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

7. BRI provides a five year warranty for the media on which the BRI software is furnished. This warranty is limited to defects in materials and workmanship; it does not cover the functions provided by the BRI software. This license is subject to termination upon breach of this agreement. The BRI software and any copies must be destroyed or returned to Boca Research, Inc.

8. BRI reserves the right to make modifications to the software without any prior notice.

9. This license is governed by the laws of Florida.

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RESEARCH INC.

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