Boca's Family of Ethernet Products

BOCALANcard TP

PRODUCT CODE: BEN110

BOCALANcard COMBO

PRODUCT CODE: BEN120

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.***
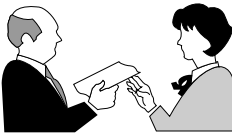
If your Dealer Can't Assist you

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

Automated *Fax*
Retrieval System
407-995-9456

Standard Free
Technical Support
407-241-8088

Priority Service
900-555-4900
($2 per minute)

On-Line Support!
CompuServe: **GO BOCA**
Internet:
   email: **support@boca.org**
   World-wide on the WEB:
   http://WWW@boca.org

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

The Contents of Your Package

The contents of the Boca Research Ethernet product package are listed below. If any items are missing or appear incomplete or damaged, contact your dealer for assistance.

BEN110
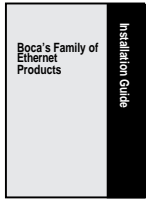
Boot ROM socket

RJ-45

GREEN LED (LNK)
RED LED (programmable; default is normal polarity)

3.5-inch diskette

Boca's Family of Ethernet Products

Installation Guide

installation guide

* The red LED on the back of the BOCALANcard Ethernet Adapter is programmable. You can specify events that cause the LED to flash. Use the BENCFG program (see 2.4) to specify these events.

BEN120

Boot ROM socket
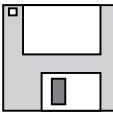
BNC

RJ-45

GREEN LED (LNK)
RED LED (programmable; default is normal polarity)

BNC T-Connector

3.5-inch diskette

Boca's Family of Ethernet Products

Installation Guide

installation guide

Quick Start (for Experienced Users)

This section is intended for knowledgeable and experienced network installers who will be using the default settings.

Other Items You May Need to Complete the Installation:

• Suitable tools to install the BOCALANcard Ethernet 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:
If you need to change any of the default settings, refer to Section Two for instructions. Otherwise, insert the adapter into a 16-bit slot.

IRQ	**9**
DMA	**5**
Base I/O Address	**300h**
Remote Boot ROM	**disabled**

IMPORTANT: If you have a "Plug and Play" BIOS or software running, you need only to install the board and the BIOS or software will configure it.

Note on Plug and Play

Plug and Play, also known as automatic card configuration, allows the card to communicate to the system specifically what system resources it requires. Every time a system with a Plug and Play capability is started up, all attached cards and devices are examined for their hardware requirements. The Plug and Play card then sets its configuration automatically based on available resources.

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 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.TXT file on the device driver diskette. This file is in the root directory. Check this file for the latest information about drivers and installation instructions.

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.

Section One: Introduction

These BOCALANcard Ethernet products allow you to connect the IBM personal computer ISA-bus (or compatible) to an Ethernet network. The 10Base-T adapter (BEN110) provides a twisted-pair transceiver with RJ-45 cabling for connecting to an unshielded twisted-pair network (10Base-T). The Combo Ethernet Adapter (BEN120) provides this plus a 10Base2 BNC connector to attach to thin coax.

Features of the BOCALANcard Ethernet Adapter:

- Compliant with ISO/ANSI IEEE 802.3 specifications
- High-performance, highly integrated one-chip solution
- On-board support for connecting to a 10Base-T (BEN110) network, or 10Base2 (BEN120).
- Employs bus-mastering technology
- Designed to work with 286, and high-speed 386 and 486-based systems
- Jumperless adapter—all features such as interrupt channel, DMA channel, and I/O address are software-selectable.
- Easy installation and maintenance.
- Extensive software driver support for popular network operating systems.
- Low-cost solution for networks requiring 10Base-T or 10Base2 connection.
- One programmable diagnostic LED indicator and one link status LED indicator.
- Plug and Play compatible.

Section Two: Installation and Configuration

The BOCALANcard Ethernet Adapters are compatible with network hardware which complies with IEEE Ethernet 802.3 standards. The BEN110 offers a twisted-pair connector (transceiver). The BEN120 offers this plus a BNC connector.

2.1 Inserting the Adapter

Removing the System Cover

These instructions assume an AT-style or compatible machine.

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

2. 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.

3. 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.

Inserting the Board

4. Select an empty 16-bit slot and remove the screw and metal plate that covers the external access to the slot you have selected.

5. 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 4.

Replacing the System Cover

6. 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 2.

Connecting Cables

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

7. Connect cables.

   a. **If attaching to an unshielded twisted-pair network**, connect one end of the 10Base-T cable to the RJ-45 connector on the board. Attach the remaining end to a network outlet, hub, or concentrator as shown below:

RJ-45 Connector

Wall Jack

Punch-down Block

RJ-45 Cable

Hub or Concentrator
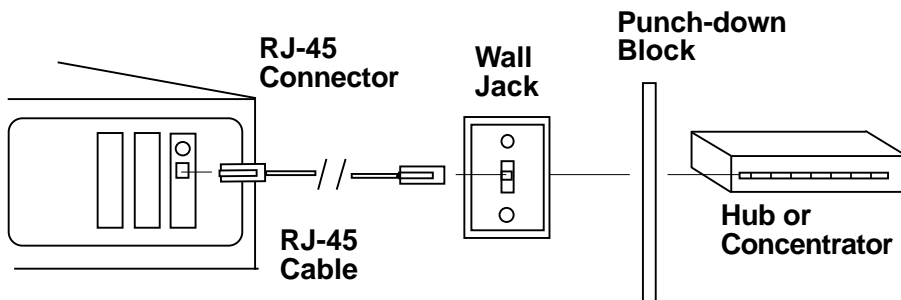
b. If attaching to "thin coax" cable:

1. Attach a BNC T-connector to the BNC port on the board. Align the notches on the card's BNC connector with those on the T-connector. Twist clockwise approximately one-quarter turn.

2. Is the workstation at the end of the cable segment?

If NO, attach the BNC connector on the cable from each adjacent workstation to the two open end of the T-connector as shown below.

Network cable to adjacent workstation
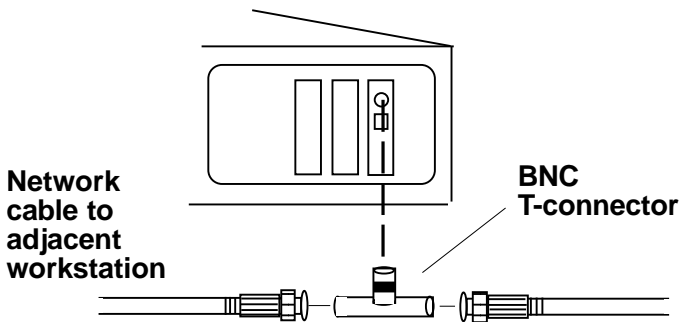
BNC T-connector

If YES, attach a terminator to the open end of the T-connector as shown below:

Network cable to adjacent workstation

BNC T-connector

BNC Terminator
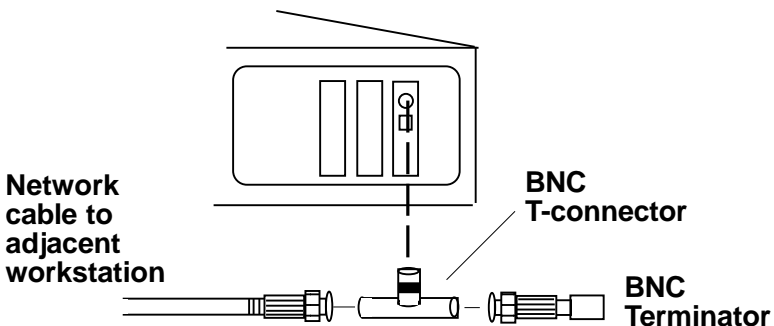
8. Re-attach all other external cables and power cords to their original position. Installation of the hardware is now complete. Go to section *2.2 Installing Drivers to Your Hard Disk.*

2.2 Installing Drivers to Your Hard Disk

Your BOCALANcard Ethernet adapter comes with drivers for most network operating systems. If the network operating system you're using does not list the Boca adapter as a valid option, then use the driver included on your Boca driver diskette.

The BOCALANcard Ethernet adapter is hardware- and software-compatible with NE2100, NE1500T, and the AMD PCnet ISA and family of Ethernet adapters.

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: 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.

2.3 Adapter Configuration

2.3.1 Loading a Single Board

The BOCALANcard Ethernet Adapter 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	**DMA setting**
IRQ Setting	**Plug and play setting**
Programmable LED options	**Boot ROM setting**

BENCFG is installed when you select "Boca Ethernet Utilities" from the installation program.

2.3.2 Loading Multiple Boards

To load more than one BOCALANcard Ethernet Adapter in your machine, you must configure each one separately. Insert each card one at a time and run BENCFG.EXE. When all cards have been correctly configured, power down and re-insert all adapters. The network driver must be loaded again for each new adapter board installed in the system. For example, to load three boards in a NetWare server environment, the following must be entered.

```
For first adapter board:  LOAD BOCANW
For second adapter board: LOAD BOCANW
For third adapter board: LOAD BOCANW
<ENTER>
```

2.4 The BENCFG.EXE Program

Once the adapter(s) 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 *Appendix F: Programmable LED Options.* To start the configuration utility, go to the directory where you installed the Boca Ethernet 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 Ethernet 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 as follows:

```
Boca Ethernet Card TP/Combo                                    Version 1.0
Configuration Utility          Copyright(c) 1994 Boca Research, Inc.
```

	Settings	
	Current	Modified
Main Menu		

Main Menu	Settings	Current	Modified
Address I/O	Address I/O	320	300
DMA Channel	DMA Channel	5	5
IRQ	IRQ	9	9
Mode Settings	Boot ROM	Disabled	Disabled
LED Options	Red LED Transmit	N	N
Standard Settings	Red LED Receive	Y	N
Save Changes & Exit	Red LED Polarity	Y	Y
Exit Without Saving	Red LED Jabber	N	N
	Red LED Collision	N	N

```
IEEE Board Address:  00    00    1A    18    BF    0E
```

Address I/O: Selects the base I/O address for the BOCALANcard Ethernet Adapter. (200h, 220h, 240h, 260h, 280h, 2A0h, 2E0h, 300h, 320h, 340h, 360h, 380h, 3A0h, 3C0h).

DMA Channel: Selects the DMA channel to use. (3, 5, 6, 7).

IRQ: Selects one of the eight hardware IRQ settings for the BOCALANcard Ethernet Adapter: 3, 4, 5, 9, 10, 11, 12, 15.

NOTE: I/O and IRQ addresses that are occupied in the system will be "blacked out" and will not be available for selection.

Mode Settings: (1) Enables plug and play mode; (2) Enables or disables the Boot ROM.

LED Options: Allows you to specify events on the Boca Ethernet card 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.

1	LED Transmit Activity	N
2	LED Receive Activity	Y
3	LED Normal Polarity	Y
4	LED Jabber Indicator	N
5	LED Collision Status	N

1. The BOCALANcard Ethernet Adapter is transmitting data onto the network.

2. The BOCALANcard Ethernet Adapter is receiving data from the network.

3. Turn on this indicator to view polarity status. When ON, the Boca Ethernet card is cabled correctly. When OFF, the negative and positive signals for the receive pair have been swapped. The Boca Ethernet card automatically adjusts for this condition. This is used for troubleshooting purposes only. **NOTE: these conditions apply ONLY when the normal polarity indicator is set to "Y".**

4. This indicates that the BOCALANcard Ethernet Adapter is jabbering[1] on the network.

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

Standard Settings: Allows you to select one of 10 basic configurations. By selecting standard settings, you will specify the I/O Address, the IRQ, and the DMA at the same time. **NOTE: I/O and IRQ addresses that are occupied in the system will be "blacked out" and will not be available for selection.**

---

[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.

Save Changes & Exit: 'Reprograms' the Boca Ethernet card with the settings you have selected in the modified column.

Exit Without Saving: Exits the BENCFG utility without reprogramming the Boca Ethernet card.

To program the LED for your custom options each time you start your computer, you must use the software keyword LED2 to activate the LED functions. See Appendix F for instructions on setting the red LED for your network operating system

The easiest way to determine the value for your LED function is by running BENCFG as described earlier in this section. When selecting "Save and Exit", BENCFG tells you the register number.

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

Section Three: Driver Installation

3.1 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 drivers included on the diskette be used.

3.1.1 NetWare DOS ODI Client Driver

You can load the NetWare BOCANW.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.EXE: NetWare shell

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

BOCANW.COM: The BOCALANcard Ethernet Adapter DOS ODI Driver

IPXODI.COM protocol stack file.

NET.CFG: this is required for configuring options. The configuration must match what was set with BENCFG.

NETX.EXE, 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 BOCANW.COM and NET.CFG from the DOS ODI directory of the driver diskette to the subdirectory.

2. To change any default settings when the driver is loaded, you must create a NET.CFG. You can use NET.CFG to change the BOCALANcard Ethernet Adapter's operating characteristics.

3. 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]
BOCANW.COM [ENTER]
IPXODI.COM [ENTER]
NETX.EXE [ENTER]

> **You must call these files in the same directory that the NET.CFG is located.**

NETX.EXE (v. 3.26) is compatible with the versions of DOS 3.x through 6.x.

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:

CD\<CLIENT DRIVERS LOCATION>
LSL.COM
BOCANW.COM
IPXODI.COM
NETX.EXE or VLM.EXE*

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

5. If necessary, 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 typing:

F: [ENTER], then LOGIN [ENTER]

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

3.1.2 NetWare OS/2 Client Driver

Load the 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 BOCALANcard adapter option, then select that option, otherwise select any other LAN adapter.

2. Copy the OS/2 ODI Driver, BOCANW.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, BOCANW.OS2. For example:

```
DEVICE=C:\NETWARE\BOCANW.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\BOCANW.OS2
   (located in \NOVELL\WKSTN\OS2ODI subdirectory 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 Ethernet Adapter without a NET.CFG file.

3.1.3 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 in the \NOVELL\SERVER\4.X subdirectory.

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 BOCANW.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, BOCANW.LAN, from the BOCALANcard Ethernet Adapter 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 BOCANW <ENTER>

(You will need to specify DOS path if the driver is not located on the DOS partition). Do not use PORT, INT, and DMA keywords. The BOCALANcard Ethernet Adapter 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 BOCANW. The BOCANW driver will autoload these files. These files should be copied from the diskette and are in the 4.x subdirectory under the Novell directory. Then, bind the driver to the IPX protocol stack by typing:

    BIND IPX TO BOCANW 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 console prompt ":" to access the install utility.

Open the MAINTENANCE/SELECTIVE INSTALL then 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. The BOCALANcard Ethernet Adapter requires no keywords to be specified for interrupt channel, DMA channel, and I/O address.

BIND IPX TO BOCANW 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 Ethernet Adapter, the following should be entered:

LOAD BOCANW FRAME=Ethernet_802.2 BOARD=1
LOAD BOCANW FRAME=Ethernet_802.3 BOARD=1
LOAD BOCANW FRAME=Ethernet_II BOARD=1
LOAD BOCANW 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.

3.1.4 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 in the \NOVELL\SERVER\3.1X subdirectory on the disk.

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 on the Driver Disk is the version 3.1x server driver labeled BOCANW.LAN. Two methods for loading this driver are to use the server command line prompted by ":" or to edit the 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 driver, follow the instructions given below:

1. Install NetWare 3.1x on your system.

2. Copy all the files from the 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\3.1X

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 BOCANW
LOAD MONITOR (only needed for NetWare 3.11 and
must use version included on disk)
<ENTER>
```

(You will need to specify the DOS path if the driver is located in a subdirectory on the 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 BOCANW. The BOCANW driver will autoload these files. These files should be copied from the Boca diskette.

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

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

3.2 Microsoft Windows NT (NDIS 3.0)

The BOCALANcard Ethernet Adapter 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.

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 BOCALANcard 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 BOCALANcard files. The Windows NT files reside in the WINNT subdirectory. So, for example, enter A:\WINNT.

6. Then, select the BOCALANcard Ethernet Adapter from the dialog box to install the BOCALANcard Ethernet Adapter.

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

   The BOCALANcard Ethernet Adapter 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.

3.2.1 Microsoft LAN Manager

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

1. Insert the BOCALANcard 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 BOCALANcard Ethernet driver from the menu, if shown. Otherwise, select Other Driver to import the driver from the BOCALANcard diskette.

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

6. Select the BOCALANcard 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 BOCALANcard 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 BOCAND driver section, it will change the number of transmit and receive buffers.

NOTE: Keywords for setting the red LED options can be found in Appendix F.

3.2.2 Loading the Windows for Workgroups Drivers

Installing the Windows for Workgroups 3.1 Driver

The BOCALANcard Ethernet Adapter 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 BOCALANcard 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 Ethernet Adapter driver from the driver diskettes.

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

1. Insert the BOCALANcard 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 BOCALANcard 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 BOCALANcard Ethernet Adapter and choose OK.

8. A setup dialog box appears displaying the default settings. For the BOCALANcard Ethernet Adapters, no settings need to be specified.

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 BOCALANcard 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 Ethernet Adapter 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 diskettes.

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 or 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 BOCALANcard driver diskette and specify the WFW311 path to install the drivers. For example: A:\WFW311

Then select OK.

8. The BOCALANcard Ethernet Adapter 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 Ethernet Adapter 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.

3.3 Installing the Banyan VINES Client Driver

The BOCALANcard Ethernet Adapter 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:

BOCAND.DOS

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

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

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\BOCAND.SYS
```

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

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

[BOCAND_NIF]
DRIVENAME   =   BOCAND$
IOBASE      =   0x300
INTERRUPT   =   3
LED2        =   0x88

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

3.4 Artisoft LANtastic/AI Driver

The BOCALC.EXE AI-LANBIOS driver, included on the BOCALANcard driver diskette, allows you to operate a BOCALANcard 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 BOCALANcard driver and the AILANBIO.EXE are run. Refer to the LANtastic documentation for additional details.

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

   BOCALC.EXE
   AILANBIO.EXE (must be obtained from Artisoft's
        LANtastic/AI package)
   (Note: you can edit the STARTNET.BAT file and insert these two lines before the REDIR.EXE command).

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

```
DMA        =    5
IRQ        =    3
I/O Port   =    300h
LED2       =    0x88
Adapter #  =    0
MPX        =    D7
```

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 BOCALANcard Ethernet Adapter driver. Example:

```
BOCALC.EXE/MPX=D7/IRQ=3/IOBASE=300/LED2=0x88
AILANBIO.EXE/MPX=D7/ADAPTER=1
```

The command line switches instruct the NETBIOS to load the BOCALANcard Ethernet Adapter as adapter number 1 using interrupt request 3, I/O Base Address 300h, and DOS MPX number D7.

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

```
---- BOCALC 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: BOCALC / @SETUP. The file SETUP contains:

```
;BOCALANcard Ethernet Adapter driver setup file
;
IOBASE=300          ; Use I/O port address 300h
IRQ=3               ; Use interrupt request 3
LED2=0x88           ; See Appendix F for details
VERBOSE             ; Display verbose information
```

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

• REMOVE command removes the BOCALC.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 BOCALC.EXE and then loaded AILANBIO.EXE, you must remove AILANBIO before BOCALC.EXE.

For more details regarding switches and BOCALC.EXE messages, consult Appendix F, the appropriate README file in the LANtastic subdirectory on the BOCALANcard diskette, and the LANtastic manuals.

3.5 Packet Drivers

The Boca Packet Driver for the BOCALANcard 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, BOCAPK.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:

BOCAPK[-n] [-d] [-w] <int=packet_int_no> [IRQ=int_irq] [IOADDR = io_addr] [DMA = dma_no] [LED2=0xnn]

[-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_irq]
This is the hardware interrupt number. This can be 3, 4, 5, 9, 10, 11, 12, or 15.

[io_addr]
This is the base I/O address. This can be 200h, 220h, 240h, 260h, 280h, 2A0h, 2E0h, 300h, 320h, 340h, 360h, 380h, 3A0h, 3C0h.

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

[int_no]   = 5
[io_addr] = 300h

[dma_no]
This is the DMA channel used by the network card. The available channels are 3, 5, 6, and 7.

[0xnn]
This is the value used by the red LED. See Appendix F for computing the nn value.

Section Four: Troubleshooting

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

• **STATUS LEDs**. The BOCALANcard 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.

GREEN: Link
RED: Normal Polarity

Power on the system, connect the network cable, and
observe the LEDs. The green LED shows that it is
connected with another 10Base-T 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	Normal polarity. Your cable is correct.
ON	*ON	Reverse polarity. Link established.

* **IF RED IS SET TO DEFAULT**

To set the red LED functions for each network operating system, refer to Appendix F.

• **BOARD SETTINGS.** If you are using a Novell network, make sure that the settings in the NET.CFG file are correct. Also, when BOCALAN.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, IRQ, and DMA 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 YOU ARE NOT USING DRIVERS MADE FOR NE2000 COMPATIBILITY. THE BOCALANCARD ETHERNET ADAPTER USES THE BOCALANCARD DRIVER; IT IS 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

10Base-T Ethernet adapter (BEN110)

- 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 normal polarity-selectable (default)
- Software-Selectable interrupts, DMA, and a base I/O address.

Combo (10Base2) Ethernet adapter (BEN120)

In addition to the above:

- 10Base2 BNC connector for thin coax
- 10Base2 operating distance: 185 meters (607") maximum hub to node length

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 Boca Research board**
   - **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:

<div align="center">

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

</div>

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:

10-pin		8-pin
1	NC	NA
2	Tx+	1
3	Tx-	2
4	Rx+	3
5	NC	4
6	NC	5
7	Rx-	6
8	NC	7
9	NC	8
10	NC	NA

Boca's Ethernet products use a 10-pin 10Base-T connector. Some manufacturers use an 8-pin format. This format is compatible with the BOCALANcard Ethernet Adapter, and will plug in and work *without* modification. If an 8-pin RJ-45 is used with the BOCALANcard Ethernet Adapter, then use the pin assignments depicted in the 8-pin column.

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 BOCALANcard 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 BOCALANcard Ethernet driver has these NET.CFG options available:

- DMA#
- INTERRUPT#
- NODE ADDRESS
- FRAME
- PROTOCOL (such as IPX)
- LINK DRIVER
- PORT
- LED2

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

```
LINK DRIVER BOCANW

    FRAME ETHERNET_802.3
    PROTOCOL IPX 00 ETHERNET_802.3
    INT 3
    PORT 300
    DMA 5
    LED2 0x88
```

Appendix F: Programmable LED Options

The red LED on the BOCALANcard TP/COMBO 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 or as a command line option when loading the BOCALANcard driver. The keyword is LED2. The syntax is LED2=NN, where NN is a hexadecimal number that denotes the red LED function.

The hexadecimal value can be found by running the BENCFG.EXE program and choosing the LED options you desire. Listed below are the functions, their assigned value, and some examples of different configurations.

Activity	Value to be Added
COLLISION	LED2 81
JABBER	LED2 82
RECEIVE	LED2 84
TRANSMIT	LED2 91
NORMAL POLARITY	LED2 4088 or no LED2 line in CONFIG.SYS file.

All values are in hexadecimal format, or base-16 math. To count in hexadecimal you start with 0 and end with F, (i.e., 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F).

Using the LED2 keyword in your network operating system is accomplished by adding it to your command line of the board driver or in the configuration file. The following examples can be used to configure the operating system you installed. For Novell DOS and OS/2 ODI client drivers, use any text editor to edit the NET.CFG file.

Link Driver BOCANW
    PORT 300
    IRQ 3
    DMA 5
    FRAME ETHERNET_802.2
    LED2 88

Novell Server driver:
    BOCANW.LAN PORT=300 IRQ=3 DMA=5 LED2=88

Artisoft LANtastic/AI:
    BOCALC.EXE /MPX=D7/IRQ=3/IOBASE=300/LED2=88

NDIS 2.0.1 (Windows for Workgroups 3.1, MS-LAN Manager)
    Specify the LED2 value in the PROTOCOL.INI file, under the BOCAND_NIF heading.

NDIS 3.0 (Windows NT, Windows for Workgroups 3.11):
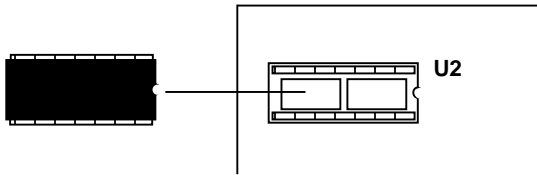   Specify the value for LED2 during the driver installation. Leave LED0, LED1 and LED3 values at the default setting.

Packet Drivers:
    BOCAPK.COM IOADDR=300 IRQ=3 DMA=5 LED2=88

Appendix G: Installing Boot ROMs

Installing the ODI Boot ROM

1. Obtain a boot ROM

2. Put the Boot ROM in the 28-pin socket. Make sure you line up the notch on the Boot ROM with the notch on the socket.
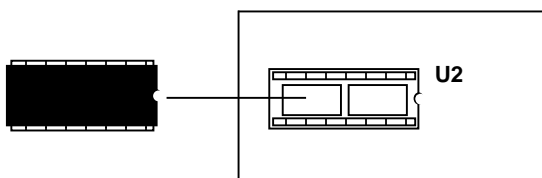

3. To enable the Boot ROM, run the BENCFG utility. Select Mode Settings, then A Boot ROM Enable.

4. The Boot ROM will work only with the following four configurations:

	I/O	INTERRUPT	DMA	BOOT ROM ADDRESS
CONFIG.1	300h	3	5	C8000h
CONFIG.2	320h	4	6	CC000h
CONFIG.3	340h	5	7	D0000h
CONFIG.4	360h	9	3	D4000h

5. Follow the Boot ROM installation procedure given in the Novell Installation manual to create the Boot Image on the Novell Server.

6. Remove any boot drives from the workstation (A:, C:) and boot from the server.

Installing the NDIS Boot ROM

1. Obtain a boot ROM.

2. Put the Boot ROM in the 28-pin socket. Make sure you line up the notch on the Boot ROM with the notch on the socket.

3. To enable the Boot ROM, run the BENCFG utility. Select Mode Settings, then A Boot ROM Enable.

4. The Boot ROM will work only with the following four configurations:

	I/O	INTERRUPT	DMA	BOOT ROM ADDRESS
CONFIG.1	300h	3	5	C8000h
CONFIG.2	320h	4	6	CC000h
CONFIG.3	340h	5	7	D0000h
CONFIG.4	360h	9	3	D4000h

5. Follow the LAN Manager server setup procedure for starting remote booting services on the LAN Manager server. Refer to the LAN Manager documentation.

6. Remove any boot drives from the workstation (A:, C:) and boot from the server.

Limited Warranty

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