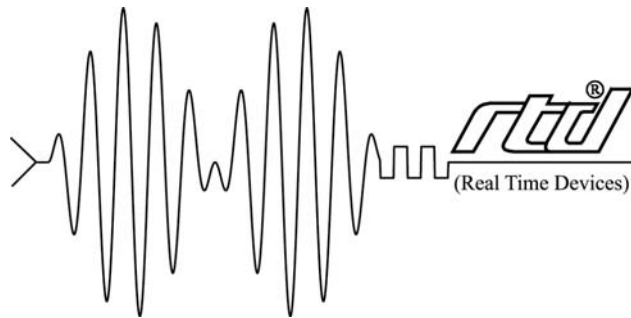


CM202 NE2000 Ethernet utilityModule

User's Manual



RTD Embedded Technologies, Inc.

"Accessing the Analog World"®

BDM-610020015
Rev. A

CM202
NE2000 Ethernet utilityModule
User's Manual



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Rev. A	New Manual Naming Method

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Chapter 1 INTRODUCTION

This manual gives information on the CM202 NE2000-compatible Ethernet utilityModule. This module supports Ethernet communications using 10Base-T or 10Base-2 media, or an external interface to 10Base-5 or optical fiber using an AUI interface.

CM202 Ethernet utilityModule

The CM202 Ethernet utilityModule was designed to provide Ethernet communications support for the Real Time Devices cpuModules and other standard PC/104 processor modules.

Features

The following are major features of the CM202 utilityModule.

NE2000 compatible Ethernet controller

- LG Semicon 82C911 chipset
- internal 16k RAM

Multiple Ethernet interfaces

- 10Base-T UTP (unshielded twisted pair)
- 10Base-2 BNC
- AUI (DIL16 or DSUB15 connectors)

Software Configurable

- Jumperless configuration for I/O address, interrupt, mode
- Configuration stored in EEPROM

Boot ROM socket

- Allows remote booting of cpuModule from file server

Connectors

Connectors provided are:

- CN1 and CN2, PC/104 bus
- CN3, 10Base-T port (RJ45)
- CN4, 10Base-T port (DIL)
- CN5, AUI port (DSUB)
- CN6, AUI port (DIL)
- CN7, 10Base-2 port (BNC)

General Specifications

- Dimensions: 3.8 x 4.75 x 0.6" (97 x 120 x 16 mm) including connectors
- Weight (mass): 3.0 ounces (85 grams)
- 6-layer PCB, combined through-hole and surface-mount
- Operating conditions:
- Temperature:
 - 0 - 70 degrees C standard
 - -40 - +85 degrees C optional
- Relative humidity: 0 - 95%, non-condensing
- Storage temperature: -55 to +85 degrees C

Chapter 2 CONFIGURING THE UTILITYMODULE

The following sections contain information on configuring the utilityModule.

Please read this entire section before attempting to use the utilityModule!

EEPROM Configuration

The most important configuration options for the module are set using the configuration program CM202SET.EXE, and then stored in a configuration EEPROM.

CM202SET is used to select:

- I/O Address
- Hardware interrupt number
- Media Type
- Remote Boot
- NE2000/1000 Compatibility Mode

Default Settings

The factory default settings for CM202SET options are:

Option	Factory Default
I/O address	340h
Interrupt	IRQ5
Media type	AUTO
Remote boot	Disabled
Compatibility mode	NE2000

Please refer to page 15 for information on changing these settings using CM202SET.

Chapter 3 **INSTALLING THE UTILITYMODULE**

Since the utilityModule uses a PC/104 stackthrough bus, the only hardware installation you will do is placing the module to the PC/104 stack. To do this, you will connect the PC/104 bus connector with the matching connector of another module.

Recommended Procedure

We recommend you follow the procedure below to ensure that stacking of the modules does not damage connectors or electronics.

- Turn off power to the PC/104 system or stack.
- Select and install standoffs to properly position the utilityModule on the PC/104 stack.
- Touch a grounded metal part of the stack to discharge any buildup of static electricity.
- Remove the utilityModule from its anti-static bag.
- Check that keying pins in the PC/104 bus connector are properly positioned.
- Check the stacking order: make sure an XT bus card will not be placed between two AT bus cards, or it will interrupt the AT bus signals.
- Hold the utilityModule by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
- Gently and evenly press the utilityModule onto the PC/104 stack.

CAUTION: Do not force the module onto the stack! Wiggling the module or applying too much force may damage it. If the module does not readily press into place, remove it, check for bent pins or out-of-place keying pins, and try again.

Chapter 4 CONNECTING THE UTILITYMODULE

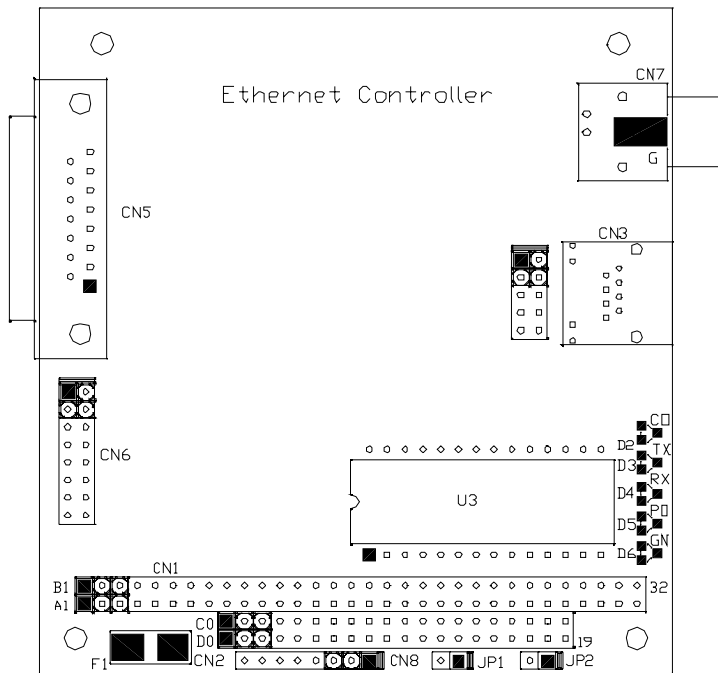
The following sections describe connectors of the utilityModule.

Finding Pin 1 of Connectors

Pin 1 of connectors is indicated by a square solder pad visible on the bottom of the PC board.

Component Locations

The figure below shows locations of major components, including connectors.



Connector	Function	Dimension
CN1	XT PC/104 bus	64 pin
CN2	AT PC/104 bus	32 pin
CN3	UTP Port (RJ45)	8 pin
CN4	UTP Port (DIL)	10 pin
CN5	AUI Port (DB15)	15 pin
CN6	AUI Port (DIL)	16 pin
CN7	BNC Port	2 pin

PC/104 Bus Connectors, CN1 and CN2

Connectors CN1 and CN2 provide PC/104 bus connections. CN1 carries XT bus signals, and CN2 carries additional signals for the AT bus. The signals on CN1 and CN2 conform to the IEEE P966 standard for the PC/104 bus.

The following tables list the connector pinouts:

PC/104 XT Bus Connector, CN1		
Pin	Row A	Row B
1	IOCHCHK*	0V
2	SD7	RESETDRV
3	SD6	+5V
4	SD5	IRQ9
5	SD4	-5V
6	SD3	DRQ2
7	SD2	-12V
8	SD1	ENDXFR*
9	SD0	+12V
10	IOCHRDY	(KEYING PIN)
11	AEN	SMEMW*
12	SA19	SMEMR*
13	SA18	IOW*
14	SA17	IOR*
15	SA16	DACK3
16	SA15	DRQ3
17	SA14	DACK1*
18	SA13	DRQ1
19	SA12	REFRESH
20	SA11	SYSCLK
21	SA10	IRQ7
22	SA9	IRQ6
23	SA8	IRQ5
24	SA7	IRQ4
25	SA6	IRQ3
26	SA5	DACK2*
27	SA4	TC
28	SA3	BALE
29	SA2	+5V
30	SA1	OSC
31	SA0	0V
32	0V	0V

PC/104 AT Bus Connector, CN2		
Pin	Row C	Row D
0	0V	0V
1	SBHE*	MEMCS16*
2	LA23	IOCS16*
3	LA22	IRQ10
4	LA21	IRQ11
5	LA20	IRQ12
6	LA19	IRQ15
7	LA18	IRQ14
8	LA17	DACK0*
9	MEMR*	DRQ0
10	MEMW*	DACK5*
11	SD8	DRQ5
12	SD9	DACK6*
13	SD10	DRQ6
14	SD11	DACK7*
15	SD12	DRQ7
16	SD13	+5V
17	SD14	MASTER*
18	SD15	0V
19	(KEYING PIN)	0V

Note: Two locations on the bus have mechanical keying pins to help prevent misconnection of the PC/104 bus. These keying pins are a part of the PC/104 standard, and we strongly recommend you leave them in place.

If you have other modules without keying pins, we suggest you modify them to include keying.

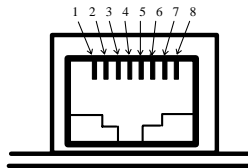
10Base-T connector, CN3

Connector CN3 is for UTP (Unshielded Twisted Pair) wiring normally used for 10Base-T Ethernet. It is wired in parallel with CN4. Don't try to use both CN3 and CN4 at the same time.

The following table gives the pinout of CN3.

Pin	Signal	Function	in/out
1	TX+	Transmit +	out
2	TX-	Transmit -	out
3	RX+	Receive +	in
4	N.C.	not connected	
5	N.C.	not connected	
6	RX-	Receive -	in
7	N.C.	not connected	
8	N.C.	not connected	

The figure below shows the pin numbering of CN3 when **looking into the connector**:



RJ-45 Jack Connector

CN3 is a standard female RJ-45 connector. One example of a mating plug is:

- AMP 5-554739-3 (unshielded)

10Base-T connector, CN4

Connector CN4 is for UTP (Unshielded Twisted Pair) wiring normally used for 10Base-T Ethernet. It is wired in parallel with CN3. Don't try to use both CN3 and CN4 at the same time.

The following table gives the pinout of CN4.

Pin	Signal	Function	in/out
1	TX+	Transmit +	out
2	RX-	Receive -	in
3	TX-	Transmit -	out
5	RX+	Receive +	in
4, 6 - 10	N.C.	not connected	

AUI connectors, CN5 and CN6

Connectors CN6 and CN5 implement the AUI (Attachment Unit Interface). This interface can be used to connect an external MAU (Media Attachment Unit) to convert to 10Base-5, Optical Fiber, or another communication media.

These connectors carry the following signals:

- Balanced Pair Transmit signal
- Balanced Pair Receive signal
- Balanced Pair Collision Detect signal
- Power supply (+12Vdc from PC/104 bus) for an external transceiver

V+ Protection

The +12V output of the AUI connectors CN6 and CN5 are protected by F1, a 1 amp fast-acting picofuse mounted near CN6 and CN5.

Pinouts

The following table gives the pinout of CN5.

Pin	Signal	Function	in/out
1	GND	Ground	--
2	COL+	Collision Detect +	in
3	TX+	Transmit +	out
4	GND	Ground	--
5	RX+	Receive +	in
6	GND	Ground	--
7	N.C.	not connected	
8	GND	Ground	--
9	COL-	Collision Detect -	in
10	TX-	Transmit -	out
11	GND	Ground	--
12	RX-	Receive -	in
13	+12V	+12 volts DC	out
14	GND	Ground	--
15	N.C.	not connected	

The following table gives the pinout of connector CN6.

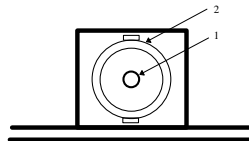
Pin	Signal	Function	in/out
1	GND	Ground	--
2	COL-	Collision Detect -	in
3	COL+	Collision Detect +	in
4	TX-	Transmit -	out
5	TX+	Transmit +	out
6	GND	Ground	--
7	GND	Ground	--
8	RX-	Receive -	in
9	RX+	Receive +	in
10	+12V	+12 volts DC	out
11	GND	Ground	--
12	GND	Ground	--
13	N.C.	not connected	
14	N.C.	not connected	
15	GND	Ground	--
16	N.C.	not connected	

10Base-2 connector, CN7

Connector CN7 is a BNC bayonet connector for coaxial cable normally used with 10Base-2 Ethernet.

The pinout of CN7 is:

Pin	Signal	Function	in/out
1	SIGNAL	Signal to 50 ohm cable	in/out
2	GND	Signal Ground	--



BNC Connector CN7

Chapter 5 USING THE UTILITYMODULE

Using the utilityModule is straightforward, and essentially identical to any other Ethernet card.

When CM202 module is powered on, data in the EEPROM on board is transferred to Ethernet controller's internal configuration registers. The data in the EEPROM contains information configuration such as the base address of the CM202 card, the active interrupt line on the PC/104 bus for Ethernet access, the media type in use, etc. The factory default setting of the board is at I/O address 0x340 and IRQ 5. And if there is a resource conflicting, you need to change your setting on CM202 with the other I/O boards removed temporarily by executing CM202SET program as described in the later chapter.

The following sections describe:

- Diagnostic LEDs
- Boot ROM socket
- Power Consumption

Diagnostic LEDs

During operation, six LEDs are used to indicate status and provide some diagnostic information in case of malfunctions. The locations of these LEDs are shown in the figure on page 7.

LED	Name	Meaning	Normal State
D2	COL	Collision Detected	Off
D3	TXD	Transmitting to network	Flashing
D4	RXD	Receiving from network	Flashing
D5	POL	Polarity of signal incorrect	Off
D6	LNK	Link established (UTP)	On (10Base-T only)

LED D2

D2 is normally off, and flashes when the module detects a collision on the network. Collisions may be due to low-quality cable, which allows crosstalk between the transmit and receive pairs, miswiring, or a malfunctioning device on the network.

LED D3

D3 flashes when the module tries to transmit on the network. It is active when using 10Base-T (UTP), 10Base-2 (BNC), or an external AUI transceiver.

LED D4

D4 flashes when the module detects a receive signal or senses a collision on the network cable. It is active when using 10Base-T (UTP), 10Base-2 (BNC), or an external AUI transceiver.

LED D5

D5 is normally off. It is turned on to indicate incorrect polarity of a received signal, which would normally be caused by incorrect wiring.

LED D6

D6 is turned on when a valid 10Base-T link is detected by the chipset. It is only active when using the 10Base-T UTP connection with link integrity checking enabled. If it is off, the UTP wiring may be broken or incorrect, link integrity checking may be disabled, or you may be using the 10Base-2 or AUI interface.

Boot ROM Socket

In some applications, you may wish to use the boot ROM socket of the utilityModule to boot a connected cpuModule from a remote server.

The socket will accommodate a 28 pin EPROM or Flash memory devices of size 8k, 16k, 32k, or 64k bytes. The device must be a byte-wide architecture.

The boot ROM feature can be enabled using the CM202SET program described on page 15.

Power Consumption

Power consumption of the utilityModule depends on which Ethernet interface is used and the degree of activity on the network.

The following table gives typical power consumption:

Configuration	AUI	TP	BNC
Consumption	200 mA	200 mA	200 mA

Chapter 6 SOFTWARE INSTALLATION

This chapter contains information on:

- Software installation
- The CM202SET Program
- Server Examples
- Client Examples
- Client Remote Boot Examples

Software installation

There is no installation program for the supplied software. We suggest you create a directory named /CM202 on your target drive, and copy all files and subdirectories from the supplied floppy disk into that directory.

The CM202SET Program

The /TOOLS directory of the supplied floppy disk contains the setup and diagnostic utility, CM202SET.EXE.

Using CM202SET

Since CM202 utility module is a jumperless I/O board, complete software configurable with all its configuration data stored in EEPROM, CM202SET is a utility program that let you view or change the existing setting of the board.

When you run the CM202SET program, the utility looks at all possible I/O addresses.

If no module is found or if there is a conflicting, the utility quits with a message.

When the module is found and correctly operating, the utility displays lines indicating the active I/O address, the interrupt, the Media Type in use, the compatibility mode selected (NE2000 or NE1000), and the MAC address of the board.

You can use the program to change settings for I/O address, Interrupt, Media Type, Remote Boot Prom, and compatibility mode and save your selection either into the configuration registers or to both registers and EEPROM. Saving to registers only will allow you to perform test with the settings in your system, but the settings will be lost when power off. In order to change the setting for future operation, you need to save your changes to both registers and EEPROM. These settings then are recalled from EEPROM whenever the module is reinitialized.

NE1000 Mode

NE1000 mode can be used to allow the utilityModule to operate with an 8-bit (XT) cpuModule. In NE1000 mode, only IRQ2, IRQ3, IRQ4, IRQ5 are available. You cannot use IRQ10, IRQ11, IRQ12, IRQ15 with an 8-bit system bus.

Software drivers

The floppy supplied with the utilityModule contains the following (or newer) versions of drivers.

NetWare 4.x Client and Server Drivers:

- use the NE2000/NE1000 compatible drivers provided with the Operating System

NetWare 3.x Server

- use the NE2000/NE1000 compatible drivers provided with the Operating System

NetWare 2.x Server

- use the NE2000/NE1000 compatible drivers provided with the Operating System

ODI Workstation:

- NE2000.COM Ver. 1.54
- NE1000.COM Ver. 1.28

NDIS Drivers 3.0

- Windows for Workgroups
- Windows95
- Windows NT3.x, NT4.x
- use the NE2000 compatible drivers provided with the Operating System

LanManager for DOS

- use the NE2000/NE1000 compatible drivers provided with the Operating System

LanManager for OS/2

- use the NE2000/NE1000 compatible drivers provided with the Operating System

Packet Driver

- NE2000.COM Ver. 4.1
- NE1000.COM Ver. 11.5.3

The directory structure of the disk is:

```
+---NDIS30
+---NETWARE
|   +---NW286
|   |   +---FS
|   +---NW3.X
|   +---NW4.X
|   +---NWODI
+---MSLANMAN.DOS
|   +---DRIVERS
|       +---ETHERNET
|       |   +---NE2000
|       |   +---NE1000
|       +---NIF
+---MSLANMAN.OS2
|   +---DRIVERS
|       +---ETHERNET
|       |   +---NE2000
|       |   +---NE1000
|       +---NIF
+---PACKET.DRV
+---TOOLS
```

Server Examples

The following examples illustrates configuration of the module for use as a server.

Novell Netware 2.2

The NE2000 Netware Driver is configurable and may operate with a variety of selections for I/O Address and Interrupt. These options should be selected via ECONFIG, DCONFIG and NETGEN (for 2.15) or INSTALL (for 2.2) utilities, which are provided with the Netware distribution diskettes.

To generate the 2.15 dedicated server from an existing Network Disk:

1) Create NET\$OS. This can be done from any station attached to the network server.

- run netgen:
- -Select Network Configuration (Our driver)
- -Link/Configure Netware Operating System

2) Now that NET\$OS has been generated, do the Netware Installation.

On the server PC you are configuring:

- boot DOS from a floppy
- login to the network server
- run netgen and select Netware Installation
- reboot from hard disk

To generate the 2.2 server from an existing Network Disk:

- Boot DOS from a floppy
- login to the network server
- Run install (when prompted to, select NE2000 driver)
- reboot from hard drive

Novell Netware 3.x/4.x

Use the install.nlm utility loaded from the server console, "load ...\install", to create an autoexec file as shown below:

AUTOEXEC.NCF

```
file server name BIGKAHOONAS
ipx internal net 10
load c:\ne2000 PORT=360 INT=5
bind ipx to ne2000 net=1
mount all
```

Typing SERVER at the DOS prompt will load the server and our driver.

Be sure ne2000.lan is in the c:\ directory

Driver configurable options are:

IO BASE

May be set by including the following in the command line:

Port = xxx ;where xxx can be 300, 320, 340, 360

Be sure the board is set to the same I/O address, otherwise the driver won't find the board and the message "Hardware Error - NE2000 Bank Select port failed to respond." will appear.

INTERRUPT NUMBER

May be set by including the following in the command line:

Int = x ;where x can be 2, 3, 4, 5, 10, 11, 12, 15

Defaults to EEPROM configuration if not present

NODE ADDRESS

The board has a unique IEEE address, but it may be overwritten by including the following in the command line:

Node = xxxxxxxxxxxx

Where xxxxxxxxxxxx is a 12 digit hex number (non-multicast or broadcast)

The default is the board's unique IEEE address if this line is not present.

FRAME TYPE

May be set by including the following in the command line

Frame = <type>

where <type> is ETHERNET_802.3, ETHERNET_802.2, ETHERNET_II, ETHERNET_SNAP

This defaults to ETHERNET_802.3 if the line is not present.

MEDIA TYPE SELECTION

The user may select the media type to be used. This option is specified via parameter passing in the command line.

The parameter name is "**MEDIA_TYPE=**". The value following the keyword must be one of the following:

- "AUTO" for automatic selection.
- "10BASET" for 10BaseT.
- "AUI" for AUI interface.

If the **MEDIA_TYPE** keyword is not present the driver will use the module's EEPROM default.

Client Examples

The following examples illustrates configuration of the module for use as a client.

ODI Drivers (IPX for NetWare)

STARTNET.BAT

```
cd\net
lsl
ne2000
ipxodi
netx /PS=Server_name Login_name
```

NET.CFG (in c:\net directory)

```
LINK DRIVER NE2000
PORT 360
INT 5
FRAME ETHERNET_802.3
FRAME ETHERNET_II
FRAME ETHERNET_802.2
FRAME ETHERNET_SNAP
MEDIA_TYPE AUI
NODE ADDRESS EC1000013114
```

ODI Drivers (IPX for MS Windows)

In this examples we have used the ODI drivers that are used by NetWare too. You can find them in the directory \NETWARE\NWODI\ of the drivers floppy disk. Windows for workgroup see them as "IPX monolithic" drivers.

AUTOEXEC.BAT

```
@echo off
path C:\WFW.DOS;c:\dos
prompt $p$g
cd\WFW.DOS
lsl
ne2000
ipxodi
net start
```

CONFIG.SYS

```
files=40
buffers=40
device=C:\WFW.DOS\ifshlp.sys
LASTDRIVE=Z
```

NET.CFG

```
Link Support
  buffers 8 850
```

```
LINK DRIVER NE2000
  PORT 360
  INT 5
  FRAME ETHERNET_802.3
  FRAME ETHERNET_II
  FRAME ETHERNET_802.2
  FRAME ETHERNET_SNAP
```

PROTOCOL.INI

```
[network.setup]
version=0x3110
netcard=ipxmono,1,IPXMONO,1
lana0=ipxmono,1,mono
```

```
[IPXMONO]
LANABASE=0
```

NDIS Drivers

Create a startup disk using WinNT 3.50:

- Run the program *Network Client Administrator* (in the group Network Administration).
- choose:

Make Network Installation Startup Disk (Continue)

Path E:\Clients (E: = CD-ROM di WINNT3.50)

Share Name Clients

or

Use Existing Share Directory

and hit (OK)

- choose:

Network Client: Network Client v3.0 for MS-DOS and Windows

Network Adapter Card: NE2000 compatible

and hit (OK)

- choose:

(name for the client computer)

Network Protocol: NWLink IPX Compatible Protocol

hit (OK) (OK)

this creates a startup floppy for the module.

AUTOEXEC.BAT

```
@echo off
path=a:\net
a:\net\net initialize
a:\net\nwlink
a:\net\net start
net use z: \\SERVER_NT\Clients
echo Running Setup...
z:\msclient\netsetup\setup.exe /$
```

CONFIG.SYS

```
files=30
device=a:\net\ifshlp.sys
lastdrive=z
DEVICE=A:\NET\HIMEM.SYS
DEVICE=A:\NET\EMM386.EXE NOEMS
DOS=HIGH,UMB
```

PROTOCOL.INI

```
[network.setup]
version=0x3110
netcard=ms$ne2clone,1,MS$NE2CLONE,1
transport=ms$ndishlp,MS$NDISHLP
transport=ms$nwlink,MS$NWLINK
lana0=ms$ne2clone,1,ms$nwlink
lana1=ms$ne2clone,1,ms$ndishlp
```

```
[ms$ne2clone]
drivername=MS2000$
INTERRUPT=5
IOBASE=0x360
; SlotNumber=1
```

```
[protman]
drivername=PROTMAN$
PRIORITY=MS$NDISHLP
```

```
[MS$NDISHLP]
drivername=ndishlp$
BINDINGS=ms$ne2clone
```

```
[ms$nwlink]
drivername=nwlink$
FRAME=Ethernet_802.2
BINDINGS=ms$ne2clone
LANABASE=0
```

Packet Drivers

The packet driver is loaded using the following syntax:

```
NE2000 [-n] [-d] [-w] <packet_int_no> <int_level> <io_addr>
```

Using the default settings, this would be entered as:

```
NE2000 0x60 0x5 0x340
```

If the use of ODI drivers is requested or preferred, it is possible to use the ODI packet driver:

```
LSL
NE2000
IPXODI
ODIPKT 1 0x60
```

NET.CFG

LINK SUPPORT
buffers 8 850

LINK DRIVER NE2000
PORT 360
INT 5
FRAME ETHERNET_802.3
FRAME ETHERNET_II
FRAME ETHERNET_802.2
FRAME ETHERNET_SNAP
PROTOCOL IPX 0 ETHERNET_802.3

Remote Boot Examples

The following examples illustrate configuration of the module for use in a remote boot application.

RPL from a WindowsNT server 3.5

1. Install RPL Service on your WindowsNT Server
2. Copy DOS 6.22 files in WINNT35\RPL\RPLFILES\BINFILES\DOS622
3. Copy NE2000.DOS in WINNT35\RPL\BBLOCKS\NDIS;
remember not to flag the files IO.SYS and MSDOS.SYS as Hidden or System.
4. From a DOS window run RPLCMD
5. add Vendor:
VendorName=00E0C7
comment=RTDUSA NE2000
6. add boot (b - a):
BootName= DOS
VendorName=00D081
BBCFile=BBLOCK\NETBEUI\NE2000\DOSBB.CNF
7. Restart WindowsNT and start RPL Service.

Now the cpuModule used with the utilityModule can remotely boot DOS from WindowsNT Server

DOSBB.CNF

```
; DOS on NE2000 Ethernet
BASE D0H
RPL BBLOCK\RPLBOOT.SYS
LDR BBLOCK\RPLSTART.COM ~
DAT BBLOCK\NETBEUI\NE2000\PROTOCOL.INI
DRV BBLOCK\RPLDISK.SYS ~ ~ ~
EXE BBLOCK\RPLPRO1.COM ~ 2 ~
EXE BBLOCK\I13.COM ~ ~ ~
EXE BBLOCK\RPLBIND2.EXE ~ ~
EXE BBLOCK\PROTMAN.EXE ~ ~
EXE BBLOCK\RPLBIND1.EXE ~ ~
;DRV BBLOCK\IPXNDIS.DOS ~ ~ ~
;DRV BBLOCK\TCPDRV.DOS /I:C:\LANMAN.DOS ~ ~
EXE BBLOCK\NETBEUI\NETBEUI.EXE ~ 10 ~
DRV BBLOCK\NDIS\NE2000.DOS ~ ~ ~
DRV BBLOCK\PROTMAN.DOS /I:C:\LANMAN.DOS ~ M
```

PROTOCOL.INI

```
[protman]
  drivename = protman$
  dynamic = yes
  priority = netbeui

[netbeui_xif]
  drivename = netbeui$
  bindings = ne2000_nif
  names = 6
  ncbs = 12
  packets = 20
  pipeline = 10
  sessions = 6
  stacksize = 512
  lanabase = 0

[xnsnb_xif]
  drivename = xnsnb$
  bindings = ne2000_nif
  load = xnsnb[cbr]
  lanabase = 1

[xnstp_xif]
  drivename = xnstp$
  bindings = ne2000_nif
  load = xnstp[ub]
  lanabase = 1

[tcPIP_xif]
  drivename = TCPIP$
  disabledhcp = (TCPIP_NO_DHCP)
  ipaddress0 = (TCPIP_ADDRESS)
```

```
subnetmask0 = (TCPIP_SUBMASK)
defaultgateway0 = (TCPIP_GATEWAY)
tcpsegmentsize = 1450
tcpwindowsize = 1450
nbsessions = 6
load = tcptr[c],tinyrfc[c],emsbfr[cr]
unload = "unloadt /notsr[dc]"
bindings = ne2000_nif
lanabase = 1
```

```
[ipx_xif]
drivename = ipx$
load = ipxmark[u],ipx[u]
unload = ipxrel[c]
bindings = ne2000_nif
lanabase = 1
```

```
[msdlc_xif]
drivename = msdlc$
bindings = ne2000_nif
load = msdlc[ub]
unload = msdlc[u]
```

```
[ne2000_nif]
drivename = NE2$
INTERRUPT=5
IOBASE = 0x360
```


Chapter 7 REFERENCE INFORMATION

This chapter contains reference information concerning:

- Ethernet References
- Types of Ethernet
- Types of Ethernet Cable
- Ethernet Frames
- IEEE 802 MAC Number

Ethernet References

To learn more about Ethernet, you might start with:

Charles Spurgeon's Ethernet Website:

<http://wwwhost.ots.utexas.edu/ethernet/ethernet-home.html>

This site provides thorough overviews of 10 Mbps and faster Ethernet.

Types of Ethernet

There are three standard types of 10 Megabit Ethernet, of which 10Base-T is by far the most common, and 10Base-5 is by far the least common.

Ethernet Type	Nickname	Data transfer rate	Topology	Cable type	Maximum Segment length
10Base-T	"Cheapernet"	10 Mbps	Star	100 ohm UTP (unshielded twisted pair)	100 m 328 ft
10Base-2	"Thin" Ethernet	10 Mbps	Bus	RG-58 coaxial	185 m 607 ft
10Base-5	"Thick" Ethernet	10 Mbps	Bus	RG-11 coaxial	500 m 1640 ft

Types of Ethernet cable

Ethernet uses one of three standard cable types:

Ethernet Type	Cable type	Impedance	Denomination
10Base-T	UTP	100 Ohm	unshielded twisted pair
10Base-2	RG-58	50 Ohm	Ethernet thin
10Base-5	RG-11	50 Ohm	Ethernet thick (yellow cable)

Note: Although 8-conductor telephone wire is commonly used for 10Base-T connections, this type wire is not the correct 100 ohm UTP, as it does not use twisted-pairs. Using such wire may cause excessive crosstalk, resulting in a large number of collisions and poor network performance.

10Base-T Wiring Convention

10Base-T Ethernet uses the following wiring convention when connecting a node to a hub. It is suggested you use this convention for consistency:

RJ45 PIN	First End		to	Second End		RJ45 PIN
	Pair No.	wire color		Pair No.	wire color	
1	3	W-G	to	2	W-O	1
2	3	G	to	2	O	2
3	2	W-O	to	3	W-G	3
4	1	BL	to	1	BL	4
5	1	W-BL	to	1	W-BL	5
6	2	O	to	3	G	6
7	4	W-BR	to	4	W-BR	7
8	4	BR	to	4	BR	8

Note: W-G = White-Green
 G = Green
 W-O = White-Orange
 O = Orange
 W-BL = White-Blue
 BL = Blue
 W-BR = White-Brown
 BR = Brown

Ethernet frames

The following are standard Ethernet frames.

- ETHERNET_II Primarily used by TCP/IP
- ETHERNET_802.3 Default frame for Netware 3.11
- ETHERNET_802.2 Default frame for Netware 3.12 and 4.x
- ETHERNET_SNAP Primarily used by Appletalk

IEEE 802 MAC number

The CM202 utilityModule is identified with an Organizationally Unique Identifier (OUI) and company_id number:

00-D0-81

The MAC (Media Access Control) number of the utilityModule is thus:

00-D0-81-xx-xx-xx

where the last three bytes are the serial number of the board, unique for each adapter.

Chapter 8 RETURN POLICY AND WARRANTY

Return Policy

If you wish to return a product to the factory for service, please follow this procedure:

Read the Limited Warranty to familiarize yourself with our warranty policy.

Contact the factory for a Return Merchandise Authorization (RMA) number.

Please have the following available:

- Complete board name
- Board serial number
- A detailed description of the board's behavior

List the name of a contact person, familiar with technical details of the problem or situation, **along with their phone and fax numbers, address, and e-mail address** (if available).

List your shipping address!!

Indicate the shipping method you would like used to return the product to you.

We will not ship by next-day service without your pre-approval.

Carefully package the product, using proper anti-static packaging.

Write the RMA number in large (1") letters on the outside of the package.

Return the package to:

RTD Embedded Technologies, Inc.

103 Innovation Blvd.

State College PA 16803-0906

USA

Limited Warranty

RTD Embedded Technologies, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from RTD Embedded Technologies, INC. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, RTD Embedded Technologies will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to RTD Embedded Technologies. All replaced parts and products become the property of RTD Embedded Technologies. Before returning any product for repair, customers are required to contact the factory for an RMA number.

THIS LIMITED WARRANTY DOES NOT EXTEND TO ANY PRODUCTS WHICH HAVE BEEN DAMAGED AS A RESULT OF ACCIDENT, MISUSE, ABUSE (such as: use of incorrect input voltages, improper or insufficient ventilation, failure to follow the operating instructions that are provided by RTD Embedded Technologies, "acts of God" or other contingencies beyond the control of RTD Embedded Technologies), OR AS A RESULT OF SERVICE OR MODIFICATION BY ANYONE OTHER THAN RTD Embedded Technologies. EXCEPT AS EXPRESSLY SET FORTH ABOVE, NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND RTD Embedded Technologies EXPRESSLY DISCLAIMS ALL WARRANTIES NOT STATED HEREIN. ALL IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES FOR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THIS WARRANTY. IN THE EVENT THE PRODUCT IS NOT FREE FROM DEFECTS AS WARRANTED ABOVE, THE PURCHASER'S SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. UNDER NO CIRCUMSTANCES WILL RTD Embedded Technologies BE LIABLE TO THE PURCHASER OR ANY USER FOR ANY DAMAGES, INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOST PROFITS, LOST SAVINGS, OR OTHER DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT.

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Our website: www.rtd.com