DEC LANcontroller 400

digital

Console User's Guide

Order Number: EK-DEMNA-UG-001

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The DEC LANcontroller 400 (also known as the DEMNA controller) is an Ethernet/802 controller for systems that have an XMI bus. This guide is intended for use by DIGITAL and customer personnel who monitor and/or troubleshoot networks.

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Preface

Purpose of This Manual

This manual describes how to use the console monitor program available on the DEC LANcontroller 400 module, which is an Ethernet/802 controller for systems that have an XMI bus. The console monitor program enables a user at virtually any terminal on the network to monitor DEMNA operation and network traffic.

The DEC LANcontroller 400 is also known as the DEMNA controller. Throughout the rest of this manual, the DEC LANcontroller 400 is referred to as the DEMNA.

Intended Audience

This manual is for DIGITAL and customer personnel who monitor and/or troubleshoot networks.

Document Structure

This manual has two chapters and eight appendixes, which are described below:

Chapter 1 briefly describes the DEMNA module, its functions, and its logic.

Chapter 2 describes the DEMNA console monitor program.

Appendix A describes a program that can be used to connect to the DEMNA console monitor program if the Network Control Program (NCP) is not available.

Appendix B describes how to convert an Ethernet address to a DECnet address.

Appendix C lists some commonly used Ethernet protocol types.

Appendix D describes the types of errors that can be written to the error history log in DEMNA EEPROM.

Appendix E lists the device type codes of all XMI modules available at the printing of this manual.

Appendix F describes three customer-modifiable flags in DEMNA EEPROM and indicates how to modify the flag settings.

Appendix G lists some commonly used multicast addresses.

Appendix H lists some commonly used 802 SAPs and SNAP SAP protocol IDs.

Associated Documents

Related documentation includes:

- *DEC LANcontroller 400 Installation Guide*, EK–DEMNA–IN
- *DEC LANcontroller 400 Programmer's Guide*, EK–DEMNA–PG
- *DEC LANcontroller 400 Technical Manual*, EK–DEMNA–TM
- *Ethernet Installation Guide*, EK–ETHER–IN
- *VMS I/O User's Reference Manual: Part 1*, AA–LA84A–TE
- *VMS Network Control Program Manual*, AA–LA50A–TE

Conventions Used

- All addresses are in hexadecimal (hex). All bit patterns are in binary notation. All other numbers are decimal unless otherwise indicated.
- Ranges are inclusive. For example, the range 0–4 includes the integers 0, 1, 2, 3, 4.
- Bits are enclosed in angle brackets (for example, <12>).
- Bit ranges are indicated by two bits in descending order separated by a colon; for example, <12:1>. Bit ranges are inclusive.
- K = kilo (1024); M = mega (1024**2); G = giga (1024 **3).
- The term "asserted" indicates that a signal line is in the true state. The term "deasserted" indicates that a signal line is in the false state. "Assertion" is the transition from the false to the true state. "Deassertion" is the transition from the true to the false state.

Command Notation

The following command notation is used in this manual:

Convention	Meaning
{ }	Large braces enclose lists from which you must choose one item. For example: { KERNEL / USER }
. . .	Horizontal ellipsis points mean that you can repeat the item preceding the points. For example: */qualifier . . .*
. . .	Horizontal or vertical ellipsis points in an example indicate that not all the information the system would display is shown or that not all the information a user is to supply is shown.
{ }, . . .	Braces followed by a comma and horizontal ellipsis points mean that you can repeat the enclosed items one or more times, separating two or more items with commas.
[ ]	Square brackets enclose items you can omit. For example: [=*option*, . . .]
UPPERCASE characters	Language-specific reserved words and identifiers are printed in uppercase characters. However, you can enter them in uppercase, lowercase, or a combination of uppercase and lowercase characters.
italic lowercase characters	Elements you must replace according to the description in the text are printed in italic lowercase characters. However, you can enter them in lowercase, uppercase, or a combination of lowercase and uppercase characters.

1 DEC LANcontroller 400 Module Overview

The DEC LANcontroller 400 is an intelligent, high-performance I/O controller that enables a host processor on the XMI bus to communicate with other nodes in an Ethernet/802 local area network. The DEC LANcontroller 400 is compatible with the Ethernet and IEEE 802 specifications.[1] The *Systems and Options Catalog* indicates which systems support the DEMNA option.

A single XMI bus can support multiple DEC LANcontroller 400s. An XMI bus can thus connect to multiple Ethernet/802 networks. Each DEC LANcontroller 400 connects to a single network through a standard 15-pin Sub-D connector.

The DEC LANcontroller 400 is also called the DEMNA controller. Throughout the rest of this manual, the DEC LANcontroller 400 is referred to as the DEMNA.

1.1 BASIC FUNCTIONS

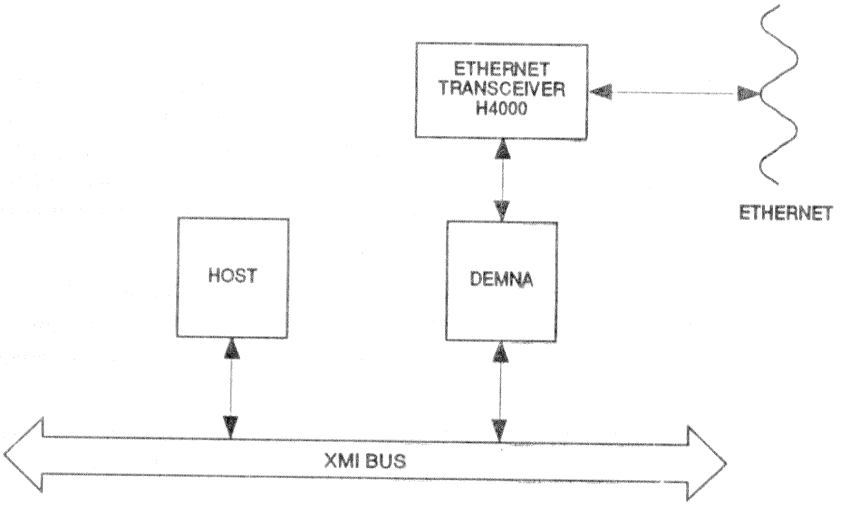
The DEMNA supports one Ethernet/IEEE 802 port, which provides the physical link layer and portions of the data link communication layer of the Ethernet and 802 protocols, as defined by the Ethernet and IEEE 802 specifications.

With its own onboard CVAX processor, the DEMNA can control operations independently of the host processor. The details of Ethernet transactions, including data transfer over the XMI bus, are thus transparent to the host processor (see Figure 1–1).

The onboard firmware is contained in EEPROM, which allows revised firmware to be loaded without hardware modification. The firmware can thus be easily upgraded in the field. In addition, various DEMNA operating parameters can be modified easily in the field.

[1] In this manual, 802 refers specifically to the CSMA/CD local area network defined in the IEEE 802.2 and 802.3 specifications (physical and data link layers).

Figure 1–1 DEMNA Module in an XMI System



The DEMNA firmware includes a console monitor program that allows a user at virtually any terminal on the network to monitor DEMNA operation and network traffic. The console monitor program can be accessed over the network or from a terminal (called the physical console) attached directly to the DEMNA. Chapter 2 describes the console monitor program and suggests how to use it to monitor DEMNA operation and network traffic.

The DEMNA has extensive onboard diagnostics. On power-up or reset, the DEMNA tests itself and makes its status (pass or fail) available through LEDs on the module and through an onboard Power-Up Diagnostic (XPUD) Register. In addition, a customer service engineer may invoke other onboard diagnostics from the system console or the DEMNA physical console to test the DEMNA's logic and functionality more extensively.

The DEMNA may participate in network boot operations. The DEMNA may be specified as the boot device by its host system or be enabled to involuntarily boot its host system on receiving a valid Boot message over the network. (See the *DEC LANcontroller 400 Technical Manual* for further information.)

1.2 LOGIC OVERVIEW

The DEMNA logic is divided into the following four subsystems, as shown in Figure 1–2:

- Microprocessor subsystem
- Shared memory subsystem
- XMI interface subsystem
- Ethernet interface subsystem

1.2.1 Microprocessor Subsystem

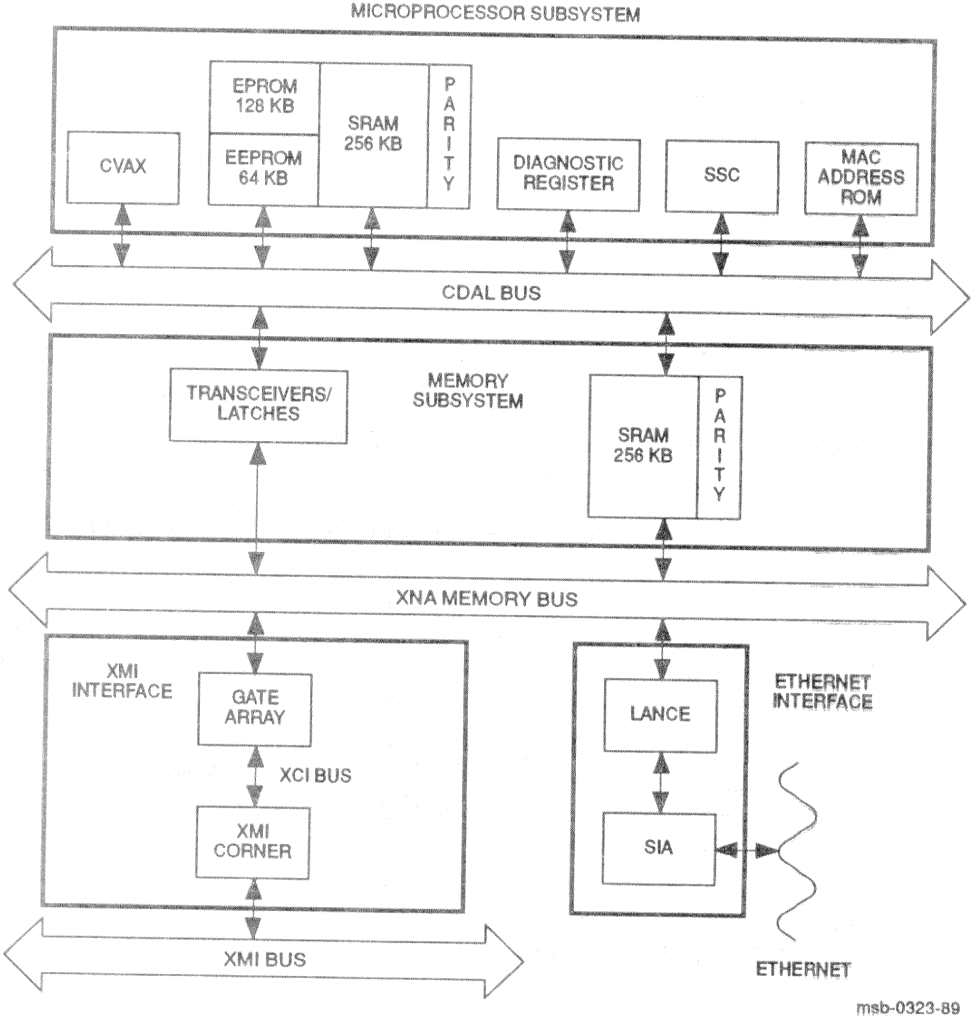
The microprocessor subsystem performs the following major functions:

- Stores and executes the module firmware (including onboard diagnostics and the console monitor program)
- Executes onboard diagnostics
- Stores and supplies the module's default (MAC) Ethernet address

The microprocessor subsystem contains the following major components:

- CVAX—a 32-bit CMOS processor dedicated to running firmware. The CVAX cannot be used directly by application programs running on the host processor or by a user at the system console.
- System Support Chip (SSC)—This chip provides control logic for the microprocessor subsystem, including timers, address decode logic, internal processor registers, and a UART for connection with the DEMNA physical console.
- EEPROM and CVAX RAM—The EEPROM stores the module's operational firmware, which executes from CVAX RAM (SRAM). The EEPROM also stores history data on DEMNA failures and errors.

Figure 1–2 DEMNA Simplified Block Diagram



- MAC Address (ENET) PROM—This PROM stores the module's default physical (Ethernet) address (DPA),[1] which is also called the Medium Access Control (MAC) address. The PROM also stores a PROM test pattern.
- EPROM—The EPROM stores diagnostic code and firmware boot code. If the DEMNA self-test finds that the EEPROM contents are invalid, the EPROM code is loaded into CVAX RAM so that additional diagnostics can be executed.
- Diagnostic Register—This register is a control/status register that controls certain low-level diagnostic operations, such as the disabling of CVAX RAM parity.

The CVAX, SSC, CVAX RAM, and Diagnostic Register connect to each other through the CDAL bus, which in turn connects to the XNA memory bus through latched transceivers.

1.2.2 Shared Memory Subsystem

The shared memory subsystem performs the following major functions:

- Buffers packets to and from the Ethernet interface
- Buffers transfers to and from the XMI bus
- Stores shared data structures that allow the CVAX and LANCE to communicate

The shared memory subsystem has the following major components:

- 256 Kbytes of parity-protected SRAM—The SRAM buffers Ethernet and XMI transfers and stores data structures shared by the CVAX and LANCE.
- Bus control logic—This logic controls read/write timing and read/write signals.
- DMA logic—This logic controls access to the SRAM.
- XNA timeout logic—This logic detects when a DMA grant has been outstanding longer than the timeout period.

[1] At the request of applications starting up a protocol such as DECnet, the port driver may assign one or more alternative addresses to the DEMNA. This type of address is called an actual physical address (APA).

The SRAM is on the XNA memory bus, which connects to the Ethernet interface, XMI interface, and the CDAL bus. The SRAM can be accessed by the LANCE chip (Ethernet interface), CVAX, or XNA gate array (XMI interface). The DMA access priority for these devices is LANCE, CVAX, and gate array.

1.2.3 Ethernet Interface Subsystem

The Ethernet interface provides an interface between the DEMNA's shared memory and the Ethernet wire. The Ethernet interface performs transmits (reads) from the shared memory and receives (writes) to the shared memory.

The Ethernet interface has the following major components:

- Local Area Network Controller for Ethernet (LANCE) chip—The LANCE chip implements the microprocessor interface, performs DMA to and from the DEMNA shared memory, implements the CSMA/CD network access algorithm, does packet handling on transmits and receives, and reports errors.
- Serial Interface Adapter (SIA) chip—The SIA chip performs Manchester encoding for transmits, Manchester decoding for receives, and implements a TTL/differential signal interface between the LANCE (TTL) and the Ethernet wire (differential signals).
- Bus interface logic—This logic generates byte parity on transfers to DEMNA shared memory and checks byte parity on transfers from shared memory.

1.2.4 XMI Interface Subsystem

The XMI interface provides an interface between the DEMNA's shared memory and the XMI bus. The XMI interface performs the following major functions:

- Transfers Ethernet read and write data between DEMNA shared memory and host memory
- Performs control operations for the DEMNA CVAX (high-priority quadword XMI reads and writes to memory and longword XMI I/O reads and writes)
- Implements the DEMNA port registers
- Implements the XMI-required registers

- Implements XMI interrupt logic

The XMI interface has the following major components:

- Gate array—The gate array implements most of the XMI interface logic.
- XMI Corner—Low-level connection logic, including latches, terminator resistors, clocks, and module-decoupling capacitors.
- XMI timeout logic—This logic detects timeouts for XMI operations.

2 Console Monitor Program

This chapter describes how to use the console monitor program. The chapter contains the following sections:

- Introduction
- Setup Procedure
- Invoking the Console
- Exiting the Console
- Console Commands
- Console Command Language Control Characters
- How to Use the Status Screens
- How to Use the Network Screens

2.1 Introduction

The DEMNA firmware includes a console monitor program that enables a user at virtually any terminal on the network to monitor DEMNA operation and network traffic. The console monitor program is resident in the DEMNA EEPROM and therefore does not have to be loaded into the DEMNA. Since the console monitor program runs entirely on the DEMNA, it consumes a negligible amount of host resources.

The console monitor program consists primarily of 12 interactively invoked screens (displays) that indicate current operating parameters and errors. The console dynamically monitors over 100 parameters. These parameters are updated every 3 seconds on-screen while being displayed.

In addition to displaying and updating key operational and diagnostic parameters, the console monitor program allows a user to examine the contents of DEMNA memory locations and registers.

To aid new users, the console monitor program provides online help information that describes the commands available to the user.

The console monitor program has the following security features:

- A password must be supplied when accessing the console monitor program from the network.
- Only one user at a time can access the console monitor program from a terminal on the network.
- A system manager can disable the console monitor program entirely or deny access to the program from a remote network node. The parameters that control access to the console monitor program can be changed with the EEPROM Update Utility, as described in Appendix F. (See the *DEC LANcontroller 400 Technical Manual* for a complete description of EVGDB.)

2.2 Setup Procedure

A user can access the console monitor program from one of three locations:

- From a terminal attached directly to the DEMNA. This terminal is referred to as the physical console.
- From a terminal at the local network node (the DEMNA's node)
- From a terminal at a remote network node (a node other than the DEMNA's)

When the console monitor program is accessed from a terminal on a network node (not from the physical console), either of the following must be used to make the actual connection:

- The Network Control Program (NCP)
- A console connection program such as the one described in Appendix A.

The above connection locations and methods require three basic setup procedures:

- For the physical console
- For a networked terminal when using NCP
- For a networked terminal when using the console connection program

2.2.1 For the Physical Console

When using the physical console to access the console monitor program, the only setup required is to connect the terminal cable to section D2 of the DEMNA's XMI slot and to set the terminal baud rate to 19.2K baud. The console monitor prompt (XNA>) will appear when the terminal is powered on.

The installation of the physical console is described in the *DEC LANcontroller 400 Installation Guide*. For information on ordering the cable, see the *Systems and Options Catalog*.

2.2.2 For a Networked Terminal When Using NCP

First, appropriate entries must be made in the network databases of the the network node from which the user will access the console monitor program. (This node can be the DEMNA's network node or a remote node). The entries are made with NCP SET/DEFINE commands.

NOTE

DECnet must be running for NCP fields to be valid.

The SET commands make entries in the node's temporary network database. These entries will remain valid until the system is rebooted. The DEFINE commands make entries in the node's permanent network database. These entries are retained across system reboots. (For more information on these commands, see the *VMS Network Control Program Manual*.)

The NCP commands supply the following information:

- Hardware address: the DEMNA's default Ethernet address (DPA), which is the address stored in the DEMNA MAC Address PROM
- Service password: the password required to connect to the console monitor program
- Service circuit: the circuit parameter associated with the network node from which the user will access the console monitor program. The service circuit is the value for the VIA parameter of NCP's CONNECT NODE command. For example, if the user is making the connection from a VAXstation 2000, the service circuit is SVA-0. If the user is making the connection from a MicroVAX, the service circuit is QNA-0. (See the *VMS Network Control Program Manual* for further information.)

NOTE

To use NCP SET commands, a user must have the OPER privilege. To use NCP DEFINE commands, a user must have the SYSPRV privilege.

To enhance security, the service password can be omitted from the information supplied with the NCP SET/DEFINE commands. A user must then supply the service password with the NCP CONNECT command each time that he/she wishes to connect to the console via NCP (see Section 2.3.1).

2.2.2.1 DEMNA at Remote Node

If the user is at a different network node than the DEMNA's network node, the following set of NCP SET/DEFINE commands should be used to set up the console:

```
$MC NCP
NCP>SET NODE node_name HARD ADDR address
NCP>DEF NODE node_name HARD ADDR address

NCP>SET NODE node_name SERVICE PASSWORD password
NCP>DEF NODE node_name SERVICE PASSWORD password

NCP>SET NODE node_name SERVICE CIRCUIT circuit_name
NCP>DEF NODE node_name SERVICE CIRCUIT circuit_name
```

where:

node_name is the logical name assigned to the DEMNA Ethernet node

address is the DEMNA default physical address (DPA) on the Ethernet

circuit_name is the service circuit for the system from which you are sending the commands. (Use the NCP command SHOW KNOWN CIRCUITS to determine the appropriate circuit name for your system.)

password is the password for the DEMNA console monitor program. The default password is 584E41424F415244 (hex).

Example 2–1 Console Setup (DEMNA at Remote Node)

```
$MC NCP
NCP>SET NODE NODE_B HARD ADDR 08-00-3C-4F-22-22
NCP>DEF NODE NODE_B HARD ADDR 08-00-3C-4F-22-22

NCP>SET NODE NODE_B SERVICE PASSWORD 584E41424F415244
NCP>DEF NODE NODE_B SERVICE PASSWORD 584E41424F415244

NCP>SET NODE NODE_B SERVICE CIRCUIT BNA-0
NCP>DEF NODE NODE_B SERVICE CIRCUIT BNA-0
```

Example 2–1 is a sample command sequence for setting up the console using NCP when the user is at a remote network node (for example, when the user is at node A and the DEMNA is at node B).

2.2.2.2 DEMNA at Local Node

If a user is at the same network node as the DEMNA, the user must first create a node name and assign it a valid DECnet address. The node name and DECnet address must be distinct from other node names and DECnet addresses already defined to the system. The best approach is to find a DECnet area that is not being used and simply assign a node name to an address in that area.

NOTE

This procedure is necessary because the NCP CONNECT command does not allow a node to connect to itself. This procedure forces the CONNECT command to default to the hardware address specified in the CONNECT command.

Use the following procedure to set up the console using NCP when the user is at the local node:

1 Use the following NCP command to determine whether the created node name is unique:

```
$MC NCP
NCP>SHOW NODE node_name
```

where *node_name* is the Ethernet node name

If the node name is unique, NCP will display the following message:

```
Node Volatile Summary as of 13-SEP-1989 14:02:52

%NCP-W-UNRCMP, Unrecognized component, Node
```

2 Use the following NCP command to determine whether the assigned DECnet address is unique:

```
NCP>SHOW NODE DECnet_address
```

where *DECnet_address* is the assigned DECnet address
NCP will display a message similar to the following:

```
Node Volatile Summary as of 13-SEP-1989 14:03:55

     Node          State     Active  Delay   Circuit    Next node
                             Links
```

If the DECnet address is unique, there will be no entry under *Node*.

3 After the node name has been created and assigned a DECnet address, use the following SET/DEFINE commands to enter the information in the network databases:

```
NCP>SET NODE DECnet_address NAME node_name
NCP>DEF NODE DECnet_address NAME node_name
```

where:

DECnet_address is the assigned DECnet address

node_name is the Ethernet node name

4 Use the following command sequence for setting up the console:

```
$MC NCP
NCP>SET NODE node_name HARD ADDR address
NCP>DEF NODE node_name HARD ADDR address
NCP>SET NODE node_name SERVICE PASSWORD 584E41424F415244
NCP>DEF NODE node_name SERVICE PASSWORD 584E41424F415244
NCP>SET NODE node_name SERVICE CIRCUIT circuit_name
NCP>DEF NODE node_name SERVICE CIRCUIT circuit_name
```

where:

node_name is the logical name that you are assigning to the DEMNA Ethernet node

address is the DEMNA default physical address (DPA) on the Ethernet

circuit_name is the service circuit for the system from which you are sending the commands. (Use the NCP command SHOW KNOWN CIRCUITS to determine the appropriate circuit name for your system.)

2.2.3 For a Networked Terminal When Using the Console Connection Program

If your system does not run NCP, use the console connection program described in Appendix A to connect to the DEMNA console monitor program.

2.3 Invoking the Console

There are two different procedures for invoking the console: one for NCP and one for the console connection program.

2.3.1 Using NCP

Once the appropriate information about the DEMNA console monitor program has been entered into the network databases of the local node, the console can be invoked with the following command sequence:

```
$MC NCP
NCP>CONNECT NODE node_name
Console connected (press CTRL/D when finished)
XNA>
```

where *node_name* is the logical name that was assigned to the DEMNA Ethernet node

If the service password was not supplied with the NCP SET/DEFINE commands when the console was set up (see Section 2.2.2), the user must supply the service password with the NCP CONNECT command:

```
NCP>CONNECT NODE node_name service_password
```

Example 2–2 illustrates invoking the DEMNA console without the service password.

Example 2–2 Using NCP to Invoke the Console Monitor Program

```
$MC NCP
NCP>CONNECT NODE MYNODE
Console connected (press CTRL/D when finished)
XNA>
```

If NCP cannot connect to the console, it will return an error message. See the *VMS Network Control Program Manual* for further information.

2.3.2 Using the Console Connection Program

Once the console connection program has been assembled and linked (see Appendix A), use the following commands to invoke the console:

```
$ASSIGN Ethernet_device CONSOLE$DEVICE
$RUN CONSOLE
XNA>
```

where *Ethernet_device* is the device number for the user's Ethernet node

When a connection to the target DEMNA is established, the DEMNA console prompt (XNA>) is displayed. Example 2–3 illustrates the commands used to invoke the console monitor program with the console connection program.

Example 2–3 Using the Console Connection Program to Invoke the Console Monitor Program

```
$ASSIGN EXA0 CONSOLE$DEVICE
$RUN CONSOLE
XNA>
```

2.4 Exiting the Console

To exit the console, type CTRL/D.

2.5 Console Commands

There are five console commands:

- BLANK
- EXAMINE
- HELP
- SHOW

- T/R

Table 2–1 summarizes these commands. Each command is then described in detail.

Table 2–1 Console Commands

Command	Parameter	Description
BLANK		Clears the screen and displays the console prompt (XNA>).
EXAMINE		Displays the contents of the next DEMNA memory location or gate array register.
EXAMINE	(period)	Displays the contents of the current DEMNA memory location or the current gate array register.
EXAMINE	*address*	Displays the contents of the location at the specified address, where *address* is a longword address.
EXAMINE/NUMBER=*n*		Displays the contents of the next *n* longwords, where *n* is an integer.
EXAMINE/REGISTER		Displays the contents of all gate array registers.
HELP		Displays the Help screen.
HELP	EXAMINE	Displays a Help screen for the EXAMINE command.
HELP	CONTROLCHAR	Displays a Help screen that provides definitions of all the console command language control characters.
HELP	SHOW	Displays a Help screen for the SHOW command.
SHOW	BUS	Displays the current configuration of the XMI bus.
SHOW	ERROR H*n*	Displays fatal error block *n*, where *n* is an integer from 1 through 5. See the *DEC LANcontroller 400 Technical Manual* for a description of the fatal error block.
SHOW	ERROR S*n*	Displays nonfatal error block *n*, where *n* is an integer from 1 through 5. See the *DEC LANcontroller 400 Technical Manual* for a description of the nonfatal error block.
SHOW	IMAGE	Displays the revision number and revision date of the DEMNA firmware.
SHOW	HISTORY	Displays a summary of all errors recorded in EEPROM.
SHOW	HISTORY *n*	Displays entry *n* of the EEPROM error history, where *n* is an integer from 1 to 31.
SHOW	NETWORK	Displays a continuously updated summary of network activity.

Table 2–1 (Cont.) Console Commands

Command	Parameter	Description
SHOW	STATUS	Displays continuously updated screens of the following: the DEMNA data link (NI) counters, statistics on the DEMNA's use of the Ethernet, error summary counters, the percentage of CVAX time used by each DEMNA firmware process, and the percentage of XMI bus traffic generated by each XMI node.
SHOW	STATUS/ERROR	Displays continuously updated screens of the DEMNA transmit, receive, and LANCE counters.
SHOW	STATUS/INTERVAL	Displays the same screen as the SHOW STATUS command. The only difference between the two screens is the time interval for which the NI counters and the Error Summary counters record events. In the Show Status screen, these counters record events from the last reset of the DEMNA module. In the Show Status/Interval screen, these counters record events starting when the SHOW STATUS/INTERVAL command is entered, when the screen is invoked by typing CTRL/E from the Status screen, or when the screen is invoked by typing CTRL/A from the Interval Status/Error screen.
SHOW	PUD	Displays the contents of the DEMNA Power-Up Diagnostic (XPUD) Register.
SHOW	USER	Displays information about the users currently defined to the DEMNA port.
T/R		Invokes the diagnostic monitor, from which ROM-based diagnostics can be run. (See the *DEC LANcontroller 400 Technical Manual* for further information on running RBDs.) This command is valid only when entered from the DEMNA's physical console and when the DEMNA is in the uninitialized state. (To put the DEMNA in the uninitialized state, stop all applications that are using the DEMNA or reset the system with auto start off.)

BLANK

The BLANK command clears the screen and displays the console prompt (XNA>).

Format

BLANK

Example

```
XNA>BLANK


XNA>
```

EXAMINE

The EXAMINE command displays the contents of the specified location in DEMNA I/O or memory space.

Format

EXAMINE [. (period) | *address* | **/NUMBER=***n* | **/REGISTER**]

Parameters

. (period)
Specifies that the contents of the current location be displayed.

address
Specifies that the contents of a longword location be displayed.

Qualifiers

/NUMBER=*n*
Specifies that the next *n* longwords be displayed.

/REGISTER
Specifies that the gate array registers be displayed.

Restrictions

None.

Description

All system responses to the EXAMINE command are formatted and displayed on the console terminal.

EXAMINE	Displays contents of the next location.
EXAMINE . (period)	Displays the contents of the current location.

EXAMINE

EXAMINE *address*	Displays the contents of the specified longword address.
EXAMINE/NUMBER=*n*	Displays the contents of the next *n* locations.
EXAMINE/REGISTER	Displays the contents of the gate array registers.

Examples

1
```
XNA>EXAMINE
 00000004/ 31303030
```

2
```
XNA>EXAMINE .
 00000004/ 31303030
```

3
```
XNA>EXAMINE 0000FFFF
0000FFFF/ 00110000
```

4
```
XNA>EXAMINE/NUMBER=5
 00000008/ 4A2D3132
 0000000C/ 312D4E55
 00000010/ 20393839
 00000014/ 79706F43
 00000018/ 68676972
```

5 XNA>EXAMINE/REGISTER

```
-- 08-00-2B-00-00-01 -- CVAX and GA Registers -- 01-JAN-1988 00:01:47 --

     XDEV/      01000C03          DMPOR0/   F0000800
     DiagReg/   D7A1C000          DMCSR0/   00000000
     GACSR/     30030024          DMXMI0/   00000084
     GAHIR/     00000000          DMNPA0/   00000000
     GAIVR/     00000000
     XBE/       8000A0E4          DMPOR1/   200014A0
     XPST/      00000002          DMCSR1/   00000000
     XPD1/      00010800          DMXMI1/   00000089
     XPD2/      00000001          DMNPA1/   00000224

     PKXMIL0/   0000AE74          DMPOR2/   10001480
     PKXMIH0/   40000000          DMCSR2/   0000003C
     PKDATA0/   A000019C          DMXMI2/   0000008D
     PKDATB0/   A000019D          DMNPA2/   00000234

     PKXMIL1/   00010A18          DMPOR3/   00000000
     PKXMIH1/   40000000          DMCSR3/   00000000
     PKDATA1/   00011A00          DMXMI3/   00000000
     PKDATB1/   003C0000          DMNPA3/   00000000
```

HELP

The HELP command displays information on the EXAMINE and SHOW console commands, as well as the console command language control characters.

Format

HELP [*command* | CONTROLCHAR]

Parameters

command

Specifies that help information be displayed for one of the following console commands:

- EXAMINE
- SHOW

CONTROLCHAR

Specifies that help information be displayed for the console command language control characters.

Restrictions

None.

Description

All system responses to the HELP command are formatted and displayed on the console terminal.

HELP	Displays the general Help screen.
HELP EXAMINE	Displays the Help screen for the EXAMINE command.
HELP SHOW	Displays the Help screen for the SHOW command.
HELP CONTROLCHAR	Displays the Help screen for the console command language control characters.

Examples

1

```
XNA>HELP

Welcome to the DEMNA console.  The console is used to monitor
the Ethernet traffic, counters and internal data on this node.

The following commands are supported by the console:
 BLANK           Clear the screen
 EXAMINE         Examine DEMNA memory locations
 HELP            Display this help screen
 SHOW            Displays information about the adapter

For additional help on the following type: HELP <command>.
      EXAMINE     SHOW     CONTROLCHAR
```

2

```
XNA>HELP EXAMINE

--- EXAMINE</qualifier> <parameter> ---

Displays the data stored at the specified address (in longwords)

     EXAMINE             - Examine the next location
     EXAMINE .           - Examine the current location
     EXAMINE <address>   - Examine the given address
     EXAMINE/NUMBER=<n>  - Examine the next 'n' longwords
     EXAMINE/REGISTER    - Examine the contents of Gate Array registers
```

3 XNA>HELP SHOW

```
--- SHOW <parameter> ---

The parameters are as follows:

     BUS      - Display XMI bus configuration
     ERROR    - Display error block indicated by the parameter
                 Hn - Harderror block number 'n', where 0<n<6 (SH ERR H<n>)
                 Sn - Softerror block number 'n', where 0<n<6 (SH ERR S<n>)
     IMAGE    - Display information about firmware image
     HISTORY  - Display EEPROM history data (SH HIS) or (SH HIS <n>)
     NETWORK  - Display interval network summary, continuously updating
                 (Ctrl-A for accumulated network summary)
     STATUS   - Display module status, continuously updating
                 /ERROR    (or Ctrl-A) - Display error counters screen
                 /INTERVAL (or Ctrl-E) - Display counters from this point
                 (SH STATUS) (SH STATUS/ERROR) (SH STATUS/INTERVAL)
     XPUD     - Display self test results - Power Up Diagnostic Register
     USER     - Display currently defined users
```

4 XNA>HELP CONTROLCHAR

```
--- CONTROL CHARACTERS ---

The following control characters are available:
     CTRL/A  -  During SHOW STATUS command - Switch between
                error status and regular status screens
                                or
                During SHOW NETWORK command - Switch between accumulated
                network summary and interval network summary screens
     CTRL/D  -  Disconnect the console from the remote connection
     CTRL/E  -  During SHOW STATUS command - Switch between
                interval and accumulated counters
     CTRL/L  -  Recall previous command line
     CTRL/U  -  Clear current command line
     CTRL/W  -  Refresh the STATUS or NETWORK screen
```

SHOW

The SHOW command displays the following:

- Configuration of the XMI system that contains the DEMNA
- DEMNA fatal error blocks and nonfatal error blocks
- DEMNA firmware revision
- Error history in the DEMNA EEPROM
- Summary of network activity
- Statistical information about the DEMNA and the network
- DEMNA Power-Up Diagnostic (XPUD) Register
- Users currently defined to the DEMNA

Format

```
SHOW { BUS
       ERROR Hn
       ERROR Sn
       HISTORY [n]
       IMAGE
       NETWORK
       STATUS [ /ERROR    ]
              [ /INTERVAL ]
       USER
       XPUD }
```

Parameters

BUS
Displays the configuration of the XMI system that contains the DEMNA.

ERROR H*n*
Displays the fatal error block specified by *n*, which must be an integer from 1 to 5.

ERROR S*n*
Displays the nonfatal error block specified by *n*, which must be an integer from 1 to 5.

HISTORY [*n*]

Displays the error summary stored in the DEMNA EEPROM. If no number is supplied, a summary of all errors recorded in EEPROM is displayed. If a number is supplied, the data for only that error is displayed.

IMAGE

Displays the firmware revision number and date for both the EEPROM image and the EPROM image.

NETWORK

Displays a continuously updated summary of network activity. Statistical information is displayed for the six most active Ethernet users and the seven most active Ethernet nodes.

STATUS

Displays a continuously updated screen that includes the following:

- Statistical information on the DEMNA's use of the network
- Data link counters
- Percentage of DEMNA CPU time used by each DEMNA firmware process
- Error summary counters
- Number of DEMNA-internal transmit and receive buffers in use
- Percentage of XMI traffic generated by each XMI node
- Statistical information on the use of the entire network

STATUS/ERROR

Displays a continuously updated screen that includes the following:

- Transmit error counters
- Receive error counters
- LANCE counters
- Date and time at which various errors last occurred

STATUS/INTERVAL

Displays the same screen as the SHOW STATUS command. The only difference between the two screens is the time interval for which the NI counters and the Error Summary counters record events. In the Show Status screen, these counters record events from the last reset of the DEMNA module. In the Show Status/Interval screen, these counters

record events starting when the SHOW STATUS/INTERVAL command is entered or when the Status/Interval screen is invoked by typing CTRL/E from the Status screen.

USER
Displays the setup parameters for each user defined to the DEMNA port.

XPUD
Displays the DEMNA Power-Up Diagnostic (XPUD) Register.

Restrictions

None.

DESCRIPTION

All system responses to the SHOW command are formatted and displayed on the console terminal.

SHOW BUS	Displays the configuration of the XMI system that contains the DEMNA.
SHOW ERROR H*n*	Displays fatal error block *n*, where *n* is an integer from 1 to 5. See the *DEC LANcontroller 400 Technical Manual* for a description of the fatal error block.
SHOW ERROR S*n*	Displays nonfatal error block *n*, where *n* is an integer from 1 to 5. See the *DEC LANcontroller 400 Technical Manual* for a description of the nonfatal error block.
SHOW HISTORY	Displays the error history summary stored in the DEMNA EEPROM.
SHOW HISTORY *n*	Displays the data for entry *n* in EEPROM history, where *n* is an integer from 1 to 31. This data is error-specific. See Appendix D for a description of the history entries.
SHOW IMAGE	Displays the revision number and revision date for the firmware in DEMNA EEPROM and the firmware in DEMNA EPROM.

SHOW NETWORK

Displays a continuously updated summary of network activity.

There is an Interval Network screen and an Accumulated Network screen. See Section 2.8.3 for a detailed description of these two screens.

SHOW STATUS

Displays a continuously updated screen that includes the following:

- Statistical information on the DEMNA's use of the network
- Data link counters
- The percentage of DEMNA CPU time used by each DEMNA firmware process
- Error summary counters
- The number of DEMNA-internal transmit and receive buffers in use
- The percentage of XMI traffic generated by each XMI node
- Statistical information on the use of the entire network

SHOW STATUS/ERROR

Displays a continuously updated screen that includes the following:

- Transmit error counters
- Receive error counters
- LANCE counters
- The date and time at which various errors last occurred

There is an Interval Status/Error screen and an Accumulated Status/Error screen. In the Accumulated Status/Error screen, which is the default Status/Error screen invoked by the SHOW STATUS/ERROR command, the counters record events from the last reset of the DEMNA module. In the Interval Status/Error screen, the counters record events starting when the screen is first invoked by typing CTRL/E from the Accumulated Status/Error screen.

SHOW STATUS/INTERVAL	Displays the same screen as the SHOW STATUS command. The only difference between the two screens is the time interval for which the NI counters and the Error Summary counters record events. In the Show Status screen, these counters record events from the last reset of the DEMNA module. In the Show Status/Interval screen, these counters record events starting when the SHOW STATUS/INTERVAL command is entered or when the Status/Interval screen is invoked by typing CTRL/E from the Status screen.
SHOW USER	Displays the setup parameters for each user defined to the DEMNA port.
SHOW XPUD	Displays the DEMNA Power-Up Diagnostic (XPUD) Register.

Examples

1

```
XNA>SHOW BUS

-- 08-00-2B-00-00-01 -- XMI Bus Configuration -- 01-JAN-1988 00:18:07 -

Node      XDEV      Module    Revision
----    --------    ------    --------
 01     01000C03     DEMNA       1.00
 13     00008001     KA62A       0.00
 14     00014001     MS62A       0.01
```

Table 2–2 Show Bus Screen—Parameter Definitions

Parameter	Description
Ethernet address	The actual physical address (APA) of the DEMNA.
Date and time	Current date and time.
Node	XMI node number of the DEMNA.
XDEV	Contents of the module's Device (XDEV) Register. See Appendix E for a listing of the device types for XMI modules.
Module	Module name.
Revision	Module revision number from the module's XDEV Register.

```
2   SHOW ERROR H1
    -- 08-00-2B-00-00-01 -- Hard Error Block #  1 -- 01-JAN-1988 00:01:13 --

    R0/    20135B00                    XBE/       00000380
    R1/    03135B00                    XFADR/     8000B5F4
    R2/    20100000                    XFAER/     10000000
    R3/    00000000                    GACSR/     E0000030
    R4/    00017568                    DiagReg/   0581C000
    R5/    00000010                    XPST/      00000001
    R6/    00000040                    XPD1/      0B2B0008
    R7/    000122F8                    XPD2/      000021BB
    R8/    00012310                    XPSTpnd/   00000B01
    R9/    00000000                    XPD1pnd/   00008EBA
    RA/    20100000                    Stack1/    00000080
    RB/    00012200                    Stack2/    EFF00004
    RC/    0003C800                    Stack3/    D0E0FC80
                                       Stack4/    01C07007
                                       Stack5/    00008EBA
                                       Stack6/    04010009
```

Table 2–3 Hard Error Block Screen—Parameter Definitions

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Hard Error Block #	The Hard Error Block that is being displayed.
Date and time	The date and time at which the error occurred.
R0	CVAX register R0.
R1	CVAX register R1.
R2	CVAX register R2.
R3	CVAX register R3.
R4	CVAX register R4.
R5	CVAX register R5.
R6	CVAX register R6.
R7	CVAX register R7.
R8	CVAX register R8.
R9	CVAX register R9.
RA	CVAX register RA.
RB	CVAX register RB.

Table 2–3 (Cont.) Hard Error Block Screen—Parameter Definitions

Parameter	Description
RC	CVAX register RC.
XBE	Bus Error Register (also known as the XBER).
XFADR	Failing Address Register.
XFAER	Failing Address Extension Register.
GACSR	Gate Array Control/Status Register.
Diagreg	Diagnostic Register.
XPST	Port Status Register.
XPD1	Port Data 1 Register.
XPD2	Port Data 2 Register.
XPSTpnd	Pending Port Status Register. This is the value that will be loaded into the XPST Register after the next state change (after error handling has been completed).
XPD1pnd	Pending Port Data 1 Register. This is the value that will be loaded into the XPD1 Register after the next state change (after error handling has been completed).
Stack1	The first longword on the DEMNA CVAX stack.
Stack2	The second longword on the DEMNA CVAX stack.
Stack3	The third longword on the DEMNA CVAX stack.
Stack4	The fourth longword on the DEMNA CVAX stack.
Stack5	The fifth longword on the DEMNA CVAX stack.
Stack6	The sixth longword on the DEMNA CVAX stack.

```
>>> SHOW ERROR S1
-- 08-00-2B-00-00-01 -- Soft Error Block #  1 -- 01-JAN-1988 00:00:00 --

Tran1/    00001440
Tran2/    0100003C
Tran3/    00FFFFFF
Tran4/    00000234
XBE/      8000A0E4
XFADR/    1FFFFE00
XFAER/    100F0000
```

Table 2–4 Soft Error Block Screen—Parameter Definitions

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Soft Error Block #	The nonfatal error block that is being displayed.
Date and time	The date and time at which the error occurred.
Tran1	For a datamove operation: datamove register DMPOR. For a peek operation: peek register PKXMIL.
Tran2	For a datamove operation: datamove register DMCSR. For a peek operation: peek register PKXMIH.
Tran3	For a datamove operation: datamove register DMXMI. For a peek operation: peek register PKDATA.
Tran4	For a datamove operation: datamove register DMNPA. For a peek operation: peek register PKDATB.
XBE	Bus Error Register (also know as the XBER).
XFADR	Failing Address Register.
XFAER	Failing Address Extension Register.

```
4   XNA>SHOW HISTORY

    -- 08-00-2B-00-00-01 -- Error History Summary -- 01-JAN-1988 01:05:17 --

 #         Date              Type  Seq     #         Date              Type  Seq
---  --------------------    ----  -----   ---  --------------------   ----  -----
 1)  01-JAN-1988 00:07:06    Mck       4   17)  01-JAN-1988 00:00:00   None      0
 2)  01-JAN-1988 00:32:31    Mck       8   18)  01-JAN-1988 00:00:00   None      0
 3)  01-JAN-1988 00:19:06    Mck       6   19)  01-JAN-1988 00:00:00   None      0
 4)  01-JAN-1988 00:00:00    None      0   20)  01-JAN-1988 00:00:00   None      0
 5)  01-JAN-1988 00:00:00    None      0   21)  01-JAN-1988 00:00:00   None      0
 6)  01-JAN-1988 00:26:51    Mck       7   22)  01-JAN-1988 00:00:00   None      0
 7)  01-JAN-1988 00:00:00    None      0   23)  01-JAN-1988 00:00:00   None      0
 8)  01-JAN-1988 00:00:00    None      0   24)  01-JAN-1988 00:00:00   None      0

 9)  01-JAN-1988 00:00:00    None      0   25)  01-JAN-1988 12:59:17   FUpd      2
10)  01-JAN-1988 00:00:00    None      0   26)  01-JAN-1988 00:00:00   None      0
11)  01-JAN-1988 00:00:00    None      0   27)  01-JAN-1988 00:00:00   None      0
12)  01-JAN-1988 00:00:00    None      0   28)  01-JAN-1988 00:18:12   FUpd      3
13)  01-JAN-1988 00:00:00    None      0   29)  01-JAN-1988 00:00:00   None      0
14)  01-JAN-1988 00:00:00    None      0   30)  01-JAN-1988 00:00:00   None      0
15)  01-JAN-1988 00:00:00    None      0   31)  01-JAN-1988 00:00:00   None      0
16)  01-JAN-1988 00:00:00    None      0
```

Table 2–5 History Screen—Parameter Definitions

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Date and time	The current date and time.
#	The entry number. The EEPROM has 31 history entries.
Date	The date and time at which the entry was made. For the *None* entry type (no entry), the date and time are always 01-JAN-1988 00:00:00.
Type	The type of entry.
Seq	A number indicating the order in which the entry was made. Lower-numbered entries were made before higher-numbered entries.

```
5   XNA>SHOW HISTORY 1
    -- 08-00-2B-00-00-01 -- Error History #  1 -- 01-JAN-1988 01:05:17 --

    Type:  Machine Check
    Date:  01-JAN-1988 00:00:54
    Number of times this event occurred:    1
    Saved Data:   00000B01
                  00009014
                  00000080
                  EFF00004
                  D0E0FC80
```

Table 2–6 History Entry Screen

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Error History #	The number of the history entry.
Date and time	The current date and time.
Type	The type of error recorded. (This example shows a machine check entry.)
Date	The date and time when the history entry was logged.
Number of times this event occurred	The number of times this particular error type has occurred since error history in EEPROM was cleared.
Saved data	Error data specific to the type of history entry.

Example 5 above shows a sample report for a machine check history entry. See Appendix D for a description of the data displayed for each type of history entry.

```
6   XNA>SHOW IMAGE

    -- 08-00-2B-00-00-01 -- Firmware Image Data -- 01-JAN-1988 01:08:26 --

    EEPROM Firmware image date:     09-AUG-1989
    EEPROM Firmware revision:              000B

    EPROM Firmware image date:      07-AUG-1989
    EPROM Firmware revision:               0009

    Module serial number:          *SG909FF916*
```

Table 2–7 Image Screen—Parameter Definitions

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Date and time	The current date and time.
EEPROM firmware image date	The firmware revision date for the image in EEPROM.
EEPROM firmware revision	The firmware revision number for the image in EEPROM.
EPROM firmware image date	The firmware revision date for the image in EPROM.
EPROM firmware revision	The firmware revision number for the image in EPROM.
Module serial number	The module serial number is a 12-character ASCII field that identifies the module.

```
7   XNA>SHOW NETWORK

    -- 08-00-2B-00-00-01 -- Network -- 01-JAN-1988 01:02:41 --

                  - 2999996 usecs --   7.4% NI--  -- 00:00:06 --   1.5% NI--
#   User              Pks/Sec  Byt/Pk  %NI-Cur    Packets    Bytes(k) %NI-Tot
-   ---------         -------  ------  -------    -------    -------- -------
1   60-07 NISca           328     211     6.5%       1959          49    1.1%
2   60-03*Decnet           70     155     1.0%        424           9    0.2%
3   60-04 Lat              20     106     0.2%        109           2    0.0%
4   60-02 MopRC            14      94     0.1%         95           1    0.0%
5   80-3F LTM               0    1490     0.0%          2           0    0.0%
6   08-00 IP                1      98     0.0%          3           0    0.0%

#   Nodes             Pks/Sec  Byt/Pk  %NI-Cur    Packets    Bytes(k) %NI-Tot
-   ---------         -------  ------  -------    -------    -------- -------
1   11.111                122     412     4.3%        796          10    0.5%
2   11.112                119     413     4.3%        754          10    0.5%
3   AB-00-00-03-00-00      28     238     0.6%        171           0    0.0%
4   11.113                 37     143     0.5%        216           0    0.1%
5   11.114                 43      94     0.4%        254           0    0.1%
6   11.115                 39      98     0.4%        246           0    0.1%
7   11.116                 13     161     0.2%         41           0    0.0%
```

Table 2–8 Network Screen—Parameter Definitions

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Date and time	The current date and time.
usecs	The length of the last interval (in microseconds) for which the following network parameters were recorded: Pks/Sec, Byt/Pk, %NI-Cur. If only one user is accessing the Network screen, the interval should be close to the nominal 3 seconds. However, if more than one user is accessing the Network screen, the interval may vary significantly from nominal.
% NI	The percentage of maximum Ethernet bandwidth consumed by all nodes on the network during the last interval.
Time	The cumulative time (in seconds) for which the following network parameters have been recorded: Packets, Bytes (k), %NI-Tot.

Table 2–8 (Cont.) Network Screen—Parameter Definitions

Parameter	Description
% NI	The percentage of maximum Ethernet bandwidth (including preamble, header,[1] user data, CRC, and interpacket gaps) consumed by all nodes on the network during the cumulative time indicated in the Time field.
#	For the User column: the six network users that generated the most network traffic (reads and/or writes) during the last recording interval. The users are ranked in descending order. For the Nodes column: the seven nodes that generated the most network traffic (reads and/or writes) during the last recording interval. The nodes are ranked in descending order. When the Accumulated Network screen is displayed, the users and nodes are ranked according to bytes/sec (Pks/Sec * Byt/Pk) for the interval indicated by the usecs field. (Bytes/sec does not include preamble or interpacket gaps.) When the interval Network screen is displayed, the users and nodes are ranked according to kilobytes (Bytes (k)) for the cumulative time indicated by the Time field. (Bytes (k) does not include preamble or interpacket gaps.)
User	The user designator (protocol type, SAP, or SNAP SAP protocol identifier) for the six most active network users. A user designator is followed by the user name. A user name is supplied only for the following Ethernet users: ARP, BIOS, Bridge, DECnet, Diag, DName, DTime, ELN, Encry, Lat, LAST, Loop, MopRC, NISca, User. The 802 SNAP SAP user is identified by an asterisk (*) after the SNAP SAP protocol identifier.
Nodes	The DECnet address or Ethernet address for the seven most active network nodes.
Pks/Sec	The average number of packets transmitted or received per second per user or per node.
Byt/Pk	The average number of bytes (header[1] + user data + CRC) transmitted or received per user or per node.
%NI-Cur	The percentage of maximum Ethernet bandwidth (including preamble, header,[1] user data, CRC, and interpacket gaps) consumed by each user or node on the network during the last interval indicated by the usecs field.
Packets	The cumulative number of packets transmitted or received per user or per node.

[1] The header consists of the destination address and the source address.

Table 2–8 (Cont.) Network Screen—Parameter Definitions

Parameter	Description
Bytes(k)	The cumulative number of kilobytes (header[1] + user data + CRC) transmitted or received per user or per node.
%NI-Tot	The per-user or per-node percentage of maximum Ethernet bandwidth (including preamble, header,[1] user data, CRC, and interpacket gaps) consumed during the cumulative time indicated by the Time field.

[1]The header consists of the destination address and the source address.

```
8   XNA>SHOW STATUS

-- 28.110            -- Status -- 25-OCT-1989 16:17:01 -- Uptime:   06:18:40

-- NI Statistics -------   -- NI Counters ---------   --Process---   --XMI---
Bytes/Pk ..... 85          BytesSnt ..... 46271442   Null   97.6%   0   0.0%
Bytes/Xmt ..... 103        BytesRcv ..... 43236506   Port    0.0%   1   3.3%
Bytes/Rcv ..... 72         MBytesSnt ..... 582131    Xmt-Ln  0.3%   2   5.0%
Pk/Sec ..... 34            MBytesRcv ..... 6751116   Xmt-Hs  0.0%   3   0.3%
Xmt/Sec ..... 13           PkSnt ..... 404207        Rcv-Ln  2.0%   4   1.6%
Rcv/Sec ..... 20           PkRcv ..... 526404        Rcv-Hs  0.0%   5   5.3%
MBaudRate .... 0.012362    MPkSnt ..... 9479         Cmd-Hs  0.0%   6   0.0%
Interrupts ..... 849302    MPkRcv ..... 106455       Mon     0.0%   7   0.0%
Interrupts/sec ..... 0                               Cons    0.0%   8   0.0%
                                                                    9   0.0%
-- Total NI Traffic ---    -- Error Summary -------   --Buffers--   A   0.0%
Bytes/Pk ..... 107         Xmt/Wire ..... 0          Rcv .... 0     B   0.0%
Pk/Sec ..... 595           Rcv/Wire ..... 0          Xmt .... 0     C   0.0%
ThisNI + Other = TotBaud   Rcv/Validation ..... 0                   D   0.0%
  0.2% +  5.7% =    6.0%   Rcv/NoBuffers ..... 1346  --XNA Bus---   E  84.3%
                                                     LANCE   1.6%   F   0.0%
                                                     XNAGA   0.0%
```

Table 2–9 Status Screen—Parameter Definitions

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Date and time	The current date and time.

Table 2–9 (Cont.) Status Screen—Parameter Definitions

Parameter	Description
Uptime	The time since the DEMNA was last reset, expressed in hours, minutes, and seconds.
NI Statistics	
Bytes/Pk	The average number of bytes per packet (transmit or receive) during the last 3 seconds. This number includes header,[1] user data, and CRC bytes.
Bytes/Xmt	The average number of bytes per transmit packet during the last 3 seconds. This number includes header,[1] user data, and CRC bytes.
Bytes/Rcv	The average number of bytes per receive packet during the last 3 seconds. This number includes header,[1] user data, and CRC bytes.
Pk/Sec	The number of packets transmitted and received per second during the last 3 seconds.
Xmt/Sec	The number of packets transmitted per second during the last 3 seconds.
Rcv/Sec	The number of packets received per second during the last 3 seconds.
MBaudRate	The megabaud rate for the DEMNA (transmits plus receives) during the last 3 seconds. The baud rate is calculated for header,[1] user data, and CRC bytes but not interpacket gaps or preamble.
Interrupts	The number of DEMNA-generated interrupts, including both error and port interrupts.
Interrupts/sec	The number of DEMNA-generated interrupts that occurred during the last 3 seconds.
Total NI Traffic	
Bytes/Pk	The average number of bytes per packet on the network during the last 3 seconds. This number includes header,[1] user data, and CRC bytes.
Pk/Sec	The average number of packets per second on the network during the last 3 seconds. This number includes all packets on the network.

[1] The header consists of the destination address and the source address.

Table 2–9 (Cont.) Status Screen—Parameter Definitions

Parameter	Description
ThisNI	The percentage of network bandwidth (preamble, header,[1] user data, CRC, and interpacket gaps) consumed by DEMNA-related traffic (transmits and receives) during the last 3 seconds.
Other	The percentage of network bandwidth (preamble, header,[1] user data, CRC, interpacket gaps) consumed by traffic (transmits and receives) related to other nodes during the last 3 seconds.
TotBaud	The sum of ThisNI and Other, which is equal to the percentage of network bandwidth (preamble, header,[1] user data, CRC, and interpacket gaps) consumed by all nodes during the last 3 seconds.
NI Counters	
BytesRcv	The number of user data bytes received without error. This number does not include header or CRC bytes.
BytesSnt	The number of user data bytes transmitted without error. This number does not include header or CRC bytes.
MBytesRcv	The number of user data bytes in multicast packets received without error. This number does not include header or CRC bytes.
MBytesSnt	The number of user data bytes in multicast packets transmitted without error. This number does not include header or CRC bytes.
PkSnt	The number of packets transmitted without error. This number includes all Xmt/Def packets (packets transmitted successfully after transmission was deferred because of Ethernet traffic), all Xmt/One packets (packets transmitted without error after a single collision-and-backoff sequence), and all Xmt/Mul packets (packets transmitted successfully on the third or subsequent attempt).
PkRcv	The number of packets received without error. This includes those packets that have passed all the port's filtering and validation checks, as well as MOP packets and loopback packets addressed to the DEMNA.

[1]The header consists of the destination address and the source address.

Table 2–9 (Cont.) Status Screen—Parameter Definitions

Parameter	Description
MPkSnt	The number of multicast packets transmitted without error. This number includes all Xmt/Def multicast packets (multicast packets transmitted successfully after transmission was deferred because of Ethernet traffic), all Xmt/One multicast packets (multicast packets transmitted without error after a single collision-and-backoff sequence), and all Xmt/Mul multicast packets (multicast packets transmitted successfully on the third or subsequent attempt).
MpkRcv	The number of multicast packets received without error. This includes those multicast packets that have passed all the port's filtering and validation checks, as well as MOP packets and loopback packets addressed to the DEMNA.
Error Summary	
Xmt/Wire	The sum of the following transmit errors: maximum number of retries exceeded (Rtry), lost carrier (LCar), late collision (LCol), maximum length exceeded (MLen), collision check test (CTest), transmit timeout (Timeout).
Rcv/Wire	The sum of the following receive errors: CRC error (Crc), framing error (Frame), maximum length exceeded (MLen) error, and invalid (Invalid) error.
Rcv/Validation	The number of receive packets that had one more of the following filtering/validation errors: the packet was longer than the maximum size requested by the destination user (SizeFilter), the packet had a multicast source address (SrcMCA), an 802 packet was longer than the length implied by the packet's Length field (Long802), an 802 packet was shorter than the length implied by the packet's Length field (Short802), a nonmulticast packet was addressed to the port's physical address but had a user designator (protocol type, DSAP, SSAP, or protocol identifier) not recognized by the port (Urfd).
Rcv/NoBuffers	The number of receive packets discarded due to one or more of the following resource errors: a system buffer was unavailable within 3 seconds or no internal buffering was available (Sbua), no user buffer was available (Ubua), the DEMNA port looked for but did not obtain a system buffer (NoRcvBuff), there was no available receive buffer in DEMNA memory (Missed), the DEMNA hardware or firmware was unable to keep up with the data rate (DOR).

Table 2–9 (Cont.) Status Screen—Parameter Definitions

Parameter	Description
Process Statistics	
Null	The percentage of CVAX time used by the kernel and/or scheduler (collectively called the Null process) in the last 3 seconds. The time spent in the null process is idle time.
Port	The percentage of CVAX time used by the Port firmware process in the last 3 seconds.
Xmt-Ln	The percentage of CVAX time used by the LanceXmt firmware process in the last 3 seconds.
Xmt-Hs	The percentage of CVAX time used by the HostXmt firmware process in the last 3 seconds.
Rcv-Ln	The percentage of CVAX time used by the LanceRcv firmware process in the last 3 seconds.
Rcv-Hs	The percentage of CVAX time used by the HostRcv firmware process in the last 3 seconds.
Cmd-Hs	The percentage of CVAX time used by the Command firmware process in the last 3 seconds.
Mon	The percentage of CVAX time used by the Monitor firmware process in the last 3 seconds.
Cons	The percentage of CVAX time used by the Console firmware process in the last 3 seconds.
Buffers in Use	
Rcv	The number of DEMNA-internal receive buffers in use when sampled during the last 3 seconds. Maximum number of receive buffers = 826.
Xmt	The number of DEMNA-internal transmit buffers in use when sampled during the last 3 seconds. Maximum number of transmit buffers = 32.
XNA Bus	
LANCE	The percentage of total XNA memory bus traffic generated by the LANCE during the last 3 seconds.
XNAGA	The percentage of total XNA memory bus traffic generated by the DEMNA gate array during the last 3 seconds.

Table 2–9 (Cont.) Status Screen—Parameter Definitions

Parameter	Description
	XMI
0 ... F	The percentage of existing XMI bus traffic generated by the corresponding XMI node (0–F) during the last 3 seconds. The combined percentages for all nodes should nominally add up to 100%. Note that these percentages pertain to existing XMI bus traffic, not to the maximum possible XMI bus traffic. For example, if XNA% = 8, then the DEMNA was consuming 8% of the existing XMI bus traffic during the 3-second interval. To roughly determine the percentage of maximum possible XMI bus traffic consumed by all XMI nodes during a 3-second interval, use the following formula: $$\frac{Pk/Sec * (24 + Bytes/Pk)}{XNA\ Percentage * 10^4} = XMI\ Percentage$$ For example, if Pk/Sec = 1,000, Bytes/Pk = 500, and XNA% = 8, then the total XMI bus traffic consumed by all XMI nodes during the 3-second interval was as follows: $$\frac{1000 * (24 + 500)}{8 * 10^4} = 6.55$$ The DEMNA thus consumed .524 % (8% of 6.55%) of the maximum possible XMI bus traffic during the 3-second interval.

```
9   XNA>SHOW STATUS/ERROR

-- 08-00-2B-00-00-01 -- Status -- 01-JAN-1988 19:02:06 -- Uptime:   19:02:06

-- Rcv Counters --------   -- Xmt Counters --------   -- Lance Counters ------
BytesRcv .... 6327084034   BytesSnt .... 6327280698   Lan/Restart ......... 0
PkRcv ......... 17462507   PkSnt ......... 17465275   Lan/UOflo ........... 0
Rcv/MCAUrfd ..... 114323   Xmt/Def ............ 769   Lan/TRxoff .......... 0
Rcv/SizeFilter ......   0   Xmt/One ............ 123   Lan/Merr ............ 0
Rcv/SrcMCA ..........   0   Xmt/Mul ............ 132   Lan/TxRx ............ 0
Misc/Cnt1 ...........   0   Xmt/Rtry ............   0   Rcv/Buffer .......... 19
Rcv/Invalid .........   8   Xmt/LCar ............   0   Rcv/NoSTP ........... 0
Rcv/Short802 ........   4   Xmt/LCol ............   0   -- Misc Counters ------
Rcv/Long802 ........ 136   Xmt/MLen ............   0   Err/HostXfer ........ 0
Rcv/Missed .......... 24   Xmt/CTest ...........   0   RX/NoRxBuf .......... 0
Rcv/Dor ............. 24   Xmt/Timeout .........   0   RX/XmtRngFull ....... 0
Rcv/NoRcvBuf ........   0   ---------------- Saved Error Data ----------------
Rcv/Stale ...........   0   Rtry at ........... None   LCol at ........... None
Rcv/Ubua ............   0   LCar at ........... None   CTst at ........... None
Rcv/Sbua ............   0   Sbua at ........... None
Rcv/Crc+Frame........   0   Crc  at ........... None
Rcv/MLen ............   0   MLen at ........... None
Rcv/Urfd .......... 2686   01-JAN-1988 19:02:05  60-02 MopRC  11.111
```

Table 2–10 Status/Error Screen—Parameter Definitions

Parameter	Description
Ethernet Address	The DEMNA's actual physical address (APA).
Date and Time	The current date and time.
Uptime	The time since the DEMNA was last reset, expressed in hours, minutes, and seconds.
Rcv Counters	
BytesRcv	The number of user data bytes received without error. This number does not include header or CRC bytes.
PkRcv	The number of packets received without error. This number includes those packets that have passed all the port's filtering and validation checks, as well as MOP packets and loopback packets addressed to the DEMNA.
Rcv/MCAUrfd	The number of multicast packets discarded because the packet's user designator (protocol type, DSAP, SSAP, or SNAP SAP protocol identifier) was not enabled for any of the users defined to the port.

Table 2–10 (Cont.) Status/Error Screen—Parameter Definitions

Parameter	Description
SizeFilter	The number of receive packets longer than the maximum size requested by the destination user.
Rcv/SrcMCA	The number of packets received with multicast source addresses. A multicast address is illegal for source addresses.
Misc/Cnt1	Miscellaneous counter 1. An unused counter reserved for future use.
Rcv/Invalid	The number of 802 receive packets that were so short that nothing else could be determined about the packet.
Rcv/Short802	The number of 802 packets whose length was shorter than that implied by the packet's Length field.
Rcv/Long802	The number of 802 packets whose length was longer than that implied by the packet's Length field.
Rcv/Missed	The number of times the LANCE reported a missed error. A missed error occurs when the LANCE discards one or more packets because no receive buffer is available in DEMNA memory.
Rcv/Dor	The number of receive packets discarded by the firmware because the DEMNA hardware or firmware was unable to keep up with the data rate.
NoRcvBuf	The number of times the port looked for but did not obtain a system buffer.
Rcv/Stale	The number of receive packets discarded because a system buffer was unavailable (SBUA) within 3 seconds.
Rcv/Ubua	The number of receive packets discarded because a user buffer was unavailable (UBUA). This counter is maintained by the port driver.
Rcv/Sbua	The number of receive packets discarded by the firmware because a system buffer was unavailable.
Rcv/Crc+Frame	The number of receive packets that had either a CRC error (Rcv/Crc) or a framing error (Rcv/Frame). A CRC error occurs when the packet CRC calculated by the LANCE does not match the CRC value specified in the packet. A framing error occurs when a packet was not framed on a byte boundary.
Rcv/MLen	The number of Ethernet receive packets whose length is longer than 1518 bytes.

Table 2–10 (Cont.) Status/Error Screen—Parameter Definitions

Parameter	Description
Rcv/Urfd	The number of nonmulticast receive packets discarded because the user designator (protocol type, DSAP, SSAP, or protocol identifier) was not recognized by the port. (The packet was, however, addressed to a physical address enabled by the port.)
Xmt Counters	
BytesSnt	The number of user data bytes transmitted without error. This number does not include header or CRC bytes.
PkSnt	The number of packets transmitted without error. This number includes all Xmt/Def packets (packets transmitted successfully after transmission was deferred because of Ethernet traffic), all Xmt/One packets (packets transmitted without error after a single collision-and-backoff sequence), and all Xmt/Mul packets (packets transmitted successfully on the third or subsequent attempt).
Xmt/Def	The number of packets transmitted without error after transmission is delayed once. (The packet is transmitted successfully on the second attempt.)
Xmt/One	The number of packets transmitted without error after a single collision-and-backoff sequence. (The packet is transmitted successfully on the second attempt.)
Xmt/Mul	The number of packets transmitted without error after more than one collision-and-backoff sequence. (The packet is transmitted successfully on the third or subsequent attempt.)
Xmt/Rtry	The number of packets that could not be transmitted because the maximum number of transmission retries (16) was exceeded.
Xmt/LCar	The number of packets that failed transmission because the LANCE could not detect the carrier during transmission.
Xmt/LCol	The number of packets that failed transmission because of a late collision.
Xmt/MLen	The number of packets that failed transmission because the total packet length was longer than the maximum allowable size.
Xmt/CTest	The number of times the LANCE did not detect the Collision Detect signal generated by the Ethernet transceiver to which the DEMNA is connected.

Table 2–10 (Cont.) Status/Error Screen—Parameter Definitions

Parameter	Description
Xmt/Timeout	The number of times the LANCE failed to complete transmission of a packet within 800 milliseconds.
LANCE Counters	
Lan/Restart	The number of times the DEMNA firmware restarted the LANCE.
Lan/UOflo	The number of transmit underflow errors plus the number of receive overflow errors detected by the LANCE.
Lan/TRxoff	The number of times the firmware noticed that the LANCE transceiver or receiver was turned off when it should have been on.
Lan/Merr	The number of memory errors detected by the LANCE.
Lan/TxRx	The number of nonloopback receive packets whose source address is the same as the DEMNA's actual physical address (APA).
Rcv/Buffer	The number of times th. the LANCE reported a buffer error in a receive buffer descriptor.
Lan/NoSTP	The number of buffer descriptors that did not have a start-of-packet indicator when the LANCE expected such descriptors..
Miscellaneous Counters	
Err/HostXfer	The number of transfer errors that occurred during a transfer to or from host memory.
RX/NoRxBuf	The number of packets that could not be transmitted in response to a MOP or loopback message because no LANCE transmit buffers were available.
RX/XmtRngFull	The number of packets that could not be transmitted in response to a MOP or loopback message because no LANCE transmit ring entries were available.
Saved Error Data	
Rtry at	The date and time at which the last Xmt/Rtry error occurred.
LCar at	The date and time at which the last Xmt/LCar error occurred.

Table 2–10 (Cont.) Status/Error Screen—Parameter Definitions

Parameter	Description
Sbua at	The date and time at which the last Rcv/Sbua error occurred, followed by the user designator (protocol type, SAP, or SNAP SAP protocol identifier), name, and address (DECnet or Ethernet) of the node that sent the packet. The 802 SNAP SAP user is identified by an asterisk (*) after the SNAP SAP protocol identifier.
Crc at	The date and time at which the last Rcv/Crc error occurred, followed by the user designator (protocol type, SAP, or SNAP SAP protocol identifier), name, and address (DECnet or Ethernet) of the node that sent the packet. The 802 SNAP SAP user is identified by an asterisk (*) after the SNAP SAP protocol identifier. The "Crc at" field records bad-CRC packets even if such packets are not addressed to the DEMNA. The Rcv/Crc+Frame counter, however, records only packets that are addressed to the DEMNA. Thus, if the "CRC at" field displays information but no error is recorded in the Rcv/Crc+Frame counter, the detected bad-CRC packet was not addressed to the DEMNA.
Mlen at	The date and time at which the last Rcv/Mlen error occurred, followed by the user designator (protocol type, SAP, or SNAP SAP protocol identifier), name, and address (DECnet or Ethernet) of the node that sent the packet. The 802 SNAP SAP user is identified by an asterisk (*) after the SNAP SAP protocol identifier.
Urfd at	The date and time at which the last Rcv/Urfd error occurred, followed by the user designator (protocol type, SAP, or SNAP SAP protocol identifier), name, and address (DECnet or Ethernet) of the node that sent the packet. The 802 SNAP SAP user is identified by an asterisk (*) after the SNAP SAP protocol identifier.
LCol at	The date and time at which the last Xmt/LCol error occurred.
CTst at	The date and time at which the last Xmt/CTst error occurred.

```
10  XNA>SHOW STATUS/INTERVAL

-- 28.101            -- Status -- 25-OCT-1989 16:17:01 -- Uptime:   06:18:40
                        -- Interval Counters --
-- NI Statistics -------   -- NI Counters ---------   --Process---   --XMI---
Bytes/Pk ..... 85          BytesSnt ..... 46271442   Null   97.6%   0   0.0%
Bytes/Xmt ..... 103        BytesRcv ..... 43236506   Port    0.0%   1   3.3%
Bytes/Rcv ..... 72         MBytesSnt ..... 582131    Xmt-Ln  0.3%   2   5.0%
Pk/Sec ..... 34            MBytesRcv ..... 6751116   Xmt-Hs  0.0%   3   0.3%
Xmt/Sec ..... 13           PkSnt ..... 404207        Rcv-Ln  2.0%   4   1.6%
Rcv/Sec ..... 20           PkRcv ..... 526404        Rcv-Hs  0.0%   5   5.3%
MBaudRate .... 0.012362    MPkSnt ..... 9479         Cmd-Hs  0.0%   6   0.0%
Interrupts ..... 849302    MPkRcv ..... 106455       Mon     0.0%   7   0.0%
Interrupts/sec ..... 0                               Cons    0.0%   8   0.0%
                                                                    9   0.0%
-- Total NI Traffic ---    -- Error Summary -------   --Buffers--   A   0.0%
Bytes/Pk ..... 107         Xmt/Wire ..... 0          Rcv .... 0    B   0.0%
Pk/Sec ..... 595           Rcv/Wire ..... 0          Xmt .... 0    C   0.0%
ThisNI + Other = TotBaud   Rcv/Validation ..... 0                  D   0.0%
  0.2% +  5.7% =    6.0%   Rcv/NoBuffers ..... 1346  --XNA Bus---  E  84.3%
                                                     LANCE   1.6%  F   0.0%
                                                     XNAGA   0.0%
```

The Status/Interval screen displays the same screen as the SHOW STATUS command. The only difference between the two screens is the time interval for which the NI counters and the Error Summary counters record events. In the Show Status screen, these counters record events from the last reset of the DEMNA module. In the Show Status/Interval screen, these counters record events starting when the SHOW STATUS/INTERVAL command is entered.

```
11  XNA>SHOW USER

-- 08-00-2B-00-00-01 -- User Data -- 01-JAN-1988 00:24:14 --

#    Ptt/Sap/PI      MaxX  MinX  MaxR  Strt  Stop  Size Pad Cls Prm Bdc Unk Amc
-  -------------     ----  ----  ----  ----  ----  ---- --- --- --- --- --- ---
0  Eth-80-00         1514    14  1518     1     0    N   N   -   N   N   N   N
1  802SAP-22         1514    14  1518     1     0    Y   N   1   N   N   N   N
2  08-00-00-00-03    1514    14  1518     1     0    Y   N   1   N   N   N   N
```

Table 2–11 User Screen

Parameter	Description
Ethernet Address	The DEMNA's actual physical address (APA).
Date and Time	The current date and time.
#	The user index.
Ptt/Sap/PI	The user designator (protocol type, SAP, or SNAP SAP protocol identifier) for the user. *Eth* indicates an Ethernet user. (See Appendix C for the most commonly used Ethernet protocol types.) *802SAP* indicates an 802 SAP user. Five 2-digit sets of hex numbers (xx-xx-xx-xx-xx) indicate an 802 SNAP SAP user.
MaxX	The maximum allowable size for transmit packets.
MinX	The minimum allowable size for transmit packets.
MaxR	The maximum receive size specified for the user.
Strt	The number of times since the last power-up or reset that the user has been started by the firmware.
Stop	The number of times since the last power-up or reset that the user has been stopped by the firmware.
Size	Indicates whether the DEMNA port expects receive packets sent to the user to have a Length field. The port uses this field to validate the packet length. Y = yes; N = no.
Pad	Indicates whether padding is enabled for the user: Y = yes; N = no.
Cls	Indicates the class (1 or 2) of an 802 user. Valid only for an 802 user.
Prm	Indicates whether the user is operating in promiscuous mode: Y = yes; N = no.
Bdc	Indicates whether the user accepts broadcast packets: Y = yes; N = no.

Table 2–11 (Cont.) User Screen

Parameter	Description
Unk	Indicates whether the user is the unknown user: Y = yes; N = no.
Amc	Indicates whether the user accepts packets addressed to *any* multicast address: Y = yes; N = no.

```
12  XNA>SHOW XPUD

-- 08-00-2B-00-00-01 -- Powerup Diagnostic Register -- 01-JAN-1988 01:09:35 --

Actual XPUD = FFFFC007                    Expected good value = FFFFC007

Bit     Set if...                         Bit     Set if...
---  ------------------------------       ---  ------------------------------
0  - Firmware init complete               16 - LANCE Test passed
1  - LANCE External Loopback              17 - Shared Parity RAM Test passed
2  - EEPROM loaded into RAM               18 - Shared RAM March Test passed
3  - EPROM loaded into RAM                19 - XNADAL Timeout Logic Test passed
4  - Diagnostic patch table is bad        20 - XNADAL Readback Test passed
5  - EEPROM error history exists          21 - EEPROM Test passed
6  - Reserved                             22 - ENET PROM Test passed
7  - Reserved                             23 - CVAX Chip Test passed
8  - Reserved                             24 - CVAX Parity RAM Test passed
9  - Reserved                             25 - CVAX RAM March Test passed
10 - Reserved                             26 - Console Drivers Test passed
11 - Reserved                             27 - SSC Test passed
12 - Reserved                             28 - Diagnostic Register test passed
13 - Reserved                             29 - CVAX Interrupt Lines Test passed
14 - XNAGA Test passed                    30 - Boot Rom Test passed
15 - Eth Subsystem Parity Test passed     31 - Self Test Complete
```

Table 2–12 XPUD Screen—Parameter Definitions

Parameter	Description
Date and Time	The current date and time.
Actual XPUD	The Power-Up Diagnostic (XPUD) Register contents in hexadecimal.
Expected good value	The hexadecimal value that the XPUD Register should contain if all DEMNA self-test routines passed. Note that the expected good value can also be FFFFC027 if there is an entry in the EEPROM error history.
bit 0 ... bit 31	Explanations of all significant bits in the XPUD Register.

T/R

The T/R command invokes the DEMNA diagnostic monitor, from which the DEMNA ROM-based diagnostics (RBDs) can be run. (See the *DEC LANcontroller 400 Technical Manual* for further information on the DEMNA RBDs). The diagnostic monitor displays the following prompt: RBD*n*, where *n* is the DEMNA's XMI node number.

This command is valid only under the following circumstances:

- When entered from the physical console attached directly to the DEMNA module
- When the DEMNA is in the uninitialized state. To put the DEMNA in the uninitialized state, stop all applications that are using the DEMNA or reset the system with auto start off.

The command cannot be used from a networked terminal (either local or remote).

Format

T/R

Example

```
XNA>T/R


RBD3>
```

2.6 Console Command Language Control Characters

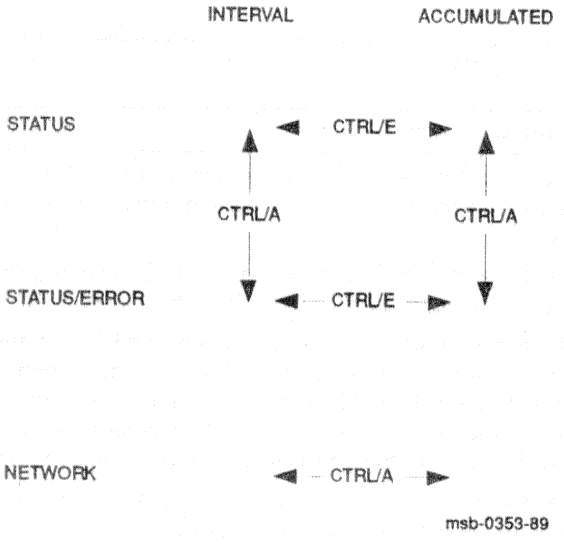
Six ASCII control characters have special meaning to the DEMNA console monitor program. Table 2–13 describes these control characters.

Table 2–13 Console Control Characters

Character	Function
CTRL/A	Alternates between a Status screen and a Status/Error screen or between an Interval Network screen and an Accumulated Network screen.
CTRL/D	Disconnects the console and exits to the system prompt. Has no effect when used on the DEMNA's physical console.
CTRL/E	Alternates between the Status screen and the Status/Interval screen or between the Interval Status/Error screen and the Accumulated Status/Error screen. Valid only when one of these screens is being displayed. If such a screen is not displayed, entering this control character invokes a Status screen.
CTRL/L	Retrieves the last console command line that was entered. The last four command lines can be retrieved.
CTRL/U	Clears the current console command line.
CTRL/W	Refreshes the screen during the display of a Status, Status/Error, Status/Interval, or Network screen. If entered when such a screen is not being displayed, clears the screen and displays a Status screen.

Figure 2–1 shows how CTRL/A and CTRL/E can be used to go from one screen to another.

Figure 2–1 Using Control Characters to Switch Screens



2.7 How to Use the Status Screens

The three Status screens accessible through the SHOW command convey a great deal of information that may not be readily apparent. The best way to use these screens is to look at *sets* of counters rather than at individual counters in isolation. This section describes various sets of Status screen counters and suggests how to use them as diagnostic and network management tools.

In general, the Status screen counters can be divided into two main groups:

- Counters that convey error information
- Counters that indicate how resources are being used

The sets of counters within these two main groups are described below. A set of counters is described by showing a picture of the appropriate Status screen(s) with the relevant counters highlighted.

2.7.1 Error Information

Table 2–14 describes the types of errors monitored by the Status screen counters, as well as additional error information provided by these counters. There is one set of counters for each error type or class of supplemental error information.

Table 2–14 Error Information Provided by Status Screen Counters

Error Type/Error Information	Description
Ethernet errors	Errors that occur because of problems on the Ethernet wire. Examples of such errors include late collisions on transmits and CRC errors on receives.
Packet filtering/validation errors	Errors that the port discovers when filtering and performing validation checks on transmit and receive packets. Such errors include frame length errors and packets that do not filter to enabled port users.
Lack-of-resource errors	Errors that occur when there are insufficient resources to process valid receive packets. Such errors include data overrun errors and a lack of user buffers.

Table 2–14 (Cont.) Error Information Provided by Status Screen Counters

Error Type/Error Information	Description
Time/user information	Time and/or user information pertinent to particular errors or to overall DEMNA operation.
LANCE errors	Errors recorded by the LANCE chip.
Firmware debug information	Information useful only for debugging the DEMNA firmware.

Notice that the first three error types listed above—Ethernet errors, packet filtering/validation errors, and lack-of-resource errors—trace the progress of a packet through the three major segments of a receive operation:

1 Receiving the packet from the Ethernet

2 Filtering and validating the packet

3 Transferring the packet to the port driver and higher-level users

2.7.1.1 Ethernet Error Counters

These counters record errors resulting from problems on the Ethernet wire. The Xmt/Wire and Rcv/Wire counters in the Status and Status/Interval screens are error summary counters that respectively indicate the total number of transmit and receive errors recorded by the highlighted counters in the Status/Error screen.

NOTE

The Xmit/Wire counter records Xmit/Mlen errors even though such errors are validation errors rather than Ethernet errors. The Xmit/Wire counter is used to record Xmit/Mlen errors because it is the only summary counter available for transmit errors.

Status and Status/Interval Screens

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:01:19 -- Uptime:    01:43:35

-- NI Statistics -------
Bytes/Pk ..... 64
Bytes/Xmt ..... 64
Bytes/Rcv ..... 64
Pk/Sec ..... 510
Xmt/Sec ..... 255
Rcv/Sec ..... 255
MBaudRate ..... 0.274471
Interrupts ... 104599634
Interrupts/Sec .... 255

-- Total NI Traffic ----
Bytes/Pk ..... 237
Pk/Sec ..... 1418
ThisNI + Other = TotBaud
  3.5% + 26.0% =   29.5%

-- NI Counters ---------
BytesSnt .... 6327255447
BytesRcv .... 6327084034
MbytesSnt ..... 20470
MbytesRcv ..... 0
PkSnt ..... 17464886
PkRcv ..... 17462507
MPkSnt ..... 230
MPkRcv ..... 0

-- Error Summary -------
Xmt/Wire ..... 0
Rcv/Wire ..... 0
Rcv/Validation ..... 1
Rcv/NoBuffers ..... 0

-- Process --
Null      88.0%
Port       0.7%
Xmt-Ln     2.8%
Xmt-Hs     2.0%
Rcv-Ln     1.6%
Rcv-Hs     3.0%
Com-Hs     0.0%
Mon        1.0%
Cons       0.4%

--Buffers--
Rcv ....  0
Xmt ....  1

--XNA Bus---
LANCE     9.3%
XNAGA     0.0%

--XMI---
0    0.0%
1    0.0%
2    0.0%
3    0.0%
4    0.0%
5    0.0%
6    0.0%
7    0.0%
8    0.0%
9    0.0%
A    0.0%
B    0.0%
C   11.7%
D    0.0%
E   89.3%
F    0.0%
```

Status/Error Screen

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:40:45 -- Uptime:     2:23:01

-- Rcv Counters --------
BytesRcv .... 6327084034
PkRcv ..... 17462507
Rcv/MCAUrfd ..... 0
Rcv/SizeFilter ..... 0
Rcv/SrcMCA ..... 0
Misc/Cntl ..... 0
Rcv/Invalid ..... 0
Rcv/Short802 ..... 0
Rcv/Long802 ..... 0
Rcv/Missed ..... 0
Rcv/Dor ..... 0
Rcv/NoRcvBuf ..... 0
Rcv/Stale ..... 0
Rcv/Ubua ..... 0
Rcv/Sbua ..... 0
Rcv/Crc+Frame ..... 0
Rcv/Mlen ..... 0
Rcv/Urfd ..... 1

-- Xmt Counters --------
BytesSnt .... 6327280698
PkSnt ..... 17465275
Xmt/Def ..... 769
Xmt/One ..... 123
Xmt/Mul ..... 132
Xmt/Rtry ..... 0
Xmt/LCar ..... 0
Xmt/LCol ..... 0
Xmt/MLen ..... 0
Xmt/CTest ..... 0
Xmt/Timeout ..... 0

-- Lance Counters ------
Lan/Restart ..... 0
Lan/UOflo ..... 0
Lan/TRxoff ..... 0
Lan/Merr ..... 0
Lan Tx/Rx ..... 0
Rcv/Buffer ..... 0
Rcv/NoSTP ..... 0
-- Misc Counters ------
Err/HostXfer ..... 0
RX/NoRxBuf ..... 0
RX/XmtRngFull ..... 0

---------- Saved Error Data ----------
Rtry at ..... None   LCol at ..... None
LCar at ..... None   CTst at ..... None
Sbua at ..... None
Crc  at ..... None
Mlen at ..... None
01-AUG-1989 08:02:05  60-02 MopRC 11.111
```

msb-0329-89

2.7.1.2 Filtering/Validation Error Counters

These counters record filtering and validation errors detected by the DEMNA port. The Rcv/Validation counter in the Status and Status/Interval screens indicates the total number of filtering and validation errors recorded by the highlighted counters in the Status/Error screen.

NOTE

Although Xmit/Mlen errors are validation errors, they are recorded in the Xmit/Wire register in the Status and Status/Interval screens since Xmit/Wire is the only summary counter for transmit errors.

Status and Status/Interval Screens

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:01:19 -- Uptime:   01:43:35

-- NI Statistics -------        -- NI Counters ---------     -- Process --     --XMI---
Bytes/Pk ..... 64               BytesSnt .... 6327255447    Null     88.0%    0   0.0%
Bytes/Xmt ..... 64              BytesRcv .... 6327084034    Port      0.7%    1   0.0%
Bytes/Rcv ..... 64              MbytesSnt ..... 20470       Xmt-Ln    2.8%    2   0.0%
Pk/Sec ..... 510                MbytesRcv ..... 0           Xmt-Hs    2.0%    3   0.0%
Xmt/Sec ..... 255               PkSnt ..... 17464886        Rcv-Ln    1.6%    4   0.0%
Rcv/Sec ..... 255               PkRcv ..... 17462507        Rcv-Hs    3.0%    5   0.0%
MBaudRate ..... 0.274471        MPkSnt ..... 230            Com-Hs    0.0%    6   0.0%
Interrupts ... 104599634        MPkRcv ..... 0              Mon       1.0%    7   0.0%
Interrupts/Sec .... 255                                     Cons      0.4%    8   0.0%
                                                                              9   0.0%
-- Total NI Traffic ----        -- Error Summary -------    --Buffers--       A   0.0%
Bytes/Pk ..... 237              Xmt/Wire ..... 0            Rcv .... 0        B   0.0%
Pk/Sec ..... 1418               Rcv/Wire ..... 0            Xmt .... 1        C  11.7%
ThisNI + Other = TotBaud        Rcv/Validation ..... 1                        D   0.0%
  3.5% + 26.0% =   29.5%        Rcv/NoBuffers ..... 0       --XNA Bus---      E  89.3%
                                                            LANCE    9.3%     F   0.0%
                                                            XNAGA    0.0%
```

Status/Error Screen

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:40:45 -- Uptime:    2:23:01

-- Rcv Counters --------        -- Xmt Counters --------     -- Lance Counters ------
BytesRcv .... 6327084034        BytesSnt .... 6327280698    Lan/Restart ..... 0
PkRcv ..... 17462507            PkSnt ..... 17465275        Lan/UOflo ..... 0
Rcv/MCAUrfd ..... 0             Xmt/Def ..... 769           Lan/TRxoff ..... 0
Rcv/SizeFilter ..... 0          Xmt/One ..... 123           Lan/Merr ..... 0
Rcv/SrcMCA ..... 0              Xmt/Mul ..... 132           Lan Tx/Rx ..... 0
Misc/Cntl ..... 0               Xmt/Rtry ..... 0            Rcv/Buffer ..... 0
Rcv/Invalid ..... 0             Xmt/LCar ..... 0            Rcv/NoSTP ..... 0
Rcv/Short802 ..... 0            Xmt/LCol ..... 0            -- Misc Counters ------
Rcv/Long802 ..... 0             Xmt/MLen ..... 0            Err/HostXfer ..... 0
Rcv/Missed ..... 0              Xmt/CTest ..... 0           RX/NoRxBuf ..... 0
Rcv/Dor ..... 0                 Xmt/Timeout ..... 0         RX/XmtRngFull ..... 0
Rcv/NoRcvBuf ..... 0
Rcv/Stale ..... 0               ---------- Saved Error Data ----------
Rcv/Ubua ..... 0                Rtry at ..... None  LCol at ..... None
Rcv/Sbua ..... 0                LCar at ..... None  CTst at ..... None
Rcv/Crc+Frame ..... 0           Sbua at ..... None
Rcv/Mlen ..... 0                Crc  at ..... None
Rcv/Urfd ..... 1                Mlen at ..... None
                                01-AUG-1989 08:02:05  60-02 MopRC 11.111
```

msb-0330-89

2.7.1.3 Lack-of-Resource Counters

These counters record errors resulting from insufficient resources for processing valid receive packets. The Rcv/Nobuffers counter in the Status and Status/Interval screens indicates the total number of lack-of-resource errors recorded by the highlighted counters in the Status/Error screen.

NOTE

The Rx/NoRxBuf and Rx/XmtRngFull errors are not recorded in the Rcv/NoBuffers counter even though they are lack-of-resource errors. Rx/NoRxBuf and Rx/XmtRngFull errors pertain only to non-host related packets (specifically, MOP loopback packets).

Status and Status/Interval Screens

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:01:19 -- Uptime:   01:43:35

-- NI Statistics -------   -- NI Counters ---------  -- Process --   --XMI---
Bytes/Pk ..... 64          BytesSnt .... 6327255447  Null    88.0%   0   0.0%
Bytes/Xmt ..... 64         BytesRcv .... 6327084034  Port     0.7%   1   0.0%
Bytes/Rcv ..... 64         MbytesSnt ..... 20470     Xmt-Ln   2.8%   2   0.0%
Pk/Sec ..... 510           MbytesRcv ..... 0         Xmt-Hs   2.0%   3   0.0%
Xmt/Sec ..... 255          PkSnt ..... 17464886      Rcv-Ln   1.6%   4   0.0%
Rcv/Sec ..... 255          PkRcv ..... 17462507      Rcv-Hs   3.0%   5   0.0%
MBaudRate ..... 0.274471   MPkSnt ..... 230          Com-Hs   0.0%   6   0.0%
Interrupts ... 104599634   MPkRcv ..... 0            Mon      1.0%   7   0.0%
Interrupts/Sec .... 255                              Cons     0.4%   8   0.0%
                                                                     9   0.0%
-- Total NI Traffic ----   -- Error Summary -------  --Buffers--     A   0.0%
Bytes/Pk ..... 237         Xmt/Wire ..... 0          Rcv .... 0      B   0.0%
Pk/Sec ..... 1418          Rcv/Wire ..... 0          Xmt .... 1      C  11.7%
ThisNI + Other = TotBaud   Rcv/Validation ..... 1                    D   0.0%
  3.5% + 26.0% =   29.5%   Rcv/NoBuffers ..... 0     --XNA Bus---    E  89.3%
                                                     LANCE    9.3%   F   0.0%
                                                     XNAGA    0.0%
```

Status/Error Screen

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:40:45 -- Uptime:    2:23:01

-- Rcv Counters --------   -- Xmt Counters --------  -- Lance Counters ------
BytesRcv .... 6327084034   BytesSnt .... 6327280698  Lan/Restart ..........  0
PkRcv ..... 17462507       PkSnt ..... 17465275      Lan/UOflo ............  0
Rcv/MCAUrfd ..........  0   Xmt/Def ..... 769         Lan/TRxoff ...........  0
Rcv/SizeFilter ......  0   Xmt/One ..... 123         Lan/Merr .............  0
Rcv/SrcMCA ...........  0   Xmt/Mul ..... 132         Lan Tx/Rx ............  0
Misc/Cntl ............  0   Xmt/Rtry .....  0         Rcv/Buffer ...........  0
Rcv/Invalid ..........  0   Xmt/LCar .....  0         Rcv/NoSTP ............  0
Rcv/Short802 .........  0   Xmt/LCol .....  0      -- Misc Counters ------
Rcv/Long802 ..........  0   Xmt/MLen .....  0      Err/HostXfer .........  0
Rcv/Missed ...........  0   Xmt/CTest ....  0      RX/NoRxBuf ...........  0
Rcv/Dor ..............  0   Xmt/Timeout ..........  RX/XmtRngFull ........  0
Rcv/NoRcvBuf .........  0   ---------- Saved Error Data ----------
Rcv/Stale ............  0   Rtry at ..... None     LCol at ..... None
Rcv/Ubua .............  0   LCar at ..... None     CTst at ..... None
Rcv/Sbua .............  0   Sbua at ..... None
Rcv/Crc+Frame ........  0   Crc  at ..... None
Rcv/Mlen .............  0   Mlen at ..... None
Rcv/Urfd .............  1   01-AUG-1989 08:02:05  60-02 MopRC 11.111
```

msb-0331-89

As Figure 2–2 indicates, the lack-of-resource error counters are ordered as follows with respect to the data flow of a receive operation:

1 Rcv/Missed—missed packet

2 Rcv/DOR—data overrun

3 Rcv/NoRcvBuf—no receive buffer (potential SBUA)

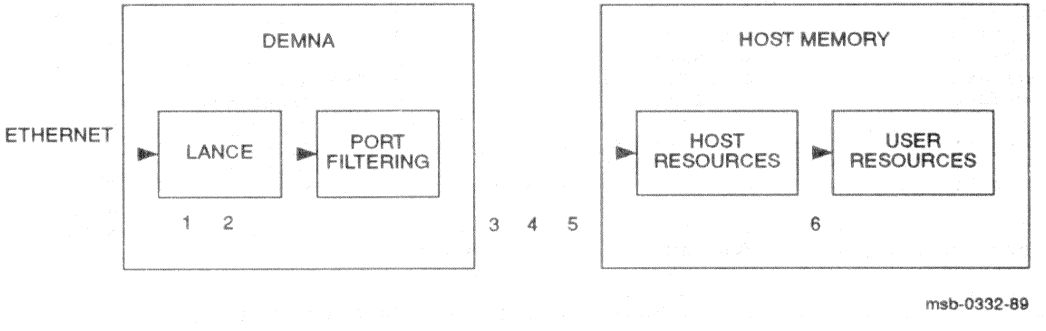
4 Rcv/Sbua—system buffer unavailable

5 Rcv/Stale—stale packet

6 Rcv/Ubua—user buffer unavailable

Errors 1 and 2, which involve receiving the packet from the Ethernet, are detected by the LANCE chip. Errors 3 through 5, which involve transfer of the packet from the port to the port driver, are detected by the port. Error 6, which involves transfer of the packet from the port driver to the user, is detected by the port driver.

Figure 2–2 Ordering of Lack-of-Resource Errors



2.7.1.4 Time/User Fields

These fields provide time and user information pertinent to particular errors or to overall DEMNA operation. The headers for each screen indicate (among other things) the uptime for the DEMNA module. The time/user fields in the Status/Error screen indicate when the last instance of a particular receive error occurred and which network node transmitted the receive packet.

Status and Status/Interval Screens

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:01:19 -- Uptime:   01:43:35

-- NI Statistics -------   -- NI Counters ---------  -- Process --    --XMI---
Bytes/Pk ..... 64          BytesSnt .... 6327255447  Null     88.0%   0   0.0%
Bytes/Xmt ..... 64         BytesRcv .... 6327084034  Port      0.7%   1   0.0%
Bytes/Rcv ..... 64         MbytesSnt ..... 20470     Xmt-Ln    2.8%   2   0.0%
Pk/Sec ..... 510           MbytesRcv ..... 0         Xmt-Hs    2.0%   3   0.0%
Xmt/Sec ..... 255          PkSnt ..... 17464886      Rcv-Ln    1.6%   4   0.0%
Rcv/Sec ..... 255          PkRcv ..... 17462507      Rcv-Hs    3.0%   5   0.0%
MBaudRate ..... 0.274471   MPkSnt ..... 230          Com-Hs    0.0%   6   0.0%
Interrupts ... 104599634   MPkRcv ..... 0            Mon       1.0%   7   0.0%
Interrupts/Sec .... 255                              Cons      0.4%   8   0.0%
                                                                      9   0.0%
-- Total NI Traffic ----   -- Error Summary -------  --Buffers--      A   0.0%
Bytes/Pk ..... 237         Xmt/Wire ..... 0          Rcv .... 0      B   0.0%
Pk/Sec ..... 1418          Rcv/Wire ..... 0          Xmt .... 1      C  11.7%
ThisNI + Other = TotBaud   Rcv/Validation ..... 1                     D   0.0%
  3.5% + 26.0% =   29.5%   Rcv/NoBuffers ..... 0     --XNA Bus---    E  89.3%
                                                     LANCE    9.3%   F   0.0%
                                                     XNAGA    0.0%
```

Status/Error Screen

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:40:45 -- Uptime:    2:23:01

-- Rcv Counters --------   -- Xmt Counters --------  -- Lance Counters ------
BytesRcv .... 6327084034   BytesSnt .... 6327280698  Lan/Restart .........  0
PkRcv ..... 17462507       PkSnt ..... 17465275      Lan/UOflo ...........  0
Rcv/MCAUrfd .....  0       Xmt/Def ..... 769         Lan/TRxoff ..........  0
Rcv/SizeFilter .....  0    Xmt/One ..... 123         Lan/Merr ............  0
Rcv/SrcMCA .....  0        Xmt/Mul ..... 132         Lan Tx/Rx ...........  0
Misc/Cntl .....  0         Xmt/Rtry .....  0         Rcv/Buffer ..........  0
Rcv/Invalid .....  0       Xmt/LCar .....  0         Rcv/NoSTP ...........  0
Rcv/Short802 .....  0      Xmt/LCol .....  0         -- Misc Counters ------
Rcv/Long802 .....  0       Xmt/MLen .....  0         Err/HostXfer ........  0
Rcv/Missed .....  0        Xmt/CTest .....  0        RX/NoRxBuf ..........  0
Rcv/Dor .....  0           Xmt/Timeout .....  0      RX/XmtRngFull .......  0
Rcv/NoRcvBuf .....  0      ---------- Saved Error Data ----------
Rcv/Stale .....  0         Rtry at ..... None  LCol at ..... None
Rcv/Ubua .....  0          LCar at ..... None  CTst at ..... None
Rcv/Sbua .....  0          Sbua at ..... None
Rcv/Crc+Frame .....  0     Crc  at ..... None
Rcv/Mlen .....  0          Mlen at ..... None
Rcv/Urfd .....  1          01-AUG-1989 08:02:05  60-02 MopRC 11.111
```

msb-0333-89

2.7.1.5 LANCE Counters

These counters, which are copies of LANCE chip counters, record LANCE-related events. The count in the Lan/Restart counter can increase rapidly when the DEMNA's loopback mode (a diagnostic function) is turned on or off or when the port driver enables and disables promiscuous mode for a port user when the Enable Promiscuous Mode flag in DEMNA EEPROM (see Appendix F) is set to No.

Status/Error Screen

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:40:45 -- Uptime:     2:23:01

-- Rcv Counters --------    -- Xmt Counters --------   -- Lance Counters ------
BytesRcv .... 6327084034    BytesSnt .... 6327280698   Lan/Restart ..........  0
PkRcv ......... 17462507    PkSnt ......... 17465275   Lan/UOflo ............  0
Rcv/MCAUrfd .........    0  Xmt/Def ............ 769   Lan/TRxoff ...........  0
Rcv/SizeFilter ......    0  Xmt/One ............ 123   Lan/Merr .............  0
Rcv/SrcMCA ..........    0  Xmt/Mul ............ 132   Lan Tx/Rx ............  0
Misc/Cntl ...........    0  Xmt/Rtry ............   0  Rcv/Buffer ...........  0
Rcv/Invalid .........    0  Xmt/LCar ............   0  Rcv/NoSTP ............  0
Rcv/Short802 ........    0  Xmt/LCol ............   0  -- Misc Counters ------
Rcv/Long802 .........    0  Xmt/MLen ............   0  Err/HostXfer .........  0
Rcv/Missed ..........    0  Xmt/CTest ...........   0  RX/NoRxBuf ...........  0
Rcv/Dor .............    0  Xmt/Timeout .........   0  RX/XmtRngFull ........  0
Rcv/NoRcvBuf ........    0  ---------------- Saved Error Data ----------------
Rcv/Stale ...........    0  Rtry at ........... None  LCol at ............ None
Rcv/Ubua ............    0  LCar at ........... None  CTst at ............ None
Rcv/Sbua ............    0  Sbua at ........... None
Rcv/Crc+Frame .......    0  Crc  at ........... None
Rcv/Mlen ............    0  Mlen at ........... None
Rcv/Urfd ............    1  01-AUG-1989 08:02:05  60-02 MopRC 11.111
```

msb-0334-89

2.7.1.6 Firmware Debug Counters

These two counters are useful only for debugging DEMNA firmware and thus do not convey useful information to DEMNA users.

Status/Error Screen

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:40:45 -- Uptime:    2:23:01

-- Rcv Counters --------   -- Xmt Counters --------  -- Lance Counters ------
BytesRcv .... 6327084034   BytesSnt .... 6327280698  Lan/Restart .........  0
PkRcv ......... 17462507   PkSnt ......... 17465275  Lan/UOflo ...........  0
Rcv/MCAUrfd .........  0    Xmt/Def ............ 769  Lan/TRxoff ..........  0
Rcv/SizeFilter ......  0    Xmt/One ............ 123  Lan/Merr ............  0
Rcv/SrcMCA ..........  0    Xmt/Mul ............ 132  Lan Tx/Rx ...........  0
Misc/Cntl ...........  0    Xmt/Rtry ............  0  Rcv/Buffer ..........  0
Rcv/Invalid .........  0    Xmt/LCar ............  0  Rcv/NoSTP ...........  0
Rcv/Short802 ........  0    Xmt/LCol ............  0  -- Misc Counters ------
Rcv/Long802 .........  0    Xmt/MLen ............  0  Err/HostXfer ........  0
Rcv/Missed ..........  0    Xmt/CTest ...........  0  RX/NoRxBuf ..........  0
Rcv/Dor .............  0    Xmt/Timeout .........  0  RX/XmtRngFull .......  0
Rcv/NoRcvBuf ........  0    ---------------- Saved Error Data ----------------
Rcv/Stale ...........  0    Rtry at ........... None  LCol at ........... None
Rcv/Ubua ............  0    LCar at ........... None  CTst at ........... None
Rcv/Sbua ............  0    Sbua at ........... None
Rcv/Crc+Frame .......  0    Crc  at ........... None
Rcv/Mlen ............  0    Mlen at ........... None
Rcv/Urfd ............  1    01-AUG-1989 08:02:05  60-02 MopRC 11.111
```

msb-0335-89

2.7.2 Resource Utilization Information

The counters that provide information on resource utilization can be divided into the following two sets:

- Data density counters
- DEMNA resource counters

2.7.2.1 Data Density Counters

These counters provide the following information about the data density on the Ethernet wire:

- The NI Statistics counters in the Status and Status/Interval screens indicate the data density per packet and per second, as well as the total (transmit and receive) baud rate for the DEMNA.
- The NI Counters in the Status and Status/Interval screens indicate the total number of bytes and packets transmitted and received by the DEMNA. Subtotals are provided for multicast packets.
- The Total NI Traffic section of the Status and Status/Interval screens shows how much network traffic the DEMNA and the other network nodes are generating.
- The data density counters in the Status/Error screen indicate the total number of bytes and packets transmitted and received by the DEMNA. Additional Xmt counters indicate how many packets were deferred or transmitted successfully after a collision-and-backoff sequence.

Status and Status/Interval Screens

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:01:19 -- Uptime:   01:43:35

-- NI Statistics -------
Bytes/Pk ............ 64
Bytes/Xmt ........... 64
Bytes/Rcv ........... 64
Pk/Sec .............. 510
Xmt/Sec ............. 255
Rcv/Sec ............. 255
MBaudRate ..... 0.274471
Interrupts ... 104599634
Interrupts/Sec .... 255

-- Total NI Traffic ----
Bytes/Pk ........... 237
Pk/Sec ............ 1418
ThisNI + Other = TotBaud
  3.5% + 26.0% =   29.5%

-- NI Counters ---------
BytesSnt .... 6327255447
BytesRcv .... 6327084034
MbytesSnt ....... 20470
MbytesRcv ........... 0
PkSnt ......... 17464886
PkRcv ......... 17462507
MPkSnt ............. 230
MPkRcv ............. 0

-- Error Summary -------
Xmt/Wire ............ 0
Rcv/Wire ............ 8
Rcv/Validation ...... 1
Rcv/NoBuffers ....... 0

-- Process --
Null      88.0%
Port       0.7%
Xmt-Ln     2.8%
Xmt-Hs     2.0%
Rcv-Ln     1.6%
Rcv-Hs     3.0%
Com-Hs     0.0%
Mon        1.0%
Cons       0.4%

--Buffers--
Rcv ....  0
Xmt ....  1

--XNA Bus---
LANCE     9.3%
XNAGA     0.0%

--XMI---
0    0.0%
1    0.0%
2    0.0%
3    0.0%
4    0.0%
5    0.0%
6    0.0%
7    0.0%
8    0.0%
9    0.0%
A    0.0%
B    0.0%
C   11.7%
D    0.0%
E   89.3%
F    0.0%
```

Status/Error Screen

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:40:45 -- Uptime:    2:23:01

-- Rcv Counters --------
BytesRcv .... 6327084034
PkRcv ......... 17462507
Rcv/MCAUrfd ......... 0
Rcv/SizeFilter ...... 0
Rcv/SrcMCA .......... 0
Misc/Cntl ........... 0
Rcv/Invalid ......... 0
Rcv/Short802 ........ 0
Rcv/Long802 ......... 0
Rcv/Missed .......... 0
Rcv/Dor ............. 0
Rcv/NoRcvBuf ........ 0
Rcv/Stale ........... 0
Rcv/Ubua ............ 0
Rcv/Sbua ............ 0
Rcv/Crc+Frame ....... 0
Rcv/Mlen ............ 0
Rcv/Urfd ............ 1

-- Xmt Counters --------
BytesSnt .... 6327280698
PkSnt ......... 17465275
Xmt/Def ............. 769
Xmt/One ............. 123
Xmt/Mul ............. 132
Xmt/Rtry ............ 0
Xmt/LCar ............ 0
Xmt/LCol ............ 0
Xmt/MLen ............ 0
Xmt/CTest ........... 0
Xmt/Timeout ......... 0
---------------- Saved Error Data ----------------
Rtry at ........... None
LCar at ........... None
Sbua at ........... None
Crc  at ........... None
Mlen at ........... None
01-AUG-1989 08:02:05  60-02 MopRC 11.111

-- Lance Counters ------
Lan/Restart ......... 0
Lan/UOflo ........... 0
Lan/TRxoff .......... 0
Lan/Merr ............ 0
Lan Tx/Rx ........... 0
Rcv/Buffer .......... 0
Rcv/NoSTP ........... 0
-- Misc Counters ------
Err/HostXfer ........ 0
RX/NoRxBuf .......... 0
RX/XmtRngFull ....... 0
LCol at ........... None
CTst at ........... None
```

msb-0336-89

2.7.2.2 DEMNA Resource Counters

These counters provide the following information on the use of DEMNA resources:

- The total number of DEMNA-generated host interrupts and the frequency of such interrupts
- What percentage of CPU time the DEMNA spends executing a particular firmware process
- The number of DEMNA-internal transmit and receive buffers in use
- The percentage of XNA memory bus traffic generated by the LANCE chip and the gate array
- The percentage of existing XMI bus traffic generated by each XMI node

Status and Status/Interval Screens

```
-- 08-00-2B-00-00-01 -- Status -- 01-AUG-1989 19:01:19 -- Uptime:   01:43:35

-- NI Statistics -------    -- NI Counters ---------   -- Process --    --XMI---
Bytes/Pk ..... 64           BytesSnt .... 6327255447   Null    88.0%   0   0.0%
Bytes/Xmt ..... 64          BytesRcv .... 6327084034   Port     0.7%   1   0.0%
Bytes/Rcv ..... 64          MbytesSnt ..... 20470      Xmt-Ln   2.8%   2   0.0%
Pk/Sec ..... 510            MbytesRcv ..... 0          Xmt-Hs   2.0%   3   0.0%
Xmt/Sec ..... 255           PkSnt ..... 17464886       Rcv-Ln   1.6%   4   0.0%
Rcv/Sec ..... 255           PkRcv ..... 17462507       Rcv-Hs   3.0%   5   0.0%
MBaudRate ..... 0.274471    MPkSnt ..... 230           Com-Hs   0.0%   6   0.0%
Interrupts ... 104599634    MPkRcv ..... 0             Mon      1.0%   7   0.0%
Interrupts/Sec ...  255                                Cons     0.4%   8   0.0%
                                                                       9   0.0%
-- Total NI Traffic ----    -- Error Summary -------   --Buffers--      A   0.0%
Bytes/Pk ..... 237          Xmt/Wire ..... 0           Rcv .... 0       B   0.0%
Pk/Sec ..... 1418           Rcv/Wire ..... 0           Xmt .... 1       C  11.7%
ThisNI + Other = TotBaud    Rcv/Validation ..... 1                      D   0.0%
  3.5% + 26.0% =   29.5%    Rcv/NoBuffers ..... 0      --XNA Bus---     E  89.3%
                                                       LANCE    9.3%    F   0.0%
                                                       XNAGA    0.0%
```

msb-0337-89

2.8 How to Use the Network Screens

This section describes how to use the Network screens. The following topics are discussed:

- Users versus nodes
- Interval parameters versus cumulative parameters counters
- Interval screen versus Accumulated screen

2.8.1 Users versus Nodes

The two leftmost columns of the Network screen are used to list the six most active users and seven most active nodes. The user designator (protocol type, SAP, or SNAP SAP protocol identifier) is listed for each of the six users. The user name is also supplied for certain commonly used Ethernet users. The DECnet or Ethernet address is listed for each of the seven nodes. (See Appendix C for a listing of commonly used Ethernet protocol types, Appendix G for a listing of commonly used Ethernet addresses, and Appendix H for a listing of commonly used SAP assignments and SNAP protocol ID assignments.)

Network Screen

```
-- 08-00-2B-00-00-01 -- Network -- 01-AUG-1989 10:50:45 --

                        - 2999996 usecs --   7.4% NI--   -- 00:00:06 --   1.5% NI--
#  User                   Pks/Sec  Byt/Pk  %NI-Cur     Packets     Bytes(k) %NI-Tot
-  ---------              -------  ------  -------     -------     -------- -------
1  60-07 NISca                328     211     6.5%        1959           49    1.1%
2  60-03 Decnet                70     155     1.0%         424            9    0.2%
3  60-04 Lat                   20     106     0.2%         109            2    0.0%
4  60-02 MopRC                 14      94     0.1%          95            1    0.0%
5  80-3F LTM                    0    1490     0.0%           2            0    0.0%
6  08-00 IP                     1      98     0.0%           3            0    0.0%

#  Nodes                  Pks/Sec  Byt/Pk  %NI-Cur     Packets     Bytes(k) %NI-Tot
-  ---------              -------  ------  -------     -------     -------- -------
1  11.111                     122     412     4.3%         796           10    0.5%
2  11.112                     119     413     4.3%         754           10    0.5%
3  AB-00-03-00-00-01           28     238     0.6%         171            0    0.0%
4  11.113                      37     143     0.5%         216            0    0.1%
5  11.114                      43      94     0.4%         254            0    0.1%
6  11.115                      39      98     0.4%         246            0    0.1%
7  11.116                      13     161     0.2%          41            0    0.0%
```

msb-0338-89

The parameters in the top table of the Network screen pertain to the users. For example, in the Network screen below, the parameters on line 1 of the top table pertain to the NISca user, the parameters on line 2 pertain to the DECnet user, and so on.

Network Screen

```
-- 08-00-2B-00-00-01 -- Network -- 01-AUG-1989 10:50:45 --

                    - 2999996 usecs --   7.4% NI--   -- 00:00:06 --   1.5% NI--
#  User             Pks/Sec  Byt/Pk  %NI-Cur   Packets   Bytes(k)  %NI-Tot
-  ---------        -------  ------  -------   -------   --------  -------
1  60-07 NISca          328     211     6.5%      1959         49     1.1%
2  60-03 Decnet          70     155     1.0%       424          9     0.2%
3  60-04 Lat             20     106     0.2%       109          2     0.0%
4  60-02 MopRC           14      94     0.1%        95          1     0.0%
5  80-3F LTM              0    1490     0.0%         2          0     0.0%
6  08-00 IP               1      98     0.0%         3          0     0.0%

#  Nodes            Pks/Sec  Byt/Pk  %NI-Cur   Packets   Bytes(k)  %NI-Tot
-  ---------        -------  ------  -------   -------   --------  -------
1  11.111               122     412     4.3%       796         10     0.5%
2  11.112               119     413     4.3%       754         10     0.5%
3  AB-00-03-00-00-01     28     238     0.6%       171          0     0.0%
4  11.113                37     143     0.5%       216          0     0.1%
5  11.114                43      94     0.4%       254          0     0.1%
6  11.115                39      98     0.4%       246          0     0.1%
7  11.116                13     161     0.2%        41          0     0.0%
```

msb-0339-89

The parameters in the bottom table of the Network screen pertain to the nodes. For example, in the example screen below, the parameters on line 1 of the bottom table pertain to the node at DECnet address 11.111, the parameters on line 2 pertain to the node at DECnet address 11.112, and so on.

Network Screen

```
-- 08-00-2B-00-00-01 -- Network -- 01-AUG-1989 10:50:45 --

                    - 2999996 usecs --   7.4% NI--  -- 00:00:06 --   1.5% NI--
 #  User             Pks/Sec  Byt/Pk  %NI-Cur    Packets    Bytes(k) %NI-Tot
 -  ---------        -------  ------  -------    -------    -------- -------
 1  60-07 NISca          328     211     6.5%       1959          49    1.1%
 2  60-03 Decnet          70     155     1.0%        424           9    0.2%
 3  60-04 Lat             20     106     0.2%        109           2    0.0%
 4  60-02 MopRC           14      94     0.1%         95           1    0.0%
 5  80-3F LTM              0    1490     0.0%          2           0    0.0%
 6  08-00 IP               1      98     0.0%          3           0    0.0%

 #  Nodes            Pks/Sec  Byt/Pk  %NI-Cur    Packets    Bytes(k) %NI-Tot
 -  ---------        -------  ------  -------    -------    -------- -------
 1  11.111               122     412     4.3%        796          10    0.5%
 2  11.112               119     413     4.3%        754          10    0.5%
 3  AB-00-03-00-00-01     28     238     0.6%        171           0    0.0%
 4  11.113                37     143     0.5%        216           0    0.1%
 5  11.114                43      94     0.4%        254           0    0.1%
 6  11.115                39      98     0.4%        246           0    0.1%
 7  11.116                13     161     0.2%         41           0    0.0%
```

msb-0340-89

2.8.2 Interval Parameters versus Accumulated Parameters

The interval parameters (see the shaded area in the figure below) are recorded for the interval indicated in the usecs field. (If only one user is accessing the Network screen, the interval should be very close to the nominal 3 seconds. However, if more than one user is accessing the Network screen, the interval may vary significantly from nominal.) The interval parameters are valid only for the indicated interval. The parameter values are updated approximately every 3 seconds.

Network Screen

```
-- 08-00-2B-00-00-01 -- Network -- 01-AUG-1989 10:50:45 --

                        - 2999996 usecs --    7.4% NI--  -- 00:00:06 --    1.5% NI--
  #  User                  Pks/Sec  Byt/Pk  %NI-Cur     Packets     Bytes(k) %NI-Tot
  -  ---------             -------  ------  -------     -------     -------- -------
  1  60-07 NISca               328     211     6.5%        1959           49    1.1%
  2  60-03 Decnet               70     155     1.0%         424            9    0.2%
  3  60-04 Lat                  20     106     0.2%         109            2    0.0%
  4  60-02 MopRC                14      94     0.1%          95            1    0.0%
  5  80-3F LTM                   0    1490     0.0%           2            0    0.0%
  6  08-00 IP                    1      98     0.0%           3            0    0.0%

  #  Nodes                 Pks/Sec  Byt/Pk  %NI-Cur     Packets     Bytes(k) %NI-Tot
  -  ---------             -------  ------  -------     -------     -------- -------
  1  11.111                   122     412     4.3%         796           10    0.5%
  2  11.112                   119     413     4.3%         754           10    0.5%
  3  AB-00-03-00-00-01         28     238     0.6%         171            0    0.0%
  4  11.113                    37     143     0.5%         216            0    0.1%
  5  11.114                    43      94     0.4%         254            0    0.1%
  6  11.115                    39      98     0.4%         246            0    0.1%
  7  11.116                    13     161     0.2%          41            0    0.0%
```

msb-0341-89

The accumulated parameters (see the shaded area of the figure below) is a cumulative record started when the Network screen is displayed. The accumulated parameters are valid for the time indicated in the Time field. The parameter values are updated approximately every 3 seconds.

Network Screen

```
-- 08-00-2B-00-00-01 -- Network -- 01-AUG-1989 10:50:45 --

                    - 2999996 usecs --    7.4% NI--   -- 00:00:06 --    1.5% NI--
 #   User             Pks/Sec  Byt/Pk   %NI-Cur      Packets     Bytes(k) %NI-Tot
 -   ---------        -------  ------   -------      --------    --------- --------
 1   60-07 NISca          328     211      6.5%          1959           49    1.1%
 2   60-03 Decnet          70     155      1.0%           424            9    0.2%
 3   60-04 Lat             20     106      0.2%           109            2    0.0%
 4   60-02 MopRC           14      94      0.1%            95            1    0.0%
 5   80-3F LTM              0    1490      0.0%             2            0    0.0%
 6   08-00 IP               1      98      0.0%             3            0    0.0%

 #   Nodes            Pks/Sec  Byt/Pk   %NI-Cur      Packets     Bytes(k) %NI-Tot
 -   ---------        -------  ------   -------      --------    --------- --------
 1   11.111               122     412      4.3%           796           10    0.5%
 2   11.112               119     413      4.3%           754           10    0.5%
 3   AB-00-03-00-00-01     28     238      0.6%           171            0    0.0%
 4   11.113                37     143      0.5%           216            0    0.1%
 5   11.114                43      94      0.4%           254            0    0.1%
 6   11.115                39      98      0.4%           246            0    0.1%
 7   11.116                13     161      0.2%            41            0    0.0%
```

msb-0342-89

2.8.3 Interval Screen versus Accumulated Screen

In the Interval Network screen, which is the default Network screen, the most active users and nodes are determined by network traffic (transmits and receives) during the interval indicated by the usecs field. Thus, the users and nodes displayed on the left of the screen are ranked for the interval, not for the cumulative time. The Interval screen should therefore be used to examine the most active users and nodes at 3-second intervals.

The Accumulated Network screen can be accessed only by typing CTRL/A when the Interval Network screen is displayed. The Accumulated screen looks exactly like the Interval screen (with the exception of the label *Accumulated* below the date and time); however, in the Accumulated screen, the users and nodes are ranked for the cumulative time indicated in the Time field. The Accumulated screen should thus be used to

examine the most active users and nodes for an interval longer than 3 seconds.

To alternate between the Interval Network screen and the Accumulated Network screen, type CTRL/A.

A Console Connection Program

This appendix describes a VAX MACRO (assembly language) program called *console.mar*. This program can be used to access the DEMNA console monitor program if the Network Control Program (NCP) is not available. If NCP is available, use the procedure described in Section 2.2.2 to access the DEMNA console.

A.1 Introduction

The console connection program uses the Maintenance Operations Protocol (MOP) console carrier mechanism to connect to the target DEMNA console. The MOP specification defines the data structures and handshaking conventions used to establish a console connection and pass data back and forth between a user terminal and the DEMNA console. Data is transferred in character I/O mode—that is, one or more ASCII characters is transferred per packet.

The console connection program also makes use of Queue I/O (QIO) structures and commands for data transfer. The QIO interface is described in the *VMS I/O User's Reference Manual: Part 1*.

The console connection program defines the following structures:

- A console packet (according to MOP specifications)
- A QIO channel for the Ethernet connection
- A QIO channel for the terminal connection
- A transmit buffer
- A receive buffer

The console connection routine has the following major steps:

1. Establish a connection with the target DEMNA console by sending a MOP Reserve Console message to the target DEMNA. If no response is received within the timeout period, the program aborts.
2. Check for valid user input (a terminated ASCII character) from the terminal QIO channel.

3 If there is valid input from the terminal channel, put it in a MOP Console Command and Poll message and send it to the target DEMNA. If there is no valid input, send a Command and Poll message that has no data.

4 Check for valid DEMNA input from the Ethernet QIO channel.

5 If there is a Console Response and Acknowledge message from the Ethernet channel, print the user data on the terminal. If there is no such message, proceed to the next step.

6 Hibernate (remain idle) for 1/40 second.

7 Loop to step 2 and proceed.

If an error occurs during any part of the program, the program aborts.

A.2 User-Supplied Parameter Values

The user must supply two parameter values to the program:

- The default physical address (DPA) of the target DEMNA. This address must be supplied as six consecutive 2-digit sets of hexadecimal numbers in the RemoteNode data structure defined at the end of the program. The order of the sets of hex numbers should be the order in which the address bytes are transmitted on the network.
- The Ethernet device number. The user supplies the Ethernet device to the program through an ASSIGN command before running the program.
- The console password. If the console password for the DEMNA has been changed, then the password (Vercode) in the program (under MOP parameters) must be changed. Otherwise, the default password supplied in the program must be used. (See the *DEC LANcontroller 400 Technical Manual* for the procedure for changing the console password.)

A.3 Running the Program

Before it can be run, the program must be compiled and linked as follows:

```
$MACRO CONSOLE
$LINK CONSOLE
```

Thereafter, the program is run as follows:

```
$ASSIGN Ethernet_device CONSOLE$DEVICE
$RUN CONSOLE
XNA>
```

where *Ethernet_device* is the device number for user's Ethernet node

When a connection to the target DEMNA is established, the DEMNA console prompt (XNA>) is displayed. Example A–1 shows the commands used to compile, link, and run the console connection program.

Example A–1 Compiling, Linking, and Running the Console Connection Program

```
$MACRO CONSOLE
$LINK CONSOLE
$ASSIGN EXA0 CONSOLE$DEVICE
$RUN CONSOLE
XNA>
```

A.4 Exiting the Program

Exit the program by typing CTRL/D or CTRL/Y.

A.5 Program Listing

```
;*****************************************************************
;*                                                               *
;*  DIGITAL ASSUMES NO RESPONSIBILITY TO SUPPORT THE             *
;*  SOFTWARE DESCRIBED IN THIS MODULE, NOR TO ANSWER             *
;*  INQUIRIES ABOUT IT.                                          *
;*                                                               *
;*  THIS SOFTWARE MODULE IS PART OF A TEMPLATE WHICH MAY         *
;*  REQUIRE CUSTOMER MODIFICATIONS TO WORK IN ALL                *
;*  CIRCUMSTANCES.                                               *
;*                                                               *
;*****************************************************************

.TITLE CONSOLE - Connect to a node via MOP Console Carrier

;*****************************************************************
; System Library Calls
;*****************************************************************

.LIBRARY "SYS$LIBRARY:LIB.MLB"

        $IODEF                          ; Define QIO symbols
        $NMADEF                         ;  Define network
                                        ;   symbols

;*****************************************************************
; Error Macro Definition
;*****************************************************************

.MACRO  $ERROR  ?L0                       ; Begin macro definition

        blbs    R0,L0                   ; If no error, proceed
        brw     Exit                    ; If error, exit program
L0:

.ENDM                                   ; End macro definition
```

```
;*************************************************************
; Console connection routine
;*************************************************************

.PSECT  $CODE, PAGE, SHR, NOWRT, PIC

.ENTRY  Console,^M<>

;-------------------------------------------------------------
; Assign and start up QIO channels. Send Reserve Console
; message to target DEMNA.
;-------------------------------------------------------------

; Assign the channels (terminal and Ethernet)

; Assign terminal channel

        $ASSIGN_S DEVNAM=TermDev,CHAN=TermChan
        $ERROR                              ; Exit on error

; Assign Ethernet channel

        $ASSIGN_S DEVNAM=NIDev,CHAN=NIChan
        $ERROR                              ; Exit on error

; Start the MOP protocol type

        $QIOW_S FUNC=#<IO$_SetMode!IO$M_Ctrl!IO$M_Startup>,-
                CHAN=NIChan,-               ; Select NI channel
                P2=#SetParmDsc              ; Specify MOP protocol
        $ERROR                              ; Exit on error

; Connect to the console. If there is no response, the console
; is reserved or disabled, an incorrect Ethernet device was
; assigned, or an incorrect RemoteNode Address was supplied.

        movb    #13,XmtData                 ; Set function code to
                                            ;  "reserve console"
        movq    VerCode,XmtData + 1         ; Set verification code
        $QIOW_S FUNC=#IO$_Writevblk,-       ; Send Reserve Console msg
                CHAN=NIChan,-               ;  Select NI channel
                P1=XmtData,-                ;  Packet data pointer
                P2=#9,-                     ;  9-byte length
                P5=#ConNode                 ;  Console node address
        movl    #5,KeepAlive                ;  Initialize keep-alive
                                            ;   count

;-------------------------------------------------------------
; Loop forever, passing data between user terminal and DEMNA
; console.
;-------------------------------------------------------------

; Obtain terminal input
```

```
0$:     $QIOW_S FUNC=#IO$_READVBLK!IO$M_TIMED!IO$M_NOECHO!IO$M_NOFILTR,-
                CHAN=TermChan,-          ; Select terminal channel
                P1=XmtData+2,-           ; Input data location
                P2=#253,-                ; Maximum length
                P3=#0,-                  ; Flush input buffer
                IOSB=QioIOSB             ; Status location
        movzwl  QioIOSB + 2,R6           ; Get input data length
        blbc    QioIOSB,1$               ; SS$Normal? No, skip terminal
                                         ;  input and send blank packet.
        incl    R6                       ; Yes, append termination
                                         ;  character
1$:     beql    2$                       ; Any data?
        cmpb    XmtData + 2,#4           ; Yes, check for disconnect
        bneq    2$                       ;  (CTRL/D typed).
        brw     Exit                     ; If CTRL/D, exit

; Issue Console Command and Poll message.

2$:     movw    #17,XmtData              ; Set MOP code; clear flags
        addl2   #2,R6                    ; Include code/flags bytes
        $QIOW_S FUNC=#IO$_Writevblk,-    ; Send the message
                CHAN=NIChan,-            ;   Select NI channel
                P1=XmtData,-             ;   Packet data pointer
                P2=R6,-                  ;   R6 contains length
                P5=#ConNode              ;   Console node address

; Receive Console Response and Acknowledge message.

        $QIOW_S FUNC=#IO$_Readvblk!IO$M_Now,-  ; Attempt rcv
        CHAN=NIChan,-                    ;  Select NI channel
        P1=RcvData,-                     ;  Packet data pointer
        P2=#500,-                        ;  Maximum length
        IOSB=QioIOSB                     ;  Status return
        blbc    R0,4$
        blbs    QioIOSB,3$               ; Got packet? No, skip rcv.
        decl    KeepAlive                ; Decrement keep-alive cntr
        bgtr    4$                       ; Keep alive expired?
        brw     Exit_NoResponse          ; Yes, exit
3$:     movl    #5,KeepAlive             ; Reset keep-alive counter
        cmpb    RcvData,#19              ; Console Response/Ack rec'd?
        bneq    4$                       ; No, hibernate.

; Print terminal output

        movzwl  QioIOSB + 2,R6           ; Get length of rcv packet
        subl2   #2,R6                    ; Subtract code/flags byte
        bleq    4$                       ; Any data? No, hibernate
        $QIOW_S FUNC=#IO$_WRITEVBLK,-    ; Yes, copy data to terminal.
                CHAN=TermChan,-          ;  Specify terminal
                P1=RcvData+2,-           ;  Location of output data
                P2=R6                    ;  Output length

; Hibernate for 1/10 second
```

```
4$:     movl    #-1000000,TimeHib       ; Set hibernation time
        movl    #-1,TimeHib + 4         ;  to 1/10 second
        $SCHDWK_S DAYTIM = TimeHib      ; Schedule wake-up call
        $HIBER_S                        ; Hibernate
        brw     0$                      ; Loop to beginning
                                        ;  of routine
;-----------------------------------------------------------------
; Done
;-----------------------------------------------------------------
Exit:   $Exit_S R0                      ; Exit status of a QIO
                                          command

        Exit_NoResponse:                ; Write "No response"
        $QIOW_S CHAN=TermChan,-         ;  to terminal
        FUNC=#IO$_WRITEVBLK,-
        IOSB=QioIOSB,-                  ; General IOSB
        P1=Disconnect,-                 ; Message
        P2=#13                          ; Message length
        $Exit_S                         ; Exit
```

```
;*************************************************************
; Data structure definitions
;*************************************************************

.PSECT $DATA, PAGE, PIC, CON, LCL, NOSHR, NOEXE, RD, WRT, NOVEC

;-------------------------------------------------------------
; Device descriptors
;-------------------------------------------------------------

TermDev:    .ascid  /SYS$INPUT/          ; Terminal device
                                         ;  = SYS$INPUT
TermChan:   .long                        ; Terminal channel

NIDev:      .ascid  /Console$Device/     ; NI device =
                                         ;  Console$Device
NIChan:     .long                        ; NI channel

XmtData:    .blkb       512              ; Transmit (xmt) buffer
RcvData:    .blkb       512              ; Receive (rcv) buffer

QioIOSB:    .blkl       2                ; General IOSB

;-------------------------------------------------------------
; Start up MOP parameters
;-------------------------------------------------------------

SetParm:    .word   NMA$C_PCLI_BFN       ; Number of rcv buffers
            .long   4
            .word   NMA$C_PCLI_PAD       ; Padding value
            .long   NMA$C_STATE_ON
            .word   NMA$C_PCLI_PTY       ; Protocol type = 60-02
            .long   ^X0260

SetParmDsc::    .long           SetParmDsc-SetParm
                .address        SetParm

; Miscellaneous data

ConNode::   .byte   ^X08,^X00,^X2B,-     ; Ethernet address of
                    ^X0C,^X2F,^XE3       ;  target node
VerCode:    .ascii  /DRAOBANX/           ; Verification code
TimeHib:    .quad                        ; Hibernation time
KeepAlive:  .long                        ; Keep-alive counter
Disconnect: .byte   13                   ; Disconnect message
            .ascii  /No response/
            .byte   13

.END Console
```

B How to Convert an Ethernet Address to a DECnet Address

Convert an Ethernet address to a DECnet address as follows:

1. Take the two low-order bytes of the Ethernet address and swap them so that the low-order byte precedes the next-to-low-order byte.
2. Convert the hex value of the two bytes into a decimal number.
3. Divide the decimal number by 1024.
4. The quotient is the DECnet area number.
5. The remainder is the DECnet node number.

For example, the Ethernet address AA-00-04-00-00-26 is converted to a DECnet address as follows:

1. Swap the two low-order bytes of the address to get the hex value 2600.
2. Convert 2600 (hex) to the decimal number 9728.
3. Divide 9728 by 1024 to get a quotient of 9 and a remainder of 512.
4. The DECnet area number is 9.
5. The DECnet node number is 512.

The Ethernet address AA-00-04-00-00-26 converts to DECnet address 9.512, which references DECnet node 512 in DECnet area 9.

C Ethernet Protocol Types

Table C–1 lists the only cross-company (universally administered) Ethernet protocol type. Table C–2 lists the Ethernet protocol types assigned by DIGITAL.

Table C–1 Cross-Company Ethernet Protocol Type

Protocol Type	Description
90-00	Ethernet loopback

Table C–2 DIGITAL Ethernet Protocol Types

Protocol Type	Description
60-01	DNA Dump/Load (MOP)
60-02	DNA Remote Console (MOP)
60-03	DNA Routing
60-04	Local Area Transport (LAT)
60-05	Diagnostics
60-06	Customer use
60-07	System Communication Architecture (SCA)
80-38	Bridge
80-3B	VAXELN
80-3C	DNA Naming Service
80-3D	CSMA/CD Encryption
80-3F	LAN Traffic Monitor
80-40	NetBios emulator (PCSG)
80-42	Reserved

The protocol types 00-00 through 05-DC are reserved so that 802.3 format frames can be distinguished from Ethernet format frames. Use of these protocol types in Ethernet format frames is incompatible with correct operation of the CSMA/CD Data Link.

D History Entry Formats

This appendix describes the types of history entries that can be written to the EEPROM. A history entry must be one of the following error types:

- Datamove—An error specific to a datamove operation.
- Exception—A firmware exception.
- Fatal error—A fatal port error.
- Firmware update—An update to the controller firmware.
- Machine check—A firmware machine check.
- Node halt—The controller executed a node halt.
- No error—No error has been logged to this entry.
- Peek—An error specific to a peek operation.
- Self-test error—One or more of the tests in the self-test failed.
- XBER—One of the hard error bits in the XMI Bus Error Register (XBER) was set.

Figure D–1 shows the general format of a history entry. Table D–1 through Table D–4 describe the history entry fields.

Figure D–1 History Entry Format

```
-- 08-00-2B-00-00-01 -- Error History #  1 -- 01-JAN-1988 01:05:17 --

Type:  Machine Check
Date:  01-JAN-1988 00:00:54
Number of times this event occurred:    1
Saved Data:    00000B01
               00009014
               00000080
               EFF00004
               D0E0FC80
```

Table D–1 History Entry—Parameter Definitions

Parameter	Description
Ethernet address	The DEMNA's actual physical address (APA).
Error History #	The number of the history entry.
Date and time	The current date and time.
Type	The type of error recorded.
Date	The date and time when the history entry was logged.
Number of times this event occurred	The number of times this particular error type occurred.
Saved data (5–7 longwords)	The meaning of these longwords is specific to the error type. See Table D–2.

Table D–2 Saved Data Definitions

Datamove Error	
Longword	**Description**
1	XBER Register
2	XFADR Register
3	XFAER Register
4	DMPOR Register
5	DMCSR Register

Exception	
Longword	**Description**
1	Pending Port Status Register (XPST_Pending). The value that will be loaded into the XPST Register after the next state change (after error handling has been completed).
2	Pending Port Data 1 Register (XPD1_Pending). The value that will be loaded into the XPD1 Register after the next state change (after error handling has been completed).
3	Address of call to shutdown request.
4	Address of exception.
5	Exception number (offset into system control block (SCB)).

Table D–2 (Cont.) Saved Data Definitions

Fatal Error	
Longword	**Description**
1	Pending Port Status Register (XPST_Pending). The value that will be loaded into the XPST Register after the next state change (after error handling has been completed).
2	Pending Port Data 1 Register (XPD1_Pending). The value that will be loaded into the XPD1 Register after the next state change (after error handling has been completed).
3	Longword 1 of the stack when the error occurred.
4	Longword 2 of the stack when the error occurred.
5	Longword 3 of the stack when the error occurred.

Firmware Update.	
Longword	**Description**
1	XDEV Register
2	Four numbers in ASCII that indicate the DEMNA firmware revision. The first two numbers are to the left of the decimal point, and the second two are to the right of the decimal point. For example, 33 32 31 30 (ASCII) = revision 01.23.
3–5	Firmware revision date and time (binary).

Machine Check	
Longword	**Description**
1	Pending Port Status Register (XPST_Pending). The value that will be loaded into the XPST Register after the next state change (after error handling has been completed).
2	Pending Port Data 1 Register (XPD1_Pending). The value that will be loaded into the XPD1 Register after the next state change (after error handling has been completed).
3	Machine check code (usually 80–83, which indicate an invalid address).
4	Most recent memory address.
5	Internal state information 1.

Table D–2 (Cont.) Saved Data Definitions

Node Halt	
Longword	Description
1	Pending Port Status Register (XPST_Pending). The value that will be loaded into the XPST Register after the next state change (after error handling has been completed).
2	Pending Port Data 1 Register (XPD1_Pending). The value that will be loaded into the XPD1 Register after the next state change (after error handling has been completed).
3	Longword 1 of the stack when the node halt occurred.
4	Longword 2 of the stack when the node halt occurred.
5	Longword 3 of the stack when the node halt occurred.

No Error	
Longword	Description
1	Must be zeros; undefined
2	Must be zeros; undefined
3	Must be zeros; undefined
4	Must be zeros; undefined
5	Must be zeros; undefined

Peek Error	
Longword	Description
1	XBER Register
2	XFADR Register
3	XFAER Register
4	XMIL Register
5	XMIH Register

Table D–2 (Cont.) Saved Data Definitions

Self-Test Error	
Longword	Description
1	Expected data
2	Received data
3	System control block (SCB) offset
4	Memory address
5	Program counter (PC) at failure
6	See Figure D–2 and Table D–3
7	See Figure D–3 and Table D–4

XBER	
Longword	Description
1	XBER Register
2	XFADR Register
3	XFAER Register
4	Must be zeros; undefined
5	Must be zeros; undefined

Figure D–2 Self-Test Entry—Longword 6 of Saved Data

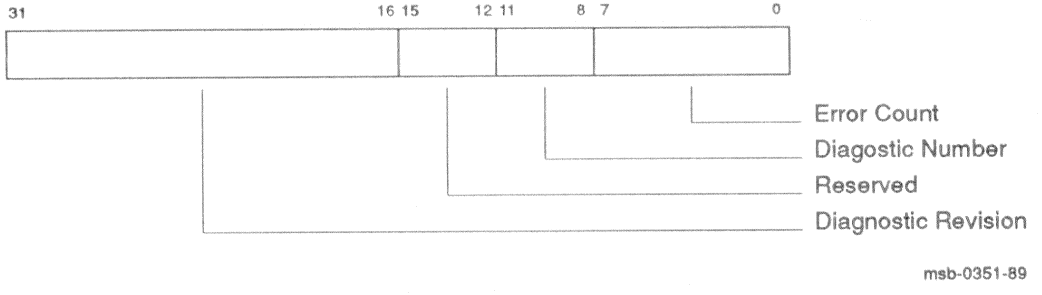


Table D–3 Self-Test Entry—Longword 6 of Saved Data

Bits	Field	Description
31:16	Diagnostic Revision	Two numbers in ASCII. The first number is to the left of the decimal point, and the second is to the right of the decimal point. For example, 39 33 (ASCII) = revision 3.9.
15:12	Reserved	These bits are reserved.
11:8	Diagnostic Number	A binary field that indicates which test reported the error. 0 = self-test. 1 = NI RBD. 2 = XMI RBD. 3 = XNA RBD. See the *DEC LANcontroller 400 Technical Manual* for a description of the DEMNA ROM-based diagnostics (RBDs).
7:0	Error Count	The number of times (in binary) that this type of diagnostic error occurred.

Figure D–3 Self-Test Entry—Longword 7 of Saved Data

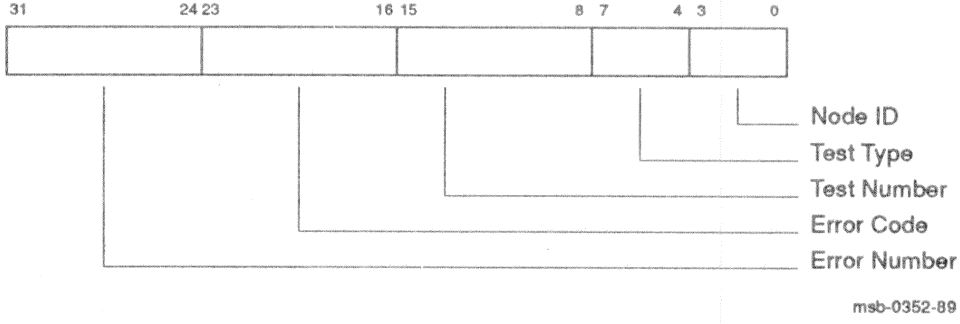


Table D–4 Self-Test Entry—Longword 7 of Saved Data

Bits	Field	Description
31:24	Error Number	See the *DEC LANcontroller 400 Technical Manual.*
23:16	Error Code	The nature of the detected error. See the *DEC LANcontroller 400 Technical Manual* for a description of the error codes for the DEMNA self-test.
15:8	Test Number	Number of the failing test
7:4	Test Type	1 = power-up mode; 2 = RBD mode
3:0	Node ID	XMI node ID (hex)

E Device Type Codes for XMI Modules

Table E–1 lists the device type codes for XMI modules available at the printing of this manual.

Table E–1 Device Type Codes for XMI Modules

Code	Device	Function
0C03	DEMNA	Ethernet/802 controller
0C05	CIXCD	CI Interface adapter
0C22	KDM70	Disk and tape controller
1001	XJA	XMI-to-SCU adapter
2001	DWMBA/A	XMI-to-VAXBI adapter
2002	DWMBB/A	+3.3V XMI-to-VAXBI adapter
4001	MS62A	Memory module
8001	KA62A	VAX 6000–200 CPU
8001	KA62B	VAX 6000–300 CPU
8081	KN58A/A	DECsystem 5800 CPU
8082	KA64A	VAX 6000–400 CPU

F How to Modify Flags in EEPROM

This appendix describes how to modify three flags in the DEMNA EEPROM. Two of these flags affect the operation of the console monitor program. Table F–1 describes the flags.

NOTE

The DEMNA EEPROM contains additional flags and parameters not described in this appendix. See the *DEC LANcontroller 400 Technical Manual* for a description of these flags and parameters.

Table F–1 EEPROM Flags

Name	Description
Enable Remote Boot	When set to Yes, enables the DEMNA to participate in remote booting over the network. When set to No, disables this function. See the *DEC LANcontroller 400 Technical Manual* for further information.
Enable Remote DEMNA Console	When set to Yes, enables the DEMNA console monitor program to be accessed from a remote network node. When set to No, denies access to the console monitor program from a remote node.
Enable Promiscuous Mode	When set to Yes, the DEMNA operates by default in promiscuous mode. When set to No, the DEMNA does not operate in promiscuous mode by default. (An application can override a flag setting of No by starting up a promiscuous user.) In promiscuous mode, the DEMNA receives all packets on the network, regardless of a packet's destination. The DEMNA console monitor program uses this information to determine characteristics of the network traffic. If no users defined to the DEMNA are enabled for promiscuous mode, the DEMNA discards the packets not addressed to a DEMNA user. Otherwise, the DEMNA delivers all received packets to each DEMNA user for whom promiscuous mode is enabled. (See the *DEC LANcontroller 400 Technical Manual* for further information on DEMNA operation in promiscuous mode.)

The setting of the flags in EEPROM can be modified by running the EEPROM Update Utility (EVGDB), which is a software diagnostic. Table F–2 specifies the distribution media for EVGDB for VAX 6000 and VAX 9000 systems.

Table F–2 Distribution Media for EVGDB

System	Tape Name	Tape Part Number
VAX 6000–2xx	VAX 6200 Console Tape	AQ-FJ77B-ME
VAX 6000–3xx	VAX 6300 Console Tape	AQ-FK60A-ME
VAX 6000–4xx	VAX 6400 Console Tape	AQ-FK87A-ME
VAX 9000	VAX9000 CNSL + UCODE Tape	AQ-PAKJA-ME

EVGDB can be run under the VAX Diagnostic Supervisor (VAX/DS) or under the VAX/VMS operating system. Step 1 of the following procedure indicates how to run EVGDB under VAX/DS. Step 2 indicates how to run EVGDB under the VAX/VMS operating system.

Use the following procedure to modify the flags in EEPROM:

1 To run EVGDB under VAX/DS, do the following:

   a. Invoke the console prompt by typing CTRL/P on the system console.

   b. Boot the VAX Diagnostic Supervisor (VAX/DS) with the console BOOT command. See the system *Owner's Manual* for a description of this command. The following is the BOOT command used on a VAX 6000 system:

      ```
      DS>BOOT/XMI:n/BI:x /R5:10 CSA1 RETURN
      ```

      where:

      n is the XMI node number of the DWMBA (XMI-to-VAXBI adapter)

      x is the VAXBI node number of the controller for the boot device

      See the appropriate VAX 9000 documentation for a description of the procedure for booting VAX/DS on a VAX 9000 system.

2 To run EVGDB under the VAX/VMS operating system, do the following:

a. At the system prompt, enter the following command:

```
$SET DEFAULT SYS$MAINTENANCE
```

b. Run the VAX Diagnostic Supervisor (VAX/DS) with the following command:

```
$RUN filename
```

where *filename* is the executable VAX/DS file as follows:

VAX System	VAX/DS File
6000–2xx/–3xx	ELSAA
6000–4xx	ERSAA
9000	EWSAA

3 The VAX/DS header is displayed. The following VAX/DS header is displayed on a VAX 6000–2xx/–3xx system:

```
                VAX DIAGNOSTIC SOFTWARE
                    PROPERTY OF
            DIGITAL EQUIPMENT CORPORATION

            ***CONFIDENTIAL AND PROPRIETARY***

Use Authorized Only Pursuant to a Valid Right-to-Use License
Copyright, Digital Equipment Corporation,  1989.  All Rights Reserved.

DIAGNOSTIC SUPERVISOR.  ZZ-ELSAA-11.7-870   1-JAN-1989 00:00:28
```

4 Enter the following commands at the VAX/DS prompt (DS>):

```
DS>LOAD EVGDB
DS>ATTACH DEMNA HUB EXm0 n [RETURN]
DS>SELECT ALL [RETURN]
DS>START/SECTION=PARAM [RETURN]
```

where:

m is the unit number of the DEMNA. The DEMNA with the lowest XMI node number is unit A, the DEMNA with the second lowest XMI node number is unit B, and so on.

n is the XMI node number of the DEMNA

5 EVGDB runs the DEMNA self-test to verify the module operation. If self-test fails, EVGDB prints an error message and continues.

```
.. Program: EVGDB - DEMNA EEPROM Update Utility, revision 1.1, 6 tests,
   at 15:06:50.29.
Testing:
_EXA0

Initiating DEMNA self-test, wait 10 seconds...
```

6 EVGDB asks you to verify that the appropriate key switch on the front panel is set to the Update position.

```
Please insure that Front Panel Switch is in Update position.
Ready [(Yes), No]
```

If the key switch is set to Update, answer Yes. If the key switch is not set to Update, set it to Update before answering Yes.

NOTE

On VAX 9000 systems, EEPROM updating is enabled and disabled with system console commands. Issue the following command to enable EEPROM updating:

```
SET XMI_UPDATE ON
```

7 EVGDB then asks whether you want to clear the EEPROM error log.

```
Do you wish to clear the EEPROM error log?  [(No), Yes]
```

Normally, you should not clear the EEPROM error log.

8 EVGDB displays the firmware revision number and date, the module serial number, and the default settings of the parameter flags in EEPROM.

```
Reading parameters from EEPROM...

EEPROM firmware rev:      0500 7-DEC-1989

DEMNA Serial Number:      *NI90200013*

Enable Remote Boot?              (Default =  No)  N
Enable Remote DEMNA console?     (Default = Yes)  Y
Enable Promiscuous Mode?         (Default = Yes)  Y
```

9 EVGDB asks whether you want to modify any of the flag settings

```
Do you wish to modify any of these parameters?  [(No), Yes]
```

10 If you answer No, the program prints the following message and then exits to the VAX/DS prompt (DS>):

```
No parameter changes made.
.. End of run, 0 errors detected, pass count is 1,
   time is  2-NOV-1989 11:14:58.77
DS>
```

If you answer Yes, EVGDB prompts you for the desired setting for each of the three flags:

```
Enable Remote Boot?              (Default =  No)     [(No), Yes]
Enable Remote DEMNA console?     (Default = Yes)     [(Yes), No]
Enable Promiscuous Mode?         (Default = Yes)     [(Yes), No]
```

Set the flags according to the customer's requirements.

11 The program asks twice whether you really want to modify the flag settings as you have indicated.

```
OK to modify EEPROM parameters?  [(No), Yes] Y

Are you sure?  [(No), Yes]
```

If you want to modify the parameters, answer Yes to both prompts.

12 EVGDB writes the modified flag settings to EEPROM and exits to the VAX/DS prompt (DS>):

```
Writing new parameters to EEPROM...
.. End of run, 0 errors detected, pass count is 1,
   time is  2-NOV-1989 11:14:17.08
DS>
```

13 Exit VAX/VDS.

```
DS>EXIT [RETURN]
```

14 If you are on a VAX 6000 system, set the key switch to its former position (Halt or Auto Start). If you are on a VAX 9000 system, issue the following system console command to disable EEPROM updating:

```
SET XMI_UPDATE OFF
```

G Ethernet Addresses

Table G–1 lists the cross-company (universally administered) Ethernet multicast addresses. Table G–2 lists the Ethernet multicast addresses assigned by DIGITAL. Table G–3 lists the Ethernet physical addresses assigned to DIGITAL prototypes, parts, or units. Table G–4 lists the address blocks assigned to other organizations but used in DIGITAL products.

Table G–1 Cross-Company Multicast Addresses

Multicast Address	Description
01-80-C2-00-00-00	IEEE 802.1d Bridge group address
01-80-C2-00-00-0X	IEEE 802.1d Reserved (always filtered by bridges)
01-80-C2-00-00-10	IEEE 802.1d All LANs Bridge Management group address
01-80-C2-00-00-11	IEEE 802.1e Load Server group address
01-80-C2-00-00-12	IEEE 802.1e Loadable Device group address
09-00-2B-00-00-04	ISO 9542 End System Hello
09-00-2B-00-00-05	ISO 9542 Intermediate System Hello
CF-00-00-00-00-00	Loopback Assistance
FF-FF-FF-FF-FF-FF	Broadcast

Table G–2 DIGITAL Multicast Addresses

Multicast Address	Description
AA-00-00-01-00-00	DNA Dump/Load Assistance (MOP)
AA-00-00-02-00-00	DNA Remote Console (MOP)
AB-00-00-03-00-00	DNA Level 1 Routing Layer routers
AB-00-00-04-00-00	DNA Routing Layer end nodes
AB-00-04-00-XX-XX	Customer use
AB-00-04-01-XX-XX	System Communication Architecture (SCA)

Table G–2 (Cont.) DIGITAL Multicast Addresses

Multicast Address	Description
09-00-2B-00-00-02	VAXELN
09-00-2B-00-00-03	LAN Traffic Monitor
09-00-2B-00-00-06	CSMA/CD Encryption
09-00-2B-00-00-07	NetBios Emulator (PCSG)
09-00-2B-00-00-0F	Local Area Transport (LAT)
09-00-2B-01-00-00	All bridges
09-00-2B-01-00-01	All local bridges
09-00-2B-02-00-00	DNA Level 2 Routing Layer routers
09-00-2B-02-01-00	DNA Naming Service Advertisement
09-00-2B-02-01-01	DNA Naming Service Solicitation

Table G–3 DIGITAL Physical Addresses

Physical Address	Description
AA-00-04-00-XX-XX	DECnet Phase IV station addresses
AA-00-03-00-XX-XX	UNA prototype
AA-00-03-01-XX-XX	DEUNA products
AA-00-03-02-XX-XX	Miscellaneous assignments
AA-00-03-02-00-00	H4000-TA Ethernet Transceiver Tester
AA-00-03-03-XX-XX	NI20 products
08-00-2B-0X-XX-XX	PROM 23-365A1-00
08-00-2B-1X-XX-XX	PROM 23-365A1-00
08-00-2B-22-00-00	Bridge management

Table G–4 Other Physical Addresses

Physical Address	Description
00-00-69-02-XX-XX	DTQNA, Concord Communications Inc.

H SAP Assignments and SNAP Protocol ID Assignments

Table H–1 lists the cross-company (universally administered) SAP assignments. No SAPs are assigned by DIGITAL. Table H–2 lists the SNAP protocol IDs (PIDs) assigned by DIGITAL. There are no cross-company (universally administered) SNAP PIDs.

Table H–1 Cross-Company SAP Assignments

SAP	Description
03	LLC sublayer management function group SAP (IEEE 802.1b)
FF	Global DSAP
00	Null SAP
02	LLC sublayer management function individual SAP (IEEE 802.1b)
06	ARPAnet IP
0E	PROWAY (IEC 955) network management and initialization
42	IEEE 802.1d (ISO 10038) transparent bridge protocol
4E	EIA RS-511 Manufacturing Message Service
7E	ISO 8208 (X.25 over IEEE 802.2 type 2 LLC)
8E	PROWAY (IEC 955) active station list maintenance
AA	SNAP SAP
FE	ISO Network Layer entity

Table H–2 DIGITAL SNAP Protocol IDs

Protocol ID	Description
08-00-2B-60-01	DNA Dump/Load (MOP)
08-00-2B-60-02	DNA Remote Console (MOP)
08-00-2B-60-03	DNA Routing
08-00-2B-60-04	Local Area Transport (LAT)

Table H–2 (Cont.) DIGITAL SNAP Protocol IDs

Protocol ID	Description
08-00-2B-60-05	Diagnostics
08-00-2B-60-06	Customer use
08-00-2B-60-07	System Communication Architecture (SCA)
08-00-2B-80-3B	VAXELN
08-00-2B-80-3C	DNA Naming Service
08-00-2B-80-3D	CSMA/CD Encryption
08-00-2B-80-3F	LAN Traffic Monitor
08-00-2B-80-40	NetBios emulator (PCSG)
08-00-2B-90-00	MOP LAN Loopback protocol

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