NSC Test [3]

The NSC test detects and isolates faults in the communications link between a Cray Research computer system and another Cray Research computer system, or an IBM computer system, or a Sun Workstation when the link consists of an NSC HYPERchannel and NSC adapters or an NSC Fiber Distributed Data Interface (FDDI) in HYPERchannel compatibility mode. For Cray Research systems, the test can be executed using either a shared or a dedicated path.

This chapter explains the execution of the NSC test. It covers the following topics:

- Getting started with the NSC test under MVS or VM
- Getting started with the NSC test under UNICOS or UNIX
- Execution example
- NSC network message format
- NSC test menus
- NSC test commands
- NSC test modes
  - Synchronous active-and-passive mode
  - Asynchronous active-and-passive mode
  - Local adapter loopback mode
  - Remote adapter loopback mode
  - Local adapter statistics mode
  - Local statistics and clear mode
  - Remote adapter statistics mode
  - Dump extension registers mode
  - HYPERchannel mapping mode
  - Display driver statistics mode
  - Xmapping routine mode

- NSC DX low-level command mode
- Read single adapter profile
- Map adapter profiles

Figure 12 is referenced throughout this chapter.

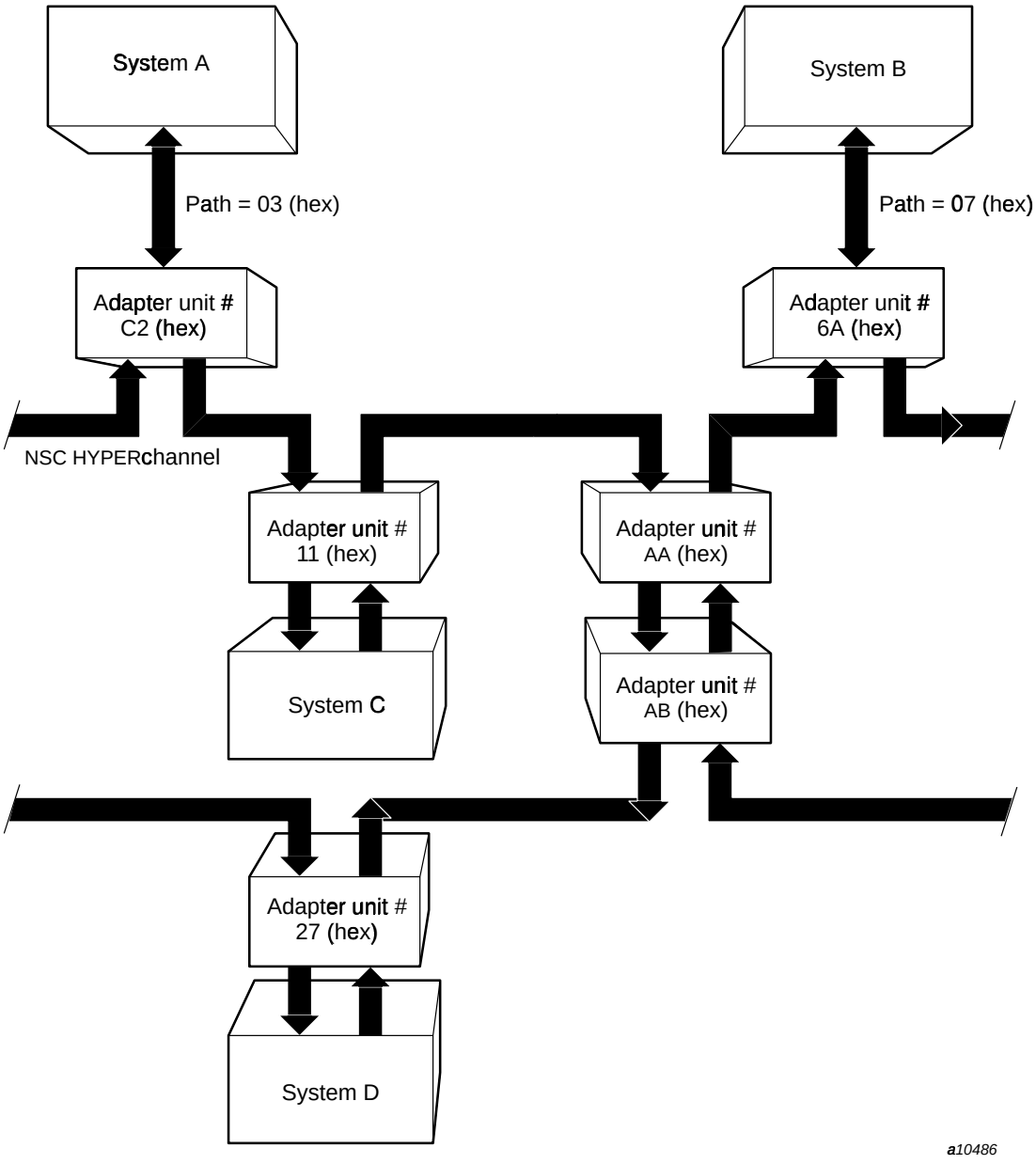

Figure 12. NSC test environment

3.1 Getting started with the NSC test under MVS or VM

Before executing the NSC test under MVS or VM, you must do the following:

1. Determine the NSC name for the connection to the HYPERchannel. The connection is called a *device path name* for MVS (`DN,`*dn* command) or a *virtual address* (`VA,`*va* command) for VM. For VM only, the virtual address and the real address must be the same. Contact your IBM system administrator to obtain the device name or virtual address.
2. Determine the NSC adapter type (`LA,`*la*) of the local adapter. The adapter may be type A (`LA,A`) or an N-series (DX) adapter (`LA,D`). Contact your IBM system administrator for this information.
3. Under VM only, obtain VM class-B privilege. You must have this privilege to vary and attach a real device under VM. Contact your VM system administrator to obtain this privilege, or contact your VM system operator to request that the NSC adapter be attached to your VM user ID.
4. Under MVS only, set the target device's device name (`DN`) missing interrupt handler (MIH) to a value of 5 seconds.

3.2 Getting started with the NSC test under UNICOS or UNIX

Before executing the NSC test under UNICOS or UNIX operating systems, you must determine the NSC name for the connection to the HYPERchannel device. The connection is called a *device path name* (`DV,`*dv* command) for UNICOS and UNIX systems.

If your site follows standard device path naming conventions for NSC, you can determine the device path name by using the OLNET `DPM` command, which is available from the NSC test Initial menu (UNICOS systems only). For more information on the `DPM` command, see Section 3.6, page 57.

The device path name (also called the *character special device path*) is typically defined as follows:

`/dev/comm/`*ioc iop chan*`/lp` *nn*

The *ioc* is the single-digit I/O cluster number, *iop* is the single-digit IOP number, *chan* is the two-digit octal channel number, and *nn* is the low-order 4 bits of the minor device number (or *logical path* in IOS terminology).

You must have read/write permission to access the device path used by OLNET. The following procedure shows you how to find a valid device path name and verify the device path file permissions:

1. Log in to the Cray Research system or Sun Workstation on which you intend to execute OLNET.
2. Enter one of the following forms of the `ls` command (your administrator may have changed the `/dev` file name):

   ```
   ls -l /dev/comm/n*
   ```

   (Cray Research system)

   ```
   ls -l /dev/h*
   ```

   (Sun Workstation)

   This command displays the configured NSC HYPERchannel devices. A sample device table for a Sun Workstation is shown in the following example. Your device table may be different.

```
crw-rw-rw- 1 root      44,   1 Apr  10  08:10 /dev/hy0l
crw-rw-rw- 1 root      44,   2 Apr  10  08:10 /dev/hy02
crw-rw-rw- 1 root      44,   3 Jun  27  1995  /dev/hy03
crw-rw-rw- 1 root      44,   4 Jun  27  1995  /dev/hy04
crw-rw-rw- 1 root      44,   5 Jun  27  1995  /dev/hy05
crw-rw-rw- 1 root      44,   6 Jun  27  1995  /dev/hy06
crw-rw-rw- 1 root      44,   7 Jun  27  1995  /dev/hy07
crw-rw-rw- 1 root      44,   8 Jun  27  1995  /dev/hy08
crw-rw-rw- 1 root      44,   9 Jun  27  1995  /dev/hy09
crw-rw-rw- 1 root      44,  10 Jun  27  1995  /dev/hy10
crw-rw-rw- 1 root      44,  65 Jun  27  1995  /dev/hy65
crw-rw-rw- 1 root      44,  66 Jun  27  1995  /dev/hy66
crw-rw-rw- 1 root      44,  67 Jun  27  1995  /dev/hy67
crw-rw-rw- 1 root      44,  68 Jun  27  1995  /dev/hy68
crw-rw-rw- 1 root      44,  69 Jun  27  1995  /dev/hy69
crw-rw-rw- 1 root      44,  70 Jun  27  1995  /dev/hy70
crw-rw-rw- 1 root      44,  71 Jun  27  1995  /dev/hy71
crw-rw-rw- 1 root      44,  72 Jun  27  1995  /dev/hy72
crw-rw-rw- 1 root      44,  73 Jun  27  1995  /dev/hy73
crw-rw-rw- 1 root      44,  74 Jun  27  1995  /dev/hy74
crw-rw-rw- 1 root      44,  75 Jun  27  1995  /dev/hy75
crw-rw-rw- 1 root      44,  76 Jun  27  1995  /dev/hy76
```

The permission field (in this case, `crw-rw-rw-`) in columns 1-10 is defined as follows:

Column 1	File type. Type `c` indicates a character special device.
Column 2-3	Read/write permission for the file owner. In this example, `rw` means that the file owner has read/write permission.
Column 4	Execute (`x`) permission for the file owner. In this example, the dash (`-`) means that file owner does not have execute permission.
Column 5-6	Read/write permission for the owner's group. `rw` means that the owner's group has read/write permission.
Column 7	Execute permission for the owner's group. The dash (`-`) means that the owner's group does not have execute permission.
Column 8-9	Read/write permission for others. `rw` means that read/write permission is enabled for others.
Column 10	Execute permission for others. The dash (`-`) means that execute permission is not enabled for others.

3. If columns 8 and 9 in the permission field for a device are `rw`, you can use the device in the NSC test. If columns 8 and 9 are not `rw`, look at columns 5 and 6.

   If columns 5 and 6 are `rw`, **and** you are part of the owner's group, you can use the device.

   If you are not part of the owner's group, ask your UNICOS or UNIX system administrator either to change the file's permissions or to define a device path name value.

4. If you cannot find a device path name displayed in the device table, contact your UNICOS or UNIX system administrator.

3.3 Execution example

This section contains an example of NSC test execution from a Cray Research UNICOS system connected to another Cray Research UNICOS system by a HYPERchannel device (the procedures are similar for IBM and Sun systems). The example contains the procedure for testing each part of the connection and then eventually the entire network connection from Cray Research system-to-Cray Research system. Figure 12, page 43 is referenced throughout this example.

1. On Cray Research system A, enter the following command to execute OLNET:

   ```
   /etc/diag/olnet
   ```

   The Main menu is displayed.

2. From the Main menu, enter `NT` to select the NSC test (you can enter OLNET commands in uppercase, lowercase, or a combination of the two; case is not significant to the OLNET program). The NSC Initial menu is displayed as shown in the following example. From this menu, you can select a device path, get help for the menu, select the NSC Test Mode menu, select the NSC Program Mode menu, or return to the Main menu.

   ```
          ********** NSC TEST INITIAL MENU ***********


      NSC INITIAL MENU COMMANDS        Current Value (if applicable)
      -------------------------      ------------------------------
      DV - Device path ------------------>  undefined
      DPM - NSC Device Path Menu

      HELP - Get HELP information about this menu.

      TMM - Select the OLNET NSC Test Mode Menu.

      RT - Return to the OLNET Main menu.

   Enter a command:
   ```

3. Select a device path with the `DV` or `DPM` command. After you have selected a valid device path, the Initial menu is updated as shown in the following example:

```
      ********** NSC TEST INITIAL MENU ***********


   NSC INITIAL MENU COMMANDS        Current Value (if applicable)
   -------------------------      ------------------------------
   DV - Device path ----------------->  /dev/comm/n00-032/lp01
   DPM - NSC Device Path Menu

   HELP - Get HELP information about this menu.

   TMM - Select the OLNET NSC T.

   RT - Return to the OLNET Main menu.

Enter a command:
```

4. Select the NSC Test Mode menu by entering the `TMM` command. The Test Mode menu for Cray Research system A is displayed, along with configuration information related to the NSC adapter and UNICOS driver.

```
   IOS Configuration information for NSC
   -------------------------------------
    Unit number(hex) = C2       Unit number and path(hex) = C203
    Adapter Type = DX series Driver mode = Parameter Block (DX/N130)
   Test Parameter Commands          Value
   -----------------------         -----
    PC - Pass count -------------->  1
    MP - Messages pass ----------->  10
    AL - Associated data length -->  100
    PT - Pattern type ------------>  ADDRESS
    RA - Remote address(Hex) ----->  undefined
    TM - Test mode --------------->  Active mode
   Execute & miscellaneous commands
   --------------------------------
    HELP - Get HELP information about this menu.
    EX - Execute: Active mode for NSC.
    CFG - Display/change IOS E configuration
    TR - NSC driver trace:  DISABLED
    RT - Return to the Initial Menu.

Enter a command:
```

5. You are now ready to test the local NSC adapter by executing local adapter loopback. Local loopback applies only if the adapter type is DX-series. The adapter type is displayed in the `IOS Configuration information` part of the NSC Test Mode menu.

   If the adapter type is A-series, you cannot run local adapter loopback, but should go to the remote loopback procedure that begins at step 10 in this example.

   Select the local adapter loopback test mode by entering the `TMM` command. This action displays the NSC test modes that are available to Cray Research system A.

```
     Command        Description
     -------        -----------
       AA ------>   Async active mode
       AP ------>   Async passive mode
       AM ------>   Active mode
       DL ------>   Display driver statistics
       CL ------>   LOSP channel loopback
       HM ------>   Hyperchannel map
       LL ------>   Local loopback
       PM ------>   Passive mode
       RL ------>   Remote loopback
       RS ------>   Remote statistics
       XM ------>   Xmapping routine
Enter a command:
```

6. Select local loopback by entering the `LL` command. Alternatively, you can select local loopback by entering the `TM,LL` command, which bypasses the list of available test modes. After local loopback has been selected, the Test Mode menu appears as follows:

```
   IOS Configuration information for NSC
   -------------------------------------
    Unit number(hex) = C2       Unit number and path(hex) = C203
    Adapter Type = DX series Driver mode = Parameter Block (DX/N130)
   Test Parameter Commands          Value
   -----------------------          -----
    PC - Pass count -------------->  1
    MP - Messages pass ----------->  10
    AL - Associated data length -->  100
    PT - Pattern type ------------>  ADDRESS
    RA - Remote address(Hex) ----->  undefined
    TM - Test mode --------------->  Active mode
   Execute & miscellaneous commands
   --------------------------------
    HELP - Get HELP information about this menu.
    EX - Execute: Active mode for NSC.
    CFG - Display/change IOS E configuration
    TR - NSC driver trace:  DISABLED
    RT - Return to the Initial Menu.

Enter a command:
```

7. Change OLNET test parameters, such as pass count, pattern type, and so on, as desired.

8. Execute the local adapter loopback test by entering the EX command. Local adapter loopback tests the following items:

   - System A's IOS LOSP channels
   - System A's adapter device interface, which is the hardware that connects the adapter to the Cray Research channels
   - System A's adapter nucleus

   The following message is updated every 10 seconds during test execution:

```
OLNET mode ---------->    Local loopback
Current pass count -->    223
Passes remaining ---->    777

Mon Nov 30 11:37:14 1995
```

On successful test completion, the following message is displayed:

```
Test passes have completed for
Local loopback

Total bytes transmitted    =  864000
Total bytes received       =  864000

Elapsed time(hh:mm:ss)     =  00:00:17
Transfer rate = 101647 bytes/second

        Press <CR> to continue.
```

If the local adapter loopback test fails, you must determine the cause of the failure before proceeding to the next step.

9. Repeat steps 1 through 8 on Cray Research system B to test its local adapter.

10. After the local adapter loopback test has executed successfully on both Cray Research systems, you can execute the remote adapter loopback test. Select the remote adapter loopback test mode by entering the `TM,RL` command.

    Executing the remote adapter loopback test from Cray Research system A tests the following items:

    - System A's adapter device interface, which is the hardware that connects the adapter to the Cray Research channels
    - System A's adapter nucleus
    - System A's adapter trunk interface, which is the NSC hardware that connects the adapter to the HYPERchannel cable (or fiber optics)
    - HYPERchannel cable
    - System B's adapter trunk interface
    - System B's adapter nucleus

11. Use the `RA` command to load the remote address number. The remote address is the unit number of the downline or system B NSC adapter. This number is site-determined. You can obtain the remote address number from the `Unit Number` field on the IOS configuration information display for Cray Research system B. For example purposes, assume that system B's

adapter unit number is 6A (hexadecimal). You would enter the following command from the Test Mode menu.

```
ra,6A
```

12. Enter the EX command from the Test Mode menu to execute remote adapter loopback.

    The following message is updated every 10 seconds during test execution:

```
OLNET mode ---------->    Remote loopback
Current pass count -->     18
Passes remaining ---->     82

Mon Nov 30 12:55:29 1995
```

    On successful test completion, the following message is displayed:

```
Test passes have completed for
Remote loopback

Total bytes transmitted  =  864000
Total bytes received     =  864000

Elapsed time(hh:mm:ss)   =  00:00:16
Transfer rate = 108000 bytes/second

       Press <CR> to continue.
```

    If the remote adapter loopback test fails, you must determine the cause of the failure before proceeding to the next step.

13. Repeat steps 10 through 12 on Cray Research system B to test the path from system A's adapter to system B's adapter.

14. After the remote adapter loopback test has executed successfully on both Cray Research systems, you can execute the end-to-end or active-and-passive test modes.

    Executing active-and-passive mode tests the following items:

    - System A's IOS LOSP channels

- System A's adapter device interface, which is the hardware that connects the adapter to the Cray Research channels
- System A's adapter nucleus
- System A's adapter trunk interface, which is the NSC hardware that connects the adapter to the HYPERchannel cable (or fiber optics)
- HYPERchannel cable
- System B's adapter trunk interface
- System B's adapter device interface
- System B's adapter nucleus
- System B's IOS LOSP channels

15. On system A, load the 16-bit unit number and path (hexadecimal) for system B in the `RA` field. You can obtain the 16-bit value from the `Unit Number and path` field on the IOS configuration information display for Cray Research system B. For example purposes, assume that system B's adapter unit number and path is C203 (hexadecimal). You would enter the following command from the Test Mode menu.

    ```
    ra,C203
    ```

16. Perform the same operation from Cray Research system B. The `RA` value entered will be 6A07 or the value from system A's `Unit Number and path` field.
17. On system A, enter the `TM,AM` command to set system A to active mode.
18. On system B, enter the `TM,PM` command to set system B to passive mode.
19. Always start execution on the passive system first. Enter the `EX` command on system B. The following message is displayed:

    ```
    Waiting for the first message.
    OLNET mode = Passive mode

    Wed Dec  2 08:18:27 1995
    ```

20. Start execution on the active system by entering the `EX` command on system A. The following message is displayed:

```
OLNET mode ---------->    Active mode
Current pass count -->      1
Passes remaining ---->     99

Wed Dec  2 08:20:47 1995
```

On successful test completion, the following message is displayed for system A:

```
Test passes have completed for
Active mode

Total bytes transmitted  =  864000
Total bytes received     =  864000

Elapsed time(hh:mm:ss)   =  00:00:21
Transfer rate            =  82285 bytes/second

       Press <CR> to continue.
```

On successful test completion, the following message is displayed for system B:

```
Test passes have completed for
Passive mode

Total bytes transmitted  =  864000
Total bytes received     =  864000

Elapsed time(hh:mm:ss)   =  00:00:21
Transfer rate            =  82285 bytes/second

       Press <CR> to continue.
```

3.4 NSC network message format

The NSC network message consists of a 64-byte message proper and optional, variable-length associated data (see Figure 13, page 55). The message proper contains 16 bytes (2 Cray words) of NSC network information and 48 bytes (6 Cray words) of OLNET diagnostic data. NSC A-series adapters limit the

maximum loopback message size to 4096 bytes. See the *Network Systems Corporation HYPERchannel A130 Adapter Software Reference Manual* or the *NSC NB130 Host Interface for Cray Customer Reference Manual* for additional information on the NSC network message format.

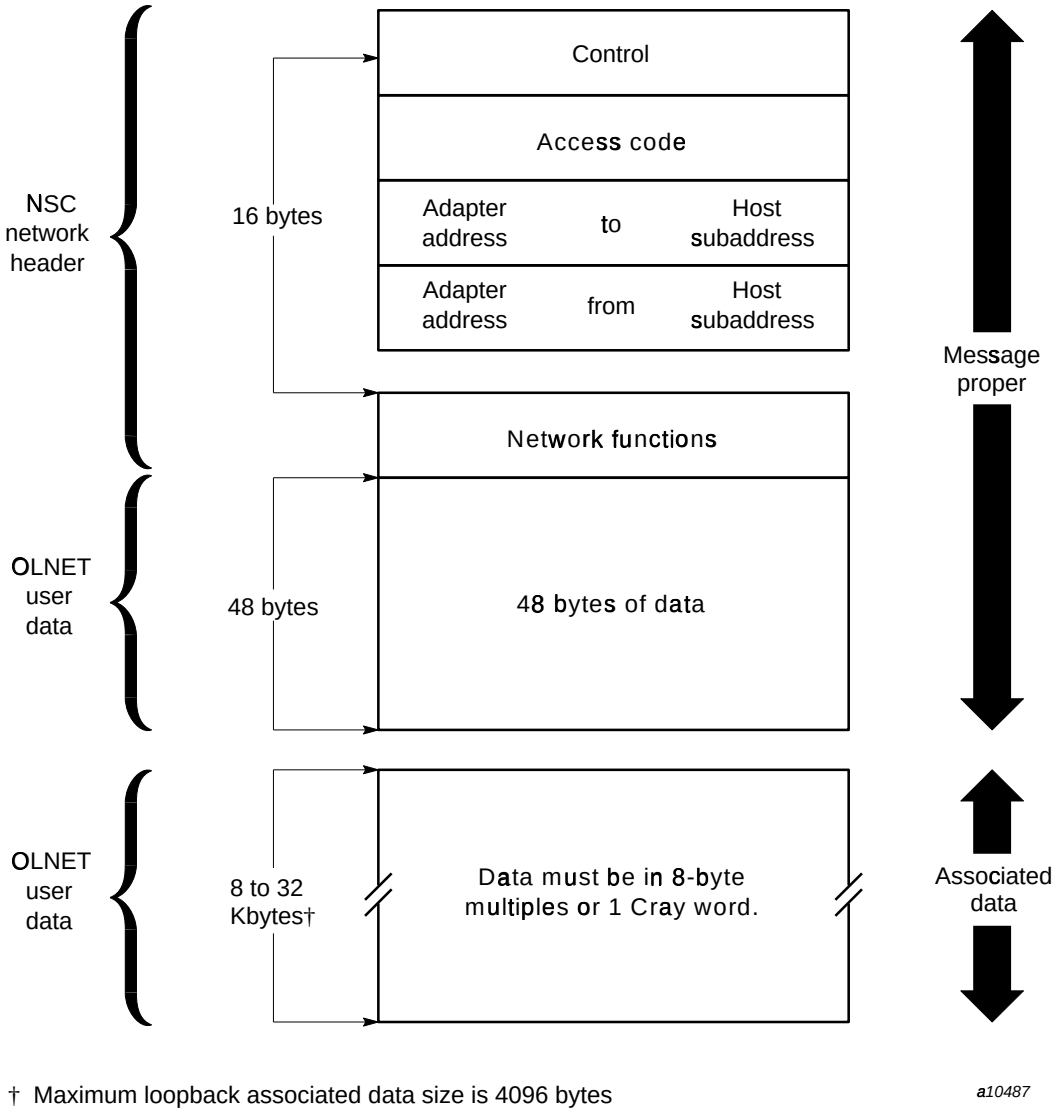

Figure 13. NSC network message format

3.5 NSC test menus

After you initialize OLNET and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4, enter NT from the Main menu to display the MVS and VM, and UNICOS and UNIX menu, Figure 14 and Figure 15 show the NSC menu under MVS and VM, and UNICOS and UNIX operating systems, respectively.

```
COMMAND                          VALUE
-------                           -----
PC - PASS COUNT --------------> 1
MP - MESSAGES/PASS -----------> 10
AL - ASSOCIATED DATA LENGTH --> 100
PT - PATTERN TYPE ------------> ADDRESS
RA - REMOTE ADDRESS (HEX) ----> NOT DEFINED
TM - TEST MODE ---------------> ACTIVE MODE
LA - LOCAL ADAPTER -----------> NOT DEFINED
DN - DEVICE NAME -------------> NOT DEFINED

ADAPTER INFORMATION              VALUE
-------------------               -----
LOCAL ADAPTER ADDRESS (HEX)     NOT DEFINED

EXECUTE/EXIT COMMANDS
---------------------
EX- execute the current nsc test mode.
RT - RETURN TO THE MAIN MENU.
```

Figure 14. NSC menu under MVS and VM

```
IOS Configuration information for NSC
-------------------------------------
     Unit number(hex) = C2       Unit number and path(hex) = C203
    Adapter Type = DX series Driver mode = Parameter Block (DX/N130)
   Test Parameter Commands          Value
   ----------------------           -----
    PC - Pass count -------------->  1
    MP - Messages pass ----------->  10
    AL - Associated data length -->  100
    PT - Pattern type ------------>  ADDRESS
    RA - Remote address(Hex) ----->  undefined
    TM - Test mode --------------->  Active mode
   Execute & miscellaneous commands
   --------------------------------
    HELP - Get HELP information about this menu.
    EX - Execute: Active mode for NSC.
    CFG - Display/change IOS E configuration
    TR - NSC driver trace:  DISABLED
    RT - Return to the Initial Menu.

Enter a command:
```

Figure 15. NSC menu under UNICOS and UNIX operating systems

3.6 NSC test commands

The commands described in this section can be used for interactive menu execution, MVS command mode jobs, UNICOS and UNIX shell scripts and commands, and VM EXEC procedures. (This section describes menu execution only. Appendix A, page 267, describes the other methods of execution.)

NSC test commands are as follows (the commands are for execution under MVS, UNICOS, UNIX, and VM systems unless otherwise noted):

Command	Description
AL,*al*	Associated data message length in 64-bit words. The valid range for *al* depends on TM (see Table 2, page 32). AL,*al* is not applicable to the following test modes (see the TM command): DX, LS, LSC, and RS. However, if allowed to default in these modes, AL will have no adverse effect on the test.

Table 3 shows the associated data message length for various test modes.

Table 3. Associated data message length

Test mode (TM)	Associated data message length (AL)	AL default
AM or PM	0 (no associated data)	100
AA or AP	1-4096 or RN (random)	
LL or RL	0 (no associated data)	100
	1-512 (A-series adapters) or RN (random)	
	1-4096 (N-series adapters)	

AR — Acknowledgment ratio (required for and applicable to asynchronous active-and-passive mode only). Indicates the number of messages sent by the active system before an acknowledgment message is returned by the passive system. AR is one of the following values:

- *mm*: 1 — Specifies that *mm* messages are sent by the asynchronous active system before the asynchronous passive system returns an acknowledgment message. For example, 100:1 specifies that 100 messages are sent by the asynchronous active system before the asynchronous passive system responds with an acknowledgment message. *mm* is a value in the range 1 through 4096.
- *mm*: 0 — Specifies no return acknowledgment (in effect, a write-only test by the asynchronous active system and a read-only test by the asynchronous passive system). *mm* is a value in the range 1 through 4096.
- *mm*: RN — Specifies a random acknowledgment ratio. *mm* indicates the upper range of random values for the acknowledgment ratio and must be a value in the range 1 through 4096.

For example, an acknowledgment ratio of `200:RN` specifies that a random number of messages (from 1 through 200) is sent by the asynchronous active system before the asynchronous passive system responds with an acknowledgment message.

The default for `AR` is 3:1.

Caution: It is recommended that you do not specify an `AR` value greater than 3:1 on a production network. A value greater than 3:1 can seriously impact network performance and result in adapter time-outs.

`CE` Tells OLNET to continue on error. Use the *errorfile* option to specify the file to which error output is written. These options do not appear on the NSC Test menus. The `CE` option must be placed between the `TMM` and `EX` options in a command-line string. See Section A.2.2, page 270, for more information.

`CFG` Modifies Cray Research LOSP channel configuration. See `np`(4), `mknod`(8), and `nconf`(8) for additional information about LOSP channel configuration. You must have super-user privilege to execute this command. The `CFG` subcommands are as follows:

`CDBE` Enables or disables the detection of double-bit errors by the LOSP driver.

`CMBE` Changes the controller mode. Options are 6-Mbyte mode, 12-Mbyte mode, or 12-Mbyte loopback mode. For an NSC adapter connected to the LOSP channel, the controller mode should be set to 12-Mbyte mode.

`DRVM` Changes the channel mode. Options are raw mode, message-proper mode (FEI-3), parameter block (DX/N130), parameter block (Ultra LSC), parameter block (FEI-3 `fy.c`), link control protocol (LCP) - USCP (FEI-1, VAX-BI), or A-series NSC adapter. For system operation, the NSC driver mode options are parameter block (DX/N130), A-series adapter, or USCP. Some tests in OLNET require the driver to be raw. If you try to test the NSC adapter and the channel mode is incorrect, an error will be displayed and testing will be terminated.

	ICHN	Changes or defines the current LOSP input and output channels. Options are channels 30, 32, 34, or 36. The output channel (odd channel number) is assumed when the input channel is defined.
	INTO	Changes the input channel time-out value.
	OUTO	Changes the output channel time-out value.
CM		Enables command-mode job execution (required for and applicable to command-mode execution only). CM also terminates incomplete or erroneous jobs, thereby preventing a hang condition in which the program waits for input.
DN,*dn*		Device name of the NSC adapter (MVS only; required). Contact your MVS system administrator to obtain the *dn* value.
DP		Displays test information from various menus (interactive menu execution only).
DPM		The device path menu (DPM) command allows you to display and dynamically select an NSC device path (assuming standard NSC device path naming conventions were used). For more information about device path naming conventions, see np(4). After the DPM command has been executed and if more than one NSC adapter is connected to your system, a menu option is displayed to choose one of the adapters by selecting a major device path. If only one adapter is connected to your system (one major path), or you have already selected a major path, a menu containing paths and statuses is displayed. You can select a path from this menu. This command is valid for UNICOS systems only.
DV,*dv*		Device path name (UNICOS and UNIX only; required). You must have read/write permission on the device path used by OLNET. Contact your system administrator to obtain these permissions, or have the administrator assign the device path name value. The *dv* variable is case-sensitive. Enter *dv* exactly as it appears in the device table. See Section 3.2, page 44, for information on finding the device path name used by OLNET.

`EDIT` Creates and loads canned test sequences or modifies an existing program (Cray Research system only). The `EDIT` subcommands are as follows:

`ST` *n* Sets the current program step to step *n*.

`LCS` Lists NSC canned test sequences. When you enter one of the following subcommands from the Help menu, the canned test sequence is loaded, and you are returned to the Edit menu:

`CS1` - Loopback write-read-compare 100 words of data

`CS2` - Loopback write-read-compare 10,000 words of data

`DX1` - DX initialization

`DX2` - DX initialization plus loopback

`DX3` - Repeat DX loopback 100 times

`DXP` - DX power-on initialization

`LEC` Lists edit program commands.

`ST` - Sets current step to *n*

`EDIT` - Selects edit mode

`IAS` - Inserts command after step *n*

`DELS` - Deletes commands from step *n* to step *x*

`SPF` - Saves program to a file

`LPF` - Loads program from a file

`LPC` Lists programming commands.

`NOP` - No operation

`DLYS` - Delays *n* seconds

`DLYU` - Delays *n* microseconds

`JBS` - Jumps backward step *n* for *x* times

CMPD - Compares write/read data in steps *n* and *n*1 for equality

PROG - Selects the Program Mode menu

LIC — Lists input channel programming commands.

RD - Reads *n* words

LOC — Lists output channel programming commands.

WRT - Writes *n* words of pattern *x*

DXINIT - Initializes the DX device

DXINPO - Power on initialization DX adapter

LADL - Local adapter loopback *x* bytes of pattern *y*

PROG — Returns to the Program Mode menu.

errorfile — Specifies the file to which error output is written. This option does not appear on the NSC Test menu. The *errorfile* option must be placed after the EX option in a command-line string. See Section A.2.2, page 270, for more information.

EX — Executes the test in the test mode specified by TM, *tm* (required).

HELP — Gets help for the current menu.

LA, *la* — Adapter type and unit number (IBM only) of the local adapter to which you are connected. *la* is one of the following values:

A — Adapter type A (format for VM and MVS only)

D — N-series adapter (DX) (format for VM and MVS only)

Contact your system administrator to determine the adapter type.

LT — Saves test information from various menus (interactive menu execution only). Each time LT is entered during an interactive OLNET session, information is accumulated in a file.

- Under VM, the file is saved under FILE NETOUT A. If you return to the Main menu for OLNET, the file is closed and will be overwritten during the next interactive OLNET session.
- Under UNICOS and UNIX operating systems, you must define the output file name and path before the output information can be saved.

`MP,`*mp* Messages generated on each pass. *mp* is a value in the range 1 through 1,000,000. The default for *mp* is 10.

`NT` Calls the NSC test (required).

`PC,`*pc* Pass count. *pc* is a value in the range 1 through 1,000,000. The default for *pc* is 1.

`PROG` Selects program mode from the Initial menu (Cray Research system only).

`PT,`*pt* Pattern type (in 64-bit words). *pt* is one of the following values:

`AD` Address (default). This sequential address pattern is incremented in each 16-bit parcel of a 64-bit word, as in the following example:

```
000000 000001 000002 000003
000004 000005 000006 000007
```

`AO` All 1's.

`AP` All patterns. A new pattern is generated for each message sent and received. The patterns are processed in the following order: `AD`, `AO`, `AZ`, `SO`, `SZ`, `RN`, `BT`.

`AZ` All 0's.

`BT` Bits. This pattern contains a random number of consecutive 1-bits randomly positioned within a 64-bit word, as in the following example:

```
000001 177770 000000 000000
000000 000000 077770 000000
177777 177777 177600 000000
000000 000000 003777 177700
```

The bits pattern is generated for each message sent and received, thereby increasing the total elapsed execution time. OLNET builds a new pattern for each message, thereby requiring extra CPU cycles and possibly reducing the data rate (bytes/second).

`RN` Random. A random pattern is generated for each message sent and received. OLNET builds a new pattern for each message, thereby requiring extra CPU cycles and possibly reducing the data rate (bytes/second).

SO — Sliding 1's. This is a 0's data pattern in which a 1-bit is circularly shifted through each 16-bit parcel, as in the following example:

```
000001 000002 000004 000010
000020 000040 000100 000200
```

SZ — Sliding 0's. This is a 1's data pattern in which a 0-bit is circularly shifted through each 16-bit parcel, as in the following example:

```
177776 177775 177773 177767
177757 177737 177677 177577
```

The default for *pt* is AD (address pattern).

RA, *ra* — Remote adapter address (8-bit hexadecimal value for an NSC adapter on the HYPERchannel). Table 4 shows the test modes for which *ra* must be defined and the *ra* length requirements. If allowed to default, *ra* is not defined.

Table 4. Remote adapter address requirements

Remote adapter address (RA) (hexadecimal)	Test mode
Two digits	LL (local adapter loopback) - RA is optional if TM is set to LL. RL (remote adapter loopback) RS (remote adapter statistics)
Four digits	AA (asynchronous active) AM (synchronous active) AP (asynchronous passive) PM (synchronous passive mode)

RT — Returns to the previous menu.

TM, *tm* — Test mode. *tm* is one of the following values:

AA — Asynchronous active.

AM — Synchronous active (default).

AP — Asynchronous passive.

	DL	Display driver statistics (Cray Research system only).
	DX	Dump extension registers (MVS and VM only; A-series adapters only).
	HM	HYPERchannel mapping.
	LL	Local adapter loopback (MVS, UNICOS, UNIX, and VM for N-series adapters; UNIX only for A-series adapters).
	LS	Local adapter statistics (MVS, UNIX on Sun Workstations, and VM only; A-series adapters only).
	LSC	Local statistics and clear (MVS and VM only; A-series adapters only).
	PM	Synchronous passive.
	PROG	NSC DX low-level command.
	RL	Remote adapter loopback.
	RP	Read single adapter profile (Cray Research system only).
	RPM	Map adapter profiles (Cray Research system only).
	RS	Remote adapter statistics.
	XM	Xmapping routine (Cray Research system only).
TMM		Selects the Test Mode menu (Cray Research system only).
TR		For UNICOS or UNIX systems only, enables or disables driver trace.
VA,*va*		Virtual address for the real device for the NSC adapter (VM only; required). To get the *va* value, contact your system administrator. VM class-B privilege is required for varying and attaching a real device. Contact your VM system administrator to request this privilege, or contact your VM system operator to request that the NSC adapter be attached to your VM user ID.

If you use the virtual address during the OLNET session and then exit the test, you must repeat the attachment procedure.

3.7 NSC test modes

You can execute the NSC test in any of the following test modes:

- Synchronous active-and-passive mode (active mode is the default)
- Asynchronous active-and-passive mode
- Local adapter loopback mode (MVS, UNICOS, UNIX, and VM for N-series adapters; UNIX only for A-series adapters)
- Remote adapter loopback mode
- Local adapter statistics mode (MVS, UNIX, and VM only; A-series adapters only)
- Local statistics and clear mode (MVS, UNIX, and VM only; A-series adapters only)
- Remote adapter statistics mode (A-series adapters only)
- Dump extension registers mode (MVS and VM only; A-series adapters only)
- HYPERchannel mapping mode
- Display driver statistics mode (Cray Research system only)
- Xmapping routine (Cray Research system only)
- NSC DX low-level command mode
- Read single adapter profile (Cray Research system only)
- Map adapter profiles (Cray Research system only)

The following sections describe the execution of each mode.

3.7.1 Synchronous active-and-passive mode or asynchronous active-and-passive mode

In synchronous active-and-passive mode (synchronous active mode is the default), either the Cray Research or the other system is assigned as active and the other as passive. The active system generates and sends synchronous

messages to the passive system. In turn, the passive computer system generates and sends messages to the active system.

In asynchronous active-and-passive mode, either the Cray Research or the other system is assigned as active and the other as passive. Unlike synchronous active-and-passive mode, asynchronous mode allows you to assign a variable number of messages to be sent (by the asynchronous active system) before an acknowledgment message is returned (by the asynchronous passive system).

Note: Unless specified otherwise, the phrase *active-and-passive mode* refers to both synchronous and asynchronous active-and-passive modes.

Executing active-and-passive mode or asynchronous active-and-passive mode from system A to system B (see Figure 12, page 43) tests the following components of the Cray Research HYPERchannel network:

- System A's IOS LOSP channels
- System A's adapter device interface, which is the hardware that connects the adapter to the Cray Research channels
- System A's local adapter nucleus
- System A's adapter trunk interface, which is the NSC hardware that connects the adapter to the HYPERchannel cable (or fiber optics)
- HYPERchannel cable
- System B's adapter trunk interface
- System B's adapter device interface
- System B's adapter nucleus
- System B's IOS LOSP channels

To execute active-and-passive mode, do the following:

1. Initialize OLNET on the active and passive computer systems and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC menu (see Figure 14, page 56, and Figure 15, page 57).
3. Perform one of the following steps, as appropriate to your test environment:

   a. MVS and VM environments:

Set the adapter type for the NSC adapter (LA command). Then specify the device name (MVS only: DN command), or set the NSC virtual address (VM only: VA command). After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number.

b. UNICOS and UNIX environments:

Set the NSC device path name (DV or DPM command).

4. Designate one computer system as active by setting the test mode to active (TM,AM) or asynchronous active (TM,AA). Then set the test mode for the other computer system to passive (TM,PM) or asynchronous passive (TM,AP).

The following commands must be set to the same values for both the active and the passive computer systems:

AL	Associated data message length
AR	Acknowledgment ratio (asynchronous active-and-passive mode only)
MP	Messages per pass (active-and-passive mode only)
PC	Pass count
PT	Pattern type

Note: For asynchronous active-and-passive mode, do not specify an AR value greater than 3:1 on a production network. A value greater than 3:1 can seriously impact network performance and result in adapter time-outs.

Modify any other command values from the NSC menu as necessary.

5. Enter the local adapter information value (16-bit hexadecimal address displayed in the NSC Unit Number and path field for the active computer system) as the value for the remote adapter address (RA command) in the NSC menu for the passive computer system.

6. Enter the local adapter address (16-bit hexadecimal address displayed in the NSC Unit number and path field for the passive computer system) as the value for the remote adapter address (RA command) in the NSC menu for the active system.

7. Enter EX from the NSC menu for the passive system to execute the NSC test.

Note: Always start test execution from the passive system.

The following informative message is then displayed:

```
Waiting for the first message.
PASSIVE MODE
```

You have 5 minutes to start test execution from the active system before the program times out.

8. Enter EX from the NSC menu for the active system to execute the NSC test.

   The following message is displayed on the active and passive systems during test execution:

```
OLNET mode test mode
Current pass count n
Passes remainingn
```

Note: You can attempt to clear an error condition under UNICOS and UNIX operating systems by reentering the NSC device path name (DV or DPM command). You can attempt to clear an error condition under MVS by reentering the device name (DN command) or under VM by reentering the virtual address (VA command). If this does not clear the error condition, you must do further testing to isolate the hardware fault in the communication link.

On test completion, the following message is displayed:

```
Test passes have completed for
test mode
Total bytes transmitted =  n
Total bytes received    =  n
Elapsed time(hh:mm:ss)  =  hh:mm:ss
Transfer rate = nbytes/second
```

Press RETURN to return to the NSC menu. You can modify the command values and rerun the NSC test, or enter RT to return to the Main menu for OLNET.

3.7.2 Local adapter loopback mode

In local adapter loopback mode (MVS, UNICOS, UNIX, and VM for N-series adapters; UNIX only for A-series adapters), the Cray Research system sends synchronous messages through the local NSC adapter to isolate faults in the adapter. The loopback operation is controlled by software. Messages are routed so that the data is returned to the computer system without going through the NSC HYPERchannel. In Figure 12, page 43, adapter C2 is the local adapter to Cray Research system A.

Executing local adapter loopback mode from system A (see Figure 12, page 43) tests the following components of the Cray Research HYPERchannel network:

- System A's IOS LOSP channels
- System A's adapter device interface, which is the hardware that connects the adapter to the Cray Research channels
- System A's local adapter nucleus

To execute local adapter loopback mode, do the following:

1. Initialize OLNET and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC Initial menu for UNIX-type systems or the NSC Initial menu for IBM systems (Figure 14, page 56 and Figure 15, page 57).
3. Perform one of the following steps, as appropriate to your test environment:
   a. MVS and VM environments:

      Set the adapter type for the NSC adapter (`LA` command). Then specify the device name (MVS only: `DN` command), or set the NSC virtual address (VM only: `VA` command). After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number.

   b. UNICOS and UNIX environments:

      Set the NSC device path name (`DV` or `DPM` command).
4. Set the test mode to local adapter loopback (`TM,LL`), modify any other command values as necessary, and enter `EX` to execute the test.

The following message is displayed during test execution:

```
OLNET mode            LOCAL ADAPTER LOOPBACK
Current pass count    n
Passes remaining      n
```

On test completion, the following message is displayed:

```
Test passes have completed for
LOCAL ADAPTER LOOPBACK
Total bytes transmitted = n
Total bytes received    = n
Elapsed time(hh:mm:ss)  = hh:mm:ss
Transfer rate           = n bytes/second
```

Press RETURN to return to the NSC menu. You can modify the command values and rerun the NSC test, or enter RT to return to the Main menu for OLNET.

3.7.3 Remote adapter loopback mode

In remote adapter loopback mode, the Cray Research or other computer system generates and sends synchronous message transfers through a remote NSC adapter. The loopback operation is controlled by software. Messages are returned to the computer system from which they were generated, without going through any other computer system in the link. See Figure 12, page 43, and note the following:

- From Cray Research computer system A, the remote adapter can be adapter 6A, AA, AB, 11, or 27 (all are hexadecimal).
- From Cray Research computer system B, the remote adapter can be adapter C2, AA, AB, 11, or 27 (all are hexadecimal).
- From computer system C, the remote adapter can be adapter C2, 6A, AA, AB, or 27 (all are hexadecimal).
- From computer system D, the remote adapter can be adapter C2, 11, 6A, AA, AB, or 2 (all are hexadecimal).

Executing remote adapter loopback mode from system A (see Figure 12, page 43) tests the following components of the Cray Research HYPERchannel network:

- System A's IOS LOSP channels

  System A's adapter device interface, which is the hardware that connects the adapter to the Cray Research channels

- System A's local adapter nucleus
- System A's adapter trunk interface, which is the NSC hardware that connects the adapter to the HYPERchannel cable (or fiber optics)
- HYPERchannel cable
- Downline system's adapter trunk interface
- Downline system's adapter nucleus

To execute remote adapter loopback mode, do the following:

1. Initialize OLNET on the Cray Research or other computer system and access the Main menu as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC menu (Figure 14, page 56 and Figure 15, page 57).
3. Perform one of the following steps, as appropriate to your test environment:

   a. MVS and VM environments:

      Specify the device name (MVS only: `DN` command), or set the NSC virtual address (VM only: `VA` command). After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number.

   b. UNICOS and UNIX environments:

      Set the NSC device path name (`DV` or `DPM` command).

4. Set the test mode to remote adapter loopback (`TM,RL`), set the remote adapter address (`RA` command), modify any other command values as necessary, and enter `EX` to execute the test.

   The following message is displayed during test execution:

```
OLNET mode
REMOTE ADAPTER LOOPBACK
Current pass count   n
Passes remaining     n
```

Note: You can attempt to clear an error condition under MVS by reentering the device name (DN command) or under VM by reentering the virtual address (VA command). If this does not clear the error condition, you must do further testing to isolate the hardware fault in the communication link.

On test completion, the following message is displayed:

```
Test passes have completed for
REMOTE ADAPTER LOOPBACK
Total bytes transmitted  = n
Total bytes received     = n
Elapsed time(hh:mm:ss)   = hh:mm:ss
Transfer rate            = n bytes/second
```

Press RETURN to return to the NSC menu. You can modify the command values and rerun the NSC test, or enter RT to return to the Main menu for OLNET.

3.7.4 Statistics menu

If the target adapter type is A-series and the test mode is set to local adapter statistics, local statistics and clear (MVS and VM only), or remote adapter statistics (TM,LS, TM,LSC, or TM,RS, respectively), and if the operation is executed without error, a Statistics menu (Figure 16, page 73) is displayed.

```
Select one of the following:

DP - Display the statistics package
LT - Save the statistics package on NETOUT.
RT - Return to the NSC menu.
```

Figure 16. Statistics menu

If you enter DP from the Statistics menu (when TM is set to LS, LSC, or RS), the adapter statistics package is displayed (see Figure 17, page 74).

For additional information on the adapter statistics package, see the appropriate Network Systems Corporation publications.

```
NSC statistics information package.
Note - All values in decimal unless noted.

Data frames (trunk  0)     = n
Data frames (trunk  1)     = n
Data frames (trunk  2)     = n
Data frames (trunk  3)     = n
Cancel operation‡          = n
Aborts‡                    = n
Retransmits (trunk  0)‡    = n
Retransmits (trunk  1)‡    = n
Retransmits (trunk  2)‡    = n
Retransmits (trunk  3)‡    = n
Model (hex)                = n
Revision (hex)             = n
Unit (hex)                 = n

Press <CR> to continue

‡ Indicates a fatal network error
```

Figure 17. Adapter statistics package

3.7.4.1 Local adapter statistics mode

In local adapter statistics mode (MVS, VM, or Sun Workstation; A-series adapters only), the Cray Research or other computer system accesses statistics from its local NSC adapter. See Figure 12, page 43, and note that from Cray Research system A, the local adapter is adapter C2.

The statistics provide you with adapter information, such as the number of messages transmitted and the number and type of errors detected.

To execute local adapter statistics mode, do the following:

1. Initialize OLNET on the Cray Research or other computer system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter NT to display the NSC menu (Figure 14, page 56 and Figure 15, page 57).
3. Perform one of the following steps, as appropriate to your test environment:
   a. MVS and VM environments:

      Set the adapter type for the NSC adapter (LA command). Then specify the device name (MVS only: DN command), or set the NSC virtual address (VM only: VA command). After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number.

   b. UNIX environment:

      Set the NSC device path name (DV or DPM command).
4. Set the test mode to local adapter statistics (TM,LS), modify any other command values as necessary, and enter EX to execute the test from the NSC menu.

If the test mode is set to local adapter statistics (TM,LS), and if the operation is executed without error, the Statistics menu (Figure 16, page 73) is displayed. If you enter DP from either menu, the adapter statistics package is displayed. Press RETURN to return to the NSC menu.

3.7.4.2 Local statistics and clear mode

In local statistics and clear mode (MVS and VM only; A-series adapters only), the IBM system accesses statistics from its local NSC adapter and then causes the adapter to clear those statistical counts. See Figure 12, page 43, and note the following:

- From IBM computer system C, the local adapter is adapter 11 (hexadecimal).
- From IBM computer system D, the local adapter is adapter 27 (hexadecimal).

The statistics provide you with adapter information, such as the number of messages transmitted and the number and type of errors detected.

To execute local statistics and clear mode, do the following:

1. Initialize OLNET on the IBM computer system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter NT to display the NSC menu (Figure 14, page 56, and Figure 15, page 57).
3. Perform one of the following steps, as appropriate to your test environment:
   a. MVS and VM environments:

      Set the adapter type for the NSC adapter (LA command). Then specify the device name (MVS only: DN command), or set the NSC virtual address (VM only: VA command).

      After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number.

   b. UNICOS and UNIX environments:

      Set the NSC device path name (DV or DPM command).
4. Set the test mode to local statistics and clear (TM,LS), modify any other command values as necessary, and enter EX to execute the test.

If the test mode is set to local statistics and clear (TM,LSC), and if the operation is executed without error, the Statistics menu (Figure 16, page 73) is displayed. If you enter DP, the adapter statistics package is displayed. Press RETURN to return to the NSC menu.

3.7.4.3 Remote adapter statistics mode

In remote adapter statistics mode, the Cray Research or other system accesses statistics from the remote NSC adapter. See Figure 12, page 43, and note the following:

- From Cray Research system A, the remote adapter can be adapter 6A, AA, AB, 11, or 27 (all are hexadecimal).
- From Cray Research system B, the remote adapter can be adapter C2, AA, AB, 11, or 27 (all are hexadecimal).
- From computer system C, the remote adapter can be adapter C2, 6A, GA, AA, AB, or 27 (all are hexadecimal).

- From computer system B, the remote adapter can be adapter C2, 6A, 11, AA, or AB (all are hexadecimal).

For A-series adapters, remote adapter statistics mode provides you with adapter information, such as the number of messages transmitted and the number and type of errors detected. For N-series adapters, this mode provides only model, revision, and unit information.

To execute remote adapter statistics mode, do the following:

1. Initialize OLNET on the Cray Research or other computer system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC menu (Figure 14, page 56, and Figure 15, page 57).
3. Perform one of the following steps, as appropriate to your test environment:
   a. MVS and VM environments:

      Specify the device name (MVS only: `DN` command), or set the NSC virtual address (VM only: `VA` command). After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number.

   b. UNICOS and UNIX environments:

      Set the NSC device path name (`DV` or `DPM` command).
4. Set the test mode to remote adapter statistics mode (`TM,RS`), set the remote adapter address (`RA` command), modify any other command values as necessary, and enter `EX` to execute the test.

If the test mode is set to remote adapter statistics (`TM,RS`), and if the operation is executed without error, the Statistics menu (Figure 16, page 73) is displayed. If you enter `DP` from either menu, the adapter statistics package is displayed. Press `RETURN` to return to the NSC menu.

3.7.5 Dump extension registers mode

In dump extension registers mode (MVS and VM only; A-series adapters only), the Cray Research or IBM system accesses the contents of the dump extension registers in the local NSC adapter. See Figure 12, page 43, and note the following:

- From system D, the local adapter is adapter 27 (hexadecimal).
- From system C, the local adapter is adapter 11 (hexadecimal).

The register contents provide you with adapter information such as the number of messages transmitted, the number and type of errors detected, and local statistics.

To execute dump extension registers mode, do the following:

1. Initialize OLNET on the Cray Research or IBM system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter NT to display the NSC menu (Figure 14, page 56, and Figure 15, page 57).
3. For IBM systems only, set the adapter type and unit number for the NSC adapter (LA command). Then specify the device name (MVS only: DN command), or set the NSC virtual address (VM only: VA command). After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number.
4. Set the test mode to dump extension registers (TM,DX), and enter EX to execute the test.

   The Dump Extension Registers menu (Figure 18, page 78) is displayed if the operation is executed without error.

```
Select one of the following:

DP - Display the extension register package.
LT - Save extension registers on NETOUT.
RT - Return to the NSC menu.
```

Figure 18. Dump Extension Registers menu

If you enter DP from either menu, the dump extension registers package is displayed. For additional information on the dump extension registers, see the appropriate Network Systems Corporation publications. Press RETURN to return to the NSC menu.

3.7.6 HYPERchannel mapping mode

In HYPERchannel mapping mode, OLNET outputs a list of the NSC adapters on the HYPERchannel. The test attempts to read remote statistics on all adapters from units 01_{16} through FF_{16}. If a response to the statistics request is received, the adapter type and related information is accumulated for displaying or saving to a user-defined file.

A-series adapters generate a single entry for each adapter. N-series adapters generate a range of addresses for each board type within an adapter. Because of the subaddressing feature of N-series adapters, a single board type may respond to several subaddresses. Therefore, a map of an N-series adapter may have more responses than adapters. If you need additional information, contact your local NSC representative.

To execute HYPERchannel mapping mode, do the following:

1. Initialize OLNET on the Cray Research or other computer system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC menu (Figure 14, page 56, and Figure 15, page 57).
3. Perform one of the following steps, as appropriate to your test environment:
   a. MVS and VM environments:

      Specify the device name (MVS only: `DN` command), or set the NSC virtual address (VM only: `VA` command). After a valid device name or virtual address is entered, the NSC menu is refreshed to display a 4-digit hexadecimal value for the local adapter address. The 2 leftmost digits indicate the local adapter address. The 2 rightmost digits indicate a subchannel number. Determine the NSC adapter type (`LA,`*la*) of the local adapter. The adapter may be type A (`LA,A`) or an N-series (DX) adapter (`LA,D`).

   b. UNICOS and UNIX environments:

      Set the NSC device path name (`DV` or `DPM` command).
4. Set the test mode to HYPERchannel mapping (`TM,HM`), and enter `EX` to execute the test.

The following message is displayed:

```
Map the HYPERchannel
day month day hh:mm:ss year
```

Until the mapping has completed, a status message similar to the following is displayed approximately once every minute:

```
Mapping in progress
Unit being polled =  nn(16)
Current date and time = day month day hh:mm:ss year
   .
   .
   .
Mapping in progress.
Last unit polled =  nn(16)
```

On mapping completion, the following message is displayed:

```
Select one of the following:
DP - Display the HYPERchannel map.
LT - Save the HYPERchannel map on NETOUT.
RT - Return to the previous menu.
```

If you enter **DP**, the mapping information is displayed interactively. The following example shows partial output from a HYPERchannel map:

```
HYPERchannel Map.  Date = 04/12/90 Time = 11:39:26

Unit No.  - 0500 Model - D101  PID - 04           CRAY INTERFACE
Unit No.  - 0520 Model - D101  PID - 04           CRAY INTERFACE
Unit No.  - 0540 Model - D101  PID - 04           CRAY INTERFACE
Unit No.  - 0560 Model - D101  PID - 04           CRAY INTERFACE
Unit No.  - 0580 Model - D101  PID - 04           CRAY INTERFACE
Unit No.  - 05A0 Model - D10l  PID - 04           CRAY INTERFACE
Unit No.  - 05C0 Model - D000  PID - 00               DX NUCLEUS
Unit No.  - 05E0 Model - D200  PID - 02      HYPERCHANNEL 50/100
Unit No.  - 14 Model   - D400  Rev - 50    MINI-COMPUTER ADAPTER
Unit No.  - 15 Model   - D400  Rev         MINI-COMPUTER ADAPTER
Unit No.  - 17 Model   - D400  Rev - 50    MINI-COMPUTER ADAPTER
Unit No.  - 1A Model   - D400  Rev - 50    MINI-COMPUTER ADAPTER
Unit No.  - 3F00 Model - D102  PID - 04            MULTIPORT IF.
Unit No.  - 3F20 Model - D102  PID - 04            MULTIPORT IF.
```

If you enter `LT`, the HYPERchannel map is saved in a user-defined file. If you enter `RT`, you return to the NSC menu.

From the NSC menu, you can enter `RT` to return to the Main menu for OLNET.

3.7.7 Display driver statistics mode

Executing display driver statistics mode (Cray Research system only) displays driver configuration and adapter information about a local NSC adapter. The information presented when driver statistics are displayed is an expanded form of the OLNET IOS configuration information display.

To execute display driver statistics mode, do the following:

1. Initialize OLNET on the Cray Research system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
2. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC Initial menu (Figure 14, page 56 and Figure 15, page 57).
3. Set the NSC device path name (`DV` or `DPM` command).
4. Enter the `TMM` command to go to the Test Mode menu.
5. Set the test mode to display driver statistics (`TM,DL`), and enter `EX` to execute the test.

On successful completion of the command, the following menu is displayed:

```
Select one of the following:
 DP - Display driver statistics.
 LT - Save driver statistics on a named file.
 RT - Return to the previous menu.

Enter a command:
```

6. From this menu you can display the driver statistics by entering the `DP` command, save the driver statistics by entering the `LT` command, or return to the previous menu by entering the `RT` command.

3.7.8 Xmapping routine mode

Executing Xmapping routine mode (UNICOS systems only) presents an X Window System display of NSC adapters on the HYPERchannel. From this display, you can perform an adapter loopback test by simply positioning the mouse pointer over an adapter widget or test operation and then pressing a mouse button.

To execute Xmapping routine mode, do the following:

1. Before initializing OLNET, set your shell's display variable to the value for your workstation. To determine your workstation's display variable name, enter `echo $DISPLAY` at your workstation.

   For a C shell, enter the following command on the Cray Research system:

   `setenv DISPLAY` *workstation variable name*

   For a Korn shell, enter the following command on the Cray Research system:

   `set DISPLAY=`*workstation variable name*

2. Initialize OLNET on the Cray Research system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
3. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC Initial menu (Figure 14, page 56 and Figure 15, page 57).
4. Set the NSC device path name (`DV` or `DPM` command).

5. Enter the TMM command to go to the Test Mode menu.

6. Set the test mode to Xmapping routine (TM,XM), and enter EX to execute the test. The following menu is displayed:

```
Choose one of the following:
 LM - Load a previously saved Xmap.
 GX - Generate a new Xmap.
 RT - Return to the NSC menu.

Enter a command:
```

7. If you have previously run and saved the Xmap, you can load the saved map by entering the LM command, followed by the name of the directory and file where the map was saved. To generate a new Xmap, enter the GX command. After entering GX, the following message is displayed until the entire HYPERchannel has been mapped:

```
Mapping in progress -->  Test mode =  Xmapping routine
Unit being polled = 21(16)
Current date and time = Wed Dec  2 10:00:47 1995
```

   On completion of the GX command, the following menu is displayed:

```
Choose one of the following:
 SM - Save the current map on a file.
 EM - Execute the current map.
 RT - Return to the NSC menu.

Enter a command:
```

8. You can save the current map in a user-defined directory and file by entering the SM command, which saves the current Xmap for later retrieval by the LM command, or you can execute the Xmap by entering the EM command.

   When you enter the EM command, and the display variable has been set correctly, an Xmap similar to the following is displayed:

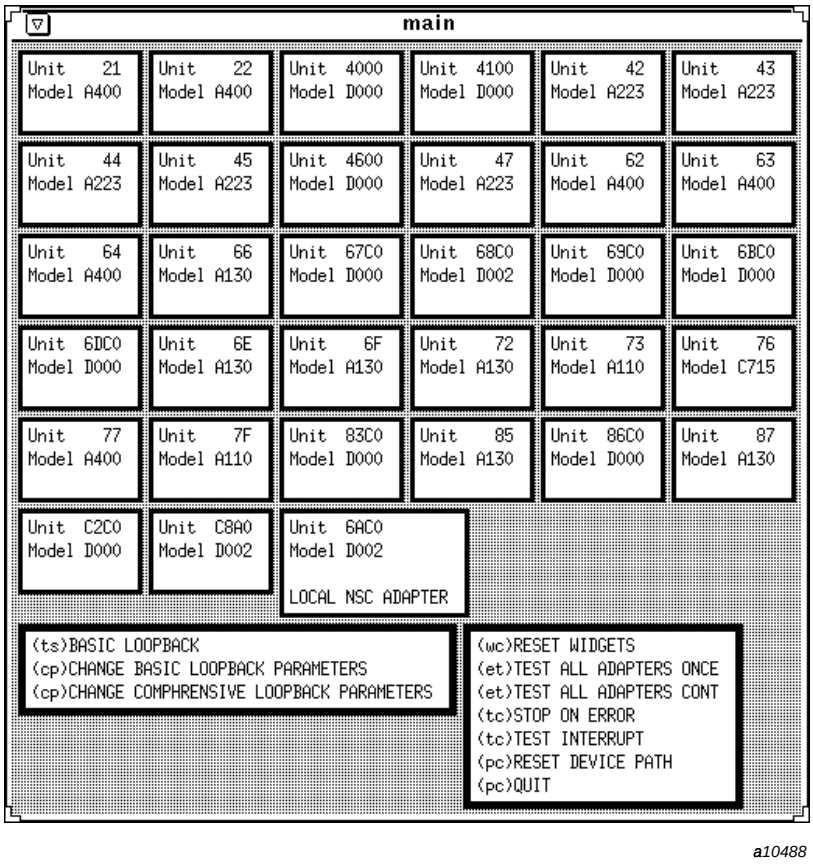

Figure 19. Sample Xmap

9. Follow the directions on the NSC Xmap Input-Output-Information window to execute a mapping test. In the NSC Xmap widget display, note that the following informative abbreviations are used.

`ts`	Test select
`cp`	Change parameters
`wc`	Widget control
`et`	Execute test
`tc`	Test control

pc	Program control

3.7.8.1 Xmap (TS) basic loopback command

The Xmap basic loopback command (TS) selects the basic loopback test. Basic loopback values can be displayed by locating your mouse pointer over the (cp)CHANGE BASIC LOOPBACK PARAMETERS command in the widget display and pressing a mouse button. The following menu is displayed in the NSC Xmap Input-Output-Information window:

```
Change BASIC LOOPBACK PARAMETERS Menu

   Command                          Value
   -------                          -----
   PC - Pass count -------------->  1
   MP - Messages pass ----------->  10
   AL - Associated data length -->  100
   PT - Pattern type ------------>  ADDRESS

   RT - Return control to the XMAP window.

Enter a command:
```

From this menu, you can change the basic loopback test parameters. To return control to the widget display, enter the RT command from the NSC Xmap Input-Output-Information window.

3.7.8.2 Xmap (TS) comprehensive loopback command

The Xmap comprehensive loopback command (TS) selects the comprehensive loopback test. Comprehensive loopback values can be displayed by locating your mouse pointer over the (cp)CHANGE COMPREHENSIVE LOOPBACK PARAMETERS command in the widget display and depressing a mouse button. The following menu is displayed in the NSC Xmap Input-Output-Information window:

```
Change COMPREHENSIVE LOOPBACK PARAMETERS Menu

   Command                          Value
   -------                          -----
   PC - Pass count -------------->  100
   MP - Messages pass ----------->  10
   AL - Associated data length -->  RANDOM
   PT - Pattern type ------------>  ALL PATTERNS

   RT - Return control to the XMAP window.

Enter a command:
```

From this menu, you can change the comprehensive loopback test parameters. To return control to the widget display, enter the `RT` command from the NSC Xmap Input-Output-Information window.

3.7.8.3 Additional Xmap commands

Additional Xmap commands are as follows:

Command	Description
`(ts)RESET WIDGETS`	Initializes the widget display.
`(et)TEST ALL ADAPTERS ONCE`	Executes the current test selection once for all adapters.
`(et)TEST ALL ADAPTERS CONT`	Executes the current test selection repetitively until you select the `(et)TEST INTERRUPT` command.
`(tc)STOP ON ERROR or CONTINUE ON ERROR`	If an error is detected by OLNET and `stop on error` is selected, test progress is terminated. Depending on the error type, you may have to perform an explicit operation in the NSC Xmap Input-Output-Information window before proceeding with test execution.

	If an error is detected by OLNET and `continue on error` is selected, test progress will continue even if an error is detected.
`(et)TEST ALL ADAPTERS CONT`	Executes the current test selection repetitively until you select the `(et)TEST INTERRUPT` command.
`(et)TEST INTERRUPT`	Stops test execution.
`(et)RESET DEVICE PATH`	Occasionally an error occurs and remains active until the device path is closed and then reopened. This command performs the close and reopen operation automatically.
`(et)QUIT`	Returns control to the NSC menu.

3.7.8.4 NSC DX low-level command mode

The NSC DX low-level command mode performs a comprehensive test of the IOS-E LOSP channel pair or an NSC DX adapter.

You may find it useful to turn on the trace option (`TR` command) while executing this test, as detailed information related to the DX initialization sequence is captured in the trace file. (See Section 3.6, page 57, for a description of the `TR` command.)

This test mode must be run using the IOS-E raw driver; therefore, network protocols must be taken down. See `np`(4) for information on the raw driver.

1. Contact the Cray Research operator and let the operator know which DX adapter you want to test. If the system is running a SUPERLINK network driver, the operator for the Cray Research system must enter the following command to take SUPERLINK down:

   ```
   /etc/slstop
   ```

   If the Cray Research station is using the target adapter, the operator must enter the following command:

   ```
   sdaemon -k uscp
   ```

If TCP/IP is using the target adapter, the operator must enter the following command:

`ifconfig` *interface* `down`

2. If you are going to execute the OLNET LOSP (CCA1) cable loopback test, you must first install a Cray Research cable loopback connector in the adapter cables. See Table 5 for loopback connector selection. See Figure 20, page 90, to select the appropriate loopback point.

Table 5. Loopback connector selection

Testing	Disconnect	Cray Research loopback connector part number
Cray Research channel modules	Point A	2203405

3. Load OLNET on the Cray Research system.
4. Initialize OLNET on the Cray Research system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.
5. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC Initial menu (Figure 14, page 56 and Figure 15, page 57).
6. Set the NSC device path name (`DV` or `DPM` command).
7. Enter the `PROG` command to select `NSC COMMAND PROGRAM (PROGRAM MODE)`, or, if desired, you can execute the LOSP cable loopback test from the Test Mode menu (`TMM` command).
8. Enter the `CFG` command to display and/or reconfigure the CCA1 for testing.
   a. If the driver mode is not raw, enter the `DRVM` command, followed by the `RAW` command to change the driver mode.
   b. If you are going to execute cable loopback, check, and if necessary, change the controller mode to 6-Mbyte mode (`CM6` option) or 12-Mbyte loopback mode (`CM12LB` option).
   c. If you are going to execute a low-level test of the adapter, check, and if necessary, change the controller mode to 12-Mbyte mode (`CM12LB`).

9. After completing the reconfiguration, enter the RT command to return to the NSC Command Program (Program Mode) menu.

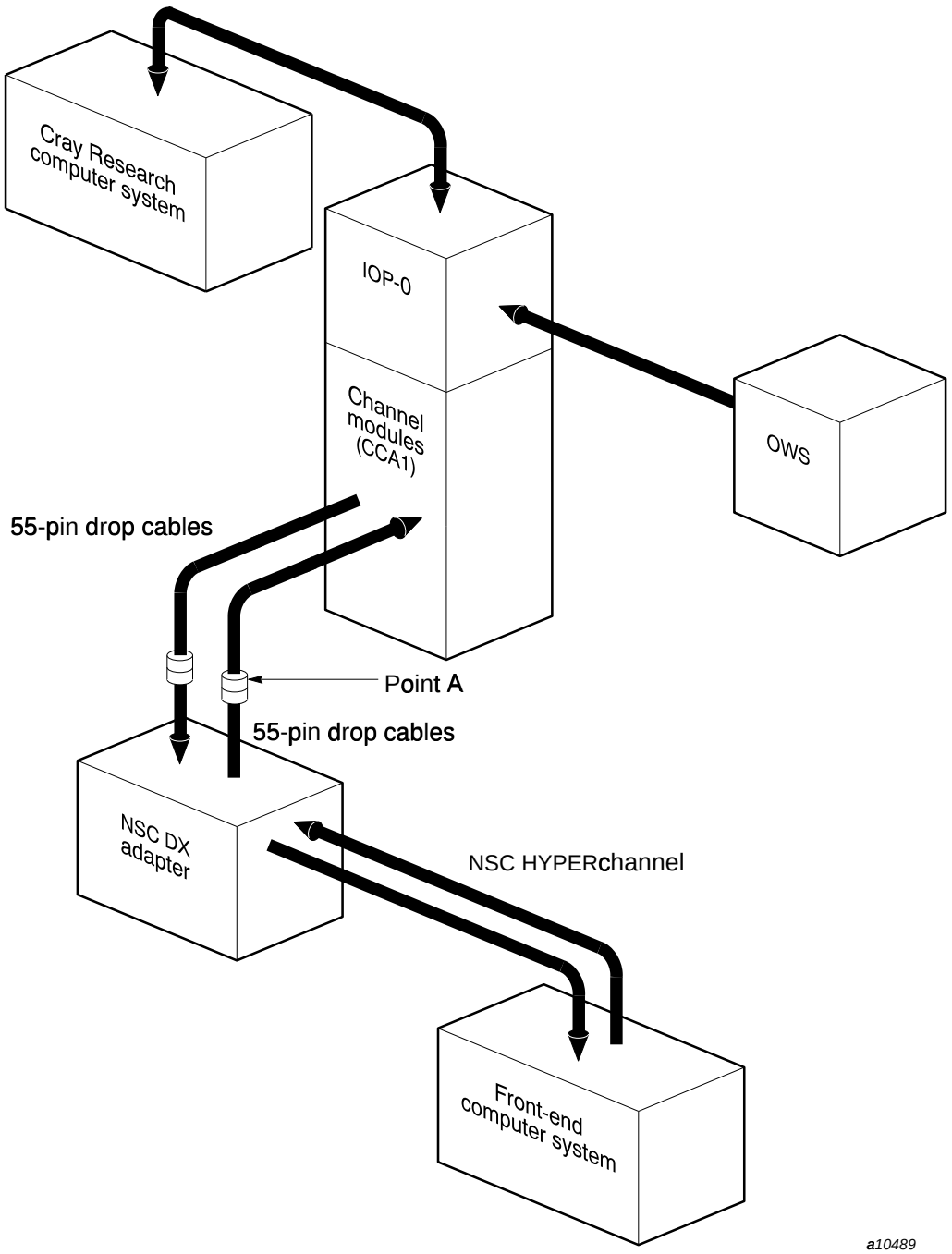

Figure 20. Selecting the appropriate loopback point

10. From the NSC Command Program (Program Mode) menu, enter the `EDIT` command.

11. From the NSC Command Program (Edit Mode) menu, enter the `HELP` command.

12. From the Edit Mode menu help display, enter the `LCS` command. The following menu is displayed:

```
      CANNED TEST SEQUENCES

SEQUENCE      DESCRIPTION:

  CS1  Loopback Write-Read-compare 100 words of data.
  CS2  Loopback Write-Read-compare 10000 words of data.
  DX1  DX initialization.
  DX2  DX initialization + loopback.
  DX3  Repeat DX loopback - 100 times.
  DXP  DX Power-on initialization.

Choose one of the following:
 - Enter: HELP,<command> for help with that command.
 - The command/sequence to enter in the program.
 - <CR> to go back to the initial help display.

Enter a command:
```

13. At this point, you can select an adapter low-level command test (`DX1`, `DX2`, `DX3`, or `DXP`) or an IOS-E CCA1 loopback test (`CS1` or `CS2`). If you select `DX1`, the following canned sequence is loaded into the NSC Command Program (Edit Mode) Edit menu.

```
 *** NSC COMMAND PROGRAM[EDIT MODE] ***

  step  1 CMC - Channel Master clear.
  step  2 DXINIT - Initialize the DX device.
* STEP  3

 HELP - Get HELP information.
 PROG - Return to PROGRAM MODE.
 RT - Return to PROGRAM MODE.
 ST - Set current step to n.

Enter a command:
```

14. Return from the NSC Command Program (Edit Mode) Edit menu to the NSC Command Program (Program Mode) Edit menu by entering the RT or PROG command.

15. Enter the EX command to execute the program sequence once, or enter the EXPR,*n* command to execute the program sequence *n* times.

    If the test sequence fails, the following message is displayed:

```
  *** PROGRAM COMPLETED ***

Total program execution time =    0.0000 seconds

The program was terminated due to an error.

Total message count:
  Total messages written = 0
  Total messages read = 0

TIME = 11:38:51  DATE = 12/02/95

           Press <CR> to continue.
```

    At this point, you can return to the Program menu by pressing RETURN. The following screen shows the Program menu with an error:

```
    IOS Configuration information for NSC
    -------------------------------------
     Unit number(hex) = C2       Unit number and path(hex) = C201
     Adapter Type = DX series Driver mode = Parameter Block (DX/N130)

 *** NSC COMMAND PROGRAM[PROGRAM MODE] ***

* STEP 1  **ERROR** CMC - Channel Master clear.
  step 2 DXINIT - Initialize the DX device.
  step 3

 SOE - Stop on error is: TRUE      TR - NSC driver trace is: DISABLED
 HELP - Get HELP information       EDIT - Select EDIT MODE.
 RT - Return to the INITIAL menu   ST - Set current step to n
 DFS - Display full status for step n
 CFG - Display/change IOS E configuration

Enter a command:
```

You can display the error in step 1 by entering the `DFS,1` command. For the previous error, the following information would be displayed:

```
  **** PROGRAM LOOP FULL STEP STATUS. step number:

Status for command:
COMMAND EXECUTED AT: TIME = 11:38:51  DATE = 12/02/95
UNICOS ERRNO = 0: Error 0
OLNET ERROR DETECTED = 2500:  Driver must be RAW mode to execute
  command.
DRIVER RETURNED ERROR = 0(8): No error

             *** WRITE STATISTICS ***
Bytes functioned = 32    Number of bytes actually WRITE = NONE
You may want to check the error statuses.

            Press <CR> to continue.
```

As you examine the error message for step 1, notice that the driver must be set to raw before executing this program sequence. The driver can be changed by entering the `CFG` command. If needed, at this point you can

run other canned tests by going to the NSC Command Program (Edit Mode) menu.

16. When you have completed testing, enter the `RT` command from the NSC Command Program (Edit Mode) menu.

17. Exit the NSC Initial menu by entering the `RT` command. If you did not return the NSC configuration to its original values, you are prompted by OLNET to do so.

18. If you disconnected channel cables or other equipment from the adapter, reconnect them before starting any of the network protocols.

19. Let the Cray Research operator know that you have completed testing the adapter. The operator must enter the following command:

    ```
    sdaemon -s uscp
    ```

    If TCP/IP is using the target adapter, the operator must also enter the following command:

    ```
    if config (interface) up
    ```

    If a SUPERLINK network driver is being used, the operator must enter the following command:

    ```
    slstart
    ```

3.7.8.5 Read single adapter profile mode and map adapter profiles mode

For UNICOS 7.C.3 and later releases, the read single adapter profile mode and map profiles mode are available on Cray Research systems with NSC DX adapters. In these test modes, DX adapter profile information from a single adapter or all adapters on the HYPERchannel device can be accessed and displayed.

To execute read single adapter profile mode or map adapter profiles mode, do the following:

1. Initialize OLNET on the Cray Research system and access the Main menu, as described in Section 1.2, page 2, and Section 1.3, page 4.

2. After you initialize OLNET and access the Main menu, enter `NT` to display the NSC Initial menu (Figure 14, page 56, and Figure 15, page 57).

3. Set the NSC device path name (`DV` or `DPM` command).

4. Enter the `TMM` command to go to the Test Mode menu.

5. Set the test mode to either read single adapter (TM,RP) or map adapter profiles (TM,RPM). If you selected read single adapter mode, you must enter the target or remote adapter address using the remote address (RA) command before executing the test mode. Map adapter profiles mode accesses all the HYPERchannel adapter profiles; therefore, it is not necessary to define the remote address with this mode.

6. Enter the EX command to execute the test mode. After the profile information is accessed successfully, the following message is displayed:

```
Select one of the following:
 DP - display the profile(s).
 LT - save the profile(s) on a named file.
 RT - return to the previous menu.

Enter a command:
```

7. If you enter DP, the profile information is displayed interactively as shown in the following example:

```
                          DX UNIT NUMBER: 40(HEX)
Date and Time returned by adapter:
  03:30:95(MM:DD:YY)  10:50:18(HH:MM:SS)
SENSE SWITCHES: 8002(HEX)
BUFFER MEMORY SIZE(Kilobytes): 07D0(HEX)

     ******BOARD FIELDS*****
BOARD NUMBER  HARDWARE PART NUMBER-REVISION
    00            201498-07
    01            201520-01
    04            201542-03
    05            201618-08
    06            201654-08
    08            201379-05
    09            201575-03
    10            201890-04
    11            201912-03
    14            202007-03

PROCESSOR FIELDS*****
 PROCESSOR NUMBER
 | POST(Power-on self test):
 |  |     If POST = 0000 then adapter OK,
 |  |     Else If POST = FFFF(HEX), Adapter MC'd before POST completed,
 |  |     Else POST detected error(Check with NSC).
 |  |  ------------------------------------------
 |  |   FIRMWARE PART NUMBER-REVISION
 |  |    |        HARDWARE PART NUMBER-REVISION
 |  |    |         |      NUMBER of LOGICAL PORTS.
 |  |    |         |         |    SUBADDRESS RANGE(HEX)
 |  |    |         |         |          |       TYPE-DESCRIPTION
 |  |    |         |         |          |         |    |
 v  v    v         v         v          v         v    v
 00 0000 217998-10 201498-07 01 010140C0-010140CF 0000-DX Nucleus
 02 0000 218625-11 201542-03 01 010140E0-010140FF 0200-HYPERchannel 50/1
 04 0000 207212-10 201379-05 01 01014080-010140BF 0100-IBM Block Mux
 06 0000 220407-06 202007-03 01 01014140-0101417F 0108-IBM Interface
```

If you enter LT, the profile information is saved in a user-defined file. If you enter RT, you return to the NSC menu.