VME Test (FEI-3) [4]

The VME test detects and isolates faults in the communications link between a Cray Research system and a Sun MWS, OWS, or Sun Workstation, or an OWS-E when the link consists of a VME device (FEI-3) or an OWS-E. The test is executed during normal system network operations and does not require a dedicated path.

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

- Getting started with the VME test under UNICOS

- Getting started with the VME test for the OWS or MWS

- Execution example

- VME testing using the fy driver

- VME network message format

- VME test menus

- VME test commands

- VME test modes

  - Active mode

  - Asynchronous active mode

  - Asynchronous passive mode

  - Cable loopback mode

  - Control cable test mode

  - Disable cable interrupts mode

  - Display driver statistics mode

  - Dump VME registers mode

  - fymc test mode

  - I/O master clear mode

  - Master clear mode

– Passive mode

– WIN echo mode

– IOS software echo mode

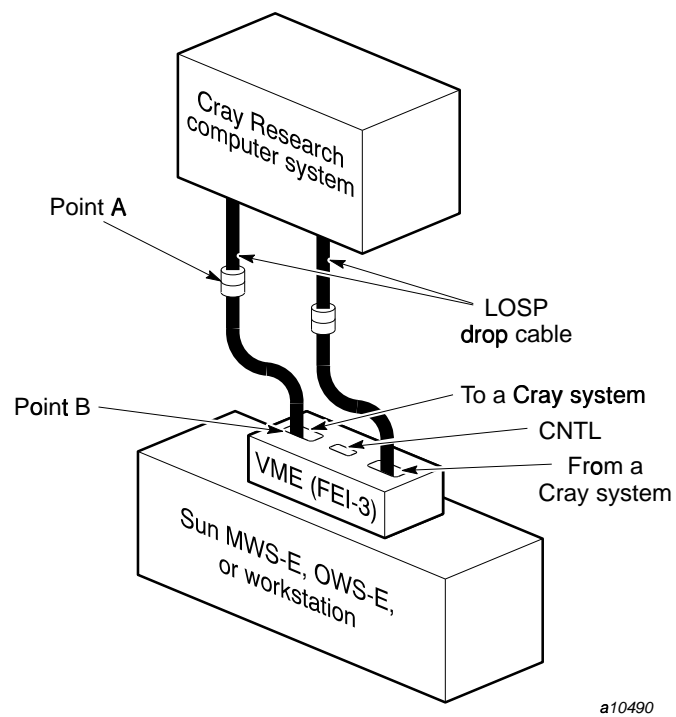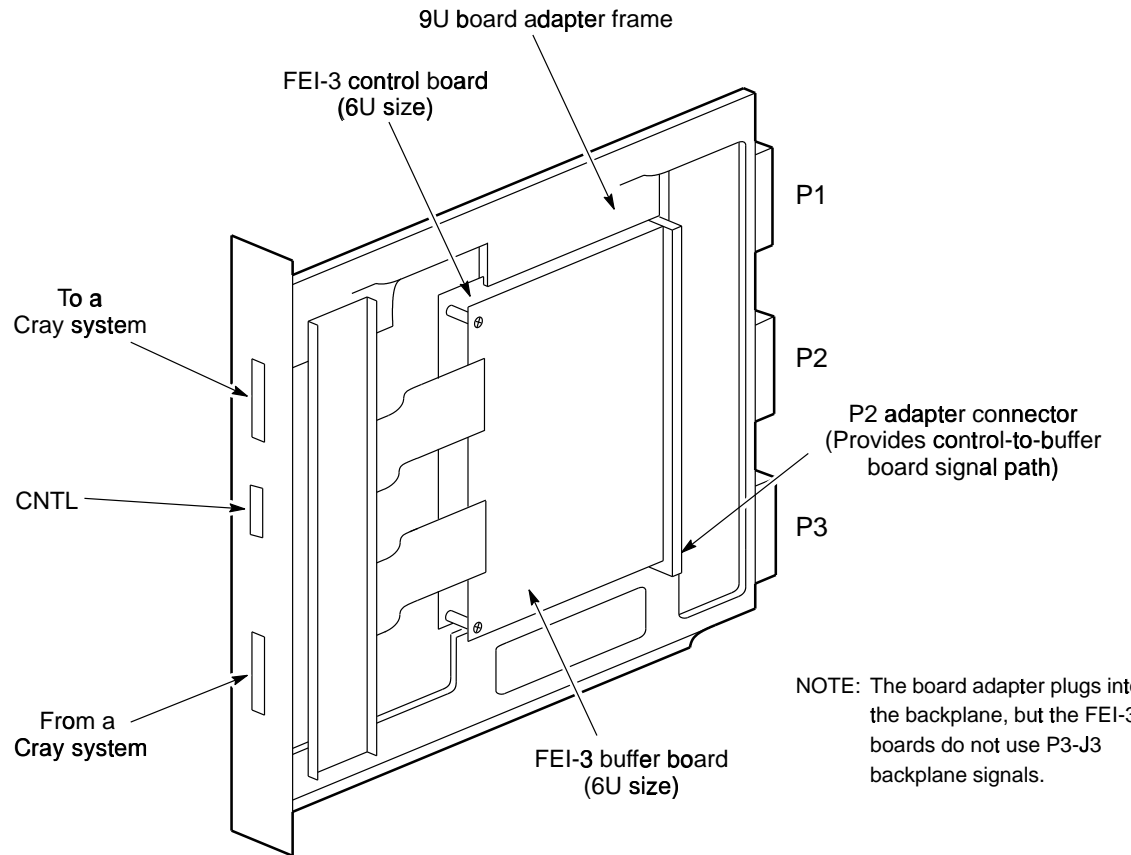Figure 21 is referenced throughout this chapter and shows the VME test environment.

Figure 21. VME loopback mode and test environment

Figure 22 shows the FEI-3 board set.

Figure 22. FEI-3 board set

4.1 Getting started with the VME test under UNICOS

The operator workstation (OWS) and maintenance workstation (MWS) have
two different VME (FEI-3) drivers. These drivers are identified by the names fy
and cy. To identify the type of driver on your system, log in to the OWS and
enter the `ls -l` command on the character special device files directory. If the
minor number contains the string `fy`, the driver is fy. If the minor number
contains the string `cy`, the driver is cy. The following is a sample partial output
for OWS VME devices when the `ls -l` command is executed.

```
                      cy driver

cy-ows{} ls -l

    crwxrwxrwx  1 cray   os    120, 0 Jan  7 07:47 cy0_00
    crw-rw----  1 cray   os    120, 1 Feb 23  1995 cy0_01
    crw-rw----  1 cray   os    120, 2 Jan  7 12:37 cy0_02
    crw-rw----  1 cray   os    120, 3 Jan  7 07:47 cy0_03
    crw-rw----  1 cray   os    120, 4 Dec 10 19:22 cy0_04
    crw-rw----  1 cray   os    120, 5 Nov 13 18:56 cy0_05
    crw-rw----  1 cray   os    120, 6 Nov 13 18:55 cy0_06


                      fy driver

fy-ows{} ls -l

    crw-rw-rw-  1 root   105, 16 Jan  7 08:40 /dev/fyc1_00
    crw-rw-rw-  1 root   105, 17 Sep 17 13:56 /dev/fyc1_01
    crw-rw-rw-  1 root   105, 18 Jan  7 08:44 /dev/fyc1_02
    crw-rw-rw-  1 root   105, 19 Jan  7 08:49 /dev/fyc1_03
```

Before executing the VME test under a Cray Research UNICOS system, you must determine the VME name for the connection to the VME device. This connection is called a device path name (DV, *dv* command).

If your site follows standard device path naming conventions for VME, you can determine the device path name by using the OLNET DPM command, which is available from the VME menu. For more information on the DPM command, see Section 4.7, page 117.

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

/dev/comm/v0*cc*/lp*xx*   (Cray Research system)

/dev/cy*xx*   (Sun Workstation/UNIX system)

/dev/cray/cy0_*xx*   (MWS or OWS cy driver)

/dev/fyc1_*xx*   (MWS or OWS fy driver)

/dev/fymc*   (MWS fy driver)

```
/dev/fy*/cCiI              (MWS or OWS fy driver)
```

The *cc* is the LOSP channel number, and *xx* is the minor device number. The *
is the Sun Workstation channel number, *C* is the IOS-E cluster number, and *I* is
the IOS-E IOP number.

You must have read/write permission for 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, Sun Workstation, or MWS/OWS 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/v*
   ```

   (Cray Research system)

   ```
   ls -l /dev/v*
   ```

   (Sun Workstation; not an MWS or OWS)

   ```
   ls -l /dev/cray/cy*
   ```

   (MWS/OWS)

   This command displays the configured VME devices. A sample device table
   for an OWS is shown in the following example. Your device table may be
   different.

```
crw-rw-rw-  1 cray    os    122,   0 Apr  6 12:47 /dev/cray/cy0
crw-rw-rw-  1 cray    os    120,   0 Jul 13 12:23 /dev/cray/cy0_00
crw-rw-rw-  1 cray    os    120,   1 Apr  6 12:47 /dev/cray/cy0_01
crw-rw-rw-  1 cray    os    120,   2 Jul 12 22:10 /dev/cray/cy0_02
crw-rw-rw-  1 cray    os    120,   3 Jul 13 14:13 /dev/cray/cy0_03
crw-rw-rw-  1 cray    os    120,   4 Jul 12 17:36 /dev/cray/cy0_04
crw-rw-rw-  1 cray    os    120,   5 Jul 12 17:36 /dev/cray/cy0_05
crw-rw-rw-  1 cray    os    120,   6 Jul 12 17:36 /dev/cray/cy0_06
crw-rw-rw-  1 cray    os    120,   7 Apr  6 12:47 /dev/cray/cy0_07
crw-rw-rw-  1 cray    os    120,   8 May 30 16:11 /dev/cray/cy0_08
crw-rw-rw-  1 cray    os    120    9 May 30 15:37 /dev/cray/cy0_09
crw-rw-rw-  1 cray    os    120, 10 Apr 26 11:14 /dev/cray/cy0_10
crw-rw-rw-  1 cray    os    120, 11 Apr  6 12:47 /dev/cray/cy0_11
crw-rw-rw-  1 cray    os    120, 12 Apr  6 12:47 /dev/cray/cy0_12
crw-rw-rw-  1 cray    os    120, 13 Apr  6 12:47 /dev/cray/cy0_13
crw-rw-rw-  1 cray    os    120, 14 Apr  6 12:47 /dev/cray/cy0_14
crw-rw-rw-  1 cray    os    120, 15 Apr  6 12:47 /dev/cray/cy0_15
```

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 the 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 VME 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.

4.2 Getting started with the VME test for the OWS or MWS

Beginning with the release of System Maintenance and Remote Testing Environment (SMARTE) 2.0b, the most current released version of OLNET available at the time is included in the OWS SMARTE directories as follows:

`/home/`*ows*`/cri/smarte/bin/olnet`

(Sun Workstation)

For example, on a Sun Workstation, the path could appear as follows:

`/home/ows1601/cri/smarte/bin/olnet`

Because OWS and UNICOS releases are asynchronous, the version of OLNET on the OWS may not match the version on the UNICOS system. However, OLNET is backwards compatible so version mismatches will not cause a failure.

4.3 Execution example

This section contains an example of VME test execution from a UNICOS system to a Sun/UNIX OWS connected by a Cray Research FEI-3. The example illustrates the procedure for testing the network connection from the Cray Research mainframe (UNICOS system) to the OWS.

1. On the UNICOS system, enter the following command to execute OLNET:

   `/etc/diag/olnet`

   The Main menu is displayed.

2. From the Cray Research Main menu, enter VT to select the VME (FEI-3) test (you can enter OLNET commands in uppercase, lowercase, or a combination of the two; case is not significant to the OLNET program). The Cray Research VME 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 VME Test Mode menu, or return to the Main menu.

```
          ********** VME TEST INITIAL MENU ***********



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


   HELP - Get HELP information about this menu.


   TMM - Select the OLNET VME Test Mode Menu.


   RT - Return to the OLNET Main menu.

 Enter a command:
```

3. From the Cray Research VME Initial menu, select a device path by entering the DV or DPM command. After selecting a valid device path, the Initial menu is updated as shown in the following example:

```
          ********** VME TEST INITIAL MENU ***********


   VME INITIAL MENU COMMANDS        Current Value (if applicable)
   -------------------------        -----------------------------
   DV - Device path ----------------->  /dev/comm/v00-30/lp02
   DPM - VME Device Path Menu


   HELP - Get HELP information about this menu.


   TMM - Select the OLNET VME Test Mode Menu.


   RT - Return to the OLNET Main menu.

 Enter a command:
```

4. From the Cray Research VME Initial menu, select the VME test mode by entering the TMM command. The Test Mode menu for the Cray Research system is displayed along with system configuration information related to the VME device and driver.

```
    IOS Configuration information for VME
    --------------------------------------
    Driver mode = parameter block (FEI-3 fy.c)
    Local path(hex) = 2

   Test Parameter Commands            Value
   -----------------------            -----
    PC - Pass count -------------->  1
    MP - Messages pass ----------->  10
    AL - Associated data length -->  100
    PT - Pattern type ------------>  ADDRESS
    RA - Remote path ------------->  undefined
    TM - Test mode --------------->  Active mode
   Execute & miscellaneous commands
   --------------------------------
    HELP - Get HELP information about this menu.
    EX - Execute: Active mode for VME.
    CFG - Display/change IOS E configuration
    TR - VME driver trace:  DISABLED
    RT - Return to the Initial Menu.

Enter a command:
```

5. From the Cray Research Test Mode menu, enter the TM command to display a list of test modes available on your system.

```
The current test mode is: Active mode.
Select one of the following or press <CR> to
  leave the value unchanged:

    Command          Description
    -------          -----------
      AM ------>    Active mode
      PM ------>    Passive mode
      AA ------>    Async active mode
      AP ------>    Async passive mode
      CL ------>    Cable loopback
      DL ------>    Display driver statistics

Enter a command:
```

6. Select passive mode by entering the `PM` command. Alternatively, you can select passive mode by entering the `TM,PM` command from the Test Mode menu, which bypasses the list of available test modes.

7. On the Sun OWS, execute the OWS version of OLNET by entering the following command:

   /home/*ows*/cri/smarte/bin/olnet

   (Sun Workstation)

   For example, on a Sun Workstation, the path could appear as follows:

   /home/ows1601/cri/smarte/bin/olnet

   The OWS OLNET Main menu is displayed.

```
          OLNET A.1 MAIN MENU


 YOUR SYSTEM:  NAME = SunOS, NODE NAME = cool-ows, RELEASE = 4.1.2,
              VERSION = 1, MACHINE = sun4


   COMMAND     DESCRIPTION
   -------     -----------
      VT - Call the VME test.
      HELP - Get HELP information about this menu.
      QT - Quit OLNET.


  OLNET IS A PROPRIETARY PRODUCT OF CRAY RESEARCH, INC.


 Enter a command:
```

8. From the OWS OLNET Main menu, enter `VT` to select the VME (FEI-3) test. The OWS VME Initial menu is displayed as shown here. From this menu, you can select a device path, get help for the menu, change test parameters, or return to the Main menu.

```
          ********** VME TEST INITIAL MENU ***********



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

   HELP - Get HELP information about this menu.

   TMM - Select the OLNET VME Test Mode Menu.

   RT - Return to the OLNET Main menu.

 Enter a command:
```

9. From the OWS VME Initial menu, select a device path by entering the DV or DPM command. After you select a valid device path, the Initial menu is updated.

```
          ********** VME TEST INITIAL MENU ***********



   VME INITIAL MENU COMMANDS         Current Value (if applicable)
   -------------------------     ----------------------------
   DV - Device path ------------------>  /dev/fyc1_03
   DPM - VME Device Path Menu

   HELP - Get HELP information about this menu.

   TMM - Select the OLNET VME Test Mode Menu.

   RT - Return to the OLNET Main menu.

 Enter a command:
```

10. From the OWS VME Initial menu, select the VME test mode by entering the TMM command. The OWS VME Test Mode menu is displayed along with system configuration information related to the VME device and driver.

```
     Configuration information for VME
     ----------------------------------
      Local path(hex) = 3

       Test Parameter Commands          Value
       -----------------------          -----
      PC - Pass count -------------->  1
      MP - Messages pass ----------->  10
      AL - Associated data length -->  100
      PT - Pattern type ------------>  ADDRESS
      RA - Remote path ------------->  undefined
      TM - Test mode --------------->  Passive mode
     Execute & miscellaneous commands
     --------------------------------
      EX - Execute: Active mode for VME.
      TR - VME driver trace:  DISABLED
      RT - Return to the Initial Menu.

  Enter a command:
```

11. If needed, change OLNET test parameters such as pass count, pattern type, and so on. Be sure that the test parameters are the same for the Cray Research mainframe and the OWS.

12. Define the logical connection from the Cray Research mainframe to the OWS driver. The name of this connection depends on your version of OLNET and may be called either the *remote address* or the *remote path*.

To define the logical connection, enter the target system's local address or local path using the RA command. In this example, the Cray Research local path is 2, as shown in the following menu:

```
    Configuration information for VME
    ----------------------------------
     Local path(hex) = 2

    Test Parameter Commands            Value
    ----------------------            -----
     PC - Pass count -------------->  1
     MP - Messages pass ----------->  10
     AL - Associated data length -->  100
     PT - Pattern type ------------>  ADDRESS
     RA - Remote path ------------->  undefined
     TM - Test mode --------------->  Active mode
    Execute & miscellaneous commands
    ---------------------------------
     EX - Execute: Active mode for VME.
     TR - VME driver trace:  DISABLED
     RT - Return to the Initial Menu.

 Enter a command:
```

13. Enter the RA,2 command on the OWS. In this example, the OWS local
    address is 3, as shown on the OWS menu.

```
    Configuration information for VME
    ----------------------------------
     Local path(hex) = 3

    Test Parameter Commands            Value
    ----------------------            -----
     PC - Pass count -------------->  1
     MP - Messages pass ----------->  10
     AL - Associated data length -->  100
     PT - Pattern type ------------>  ADDRESS
     RA - Remote path ------------->  undefined
     TM - Test mode --------------->  Passive mode
    Execute & miscellaneous commands
    ---------------------------------
     EX - Execute: Active mode for VME.
     TR - VME driver trace:  DISABLED
     RT - Return to the Initial Menu.

 Enter a command:
```

14. Enter the `RA,3` command on the Cray Research mainframe.

15. You are now ready to execute the end-to-end (OLNET active/passive) test. The Cray Research system was set to passive mode in step 6, and the OWS defaults to active mode. Enter the `EX` command on the passive (Cray Research) system. The following message is displayed:

```
Waiting for the first message on /dev/fyc1_03
OLNET mode = Passive mode

 Tue Jan  5 14:01:54 1995
```

16. Enter the `EX` command from the active (OWS) system. A message similar to the following is displayed on the active system (which has its pass count set to 100):

```
OLNET mode                Active mode
Current pass count        2
Passes remaining          98

Tue Jan  5 14:03:50 1995
```

A message similar to the following is displayed on the passive system:

```
OLNET mode                Passive mode
Current pass count        2
Passes remaining          98

Tue Jan  5 14:03:50 1995
```

On test completion, a message similar to the following is displayed on the active system:

```
Test passes have completed for
Active mode

Total bytes transmitted  =  86400
Total bytes received     =  86400

Elapsed time(hh:mm:ss)   =  00:00:34
Transfer rate            =  50823 bytes/second
```

A message similar to the following is displayed on the passive system:

```
Test passes have completed for /dev/fyc1_03
Passive mode

Total bytes transmitted  =  86400
Total bytes received     =  86400

Elapsed time(hh:mm:ss)   =  00:00:34
Transfer rate            =  50823 bytes/second
```

17. If the test fails, try to execute the local loopback test from both the Cray Research system and OWS.

4.4 VME testing using the fy driver

For Cray Research systems with Sun OWS/MWS/Workstations, the fy driver replaces the CONSULT-CRAYATTACH interface (cy) driver for FEI-3 (VME) to Cray Research system communications. The FEI-3 test methodology for the fyc (character special) driver is the same as for the CONSULT-CRAYATTACH (cy) driver. There are additional test methodologies for the fymc (maintenance character special) and fyo (WIN connection) drivers.

The fy driver is the lower layer of a two-layered driver operating under one of four pseudo-device drivers.
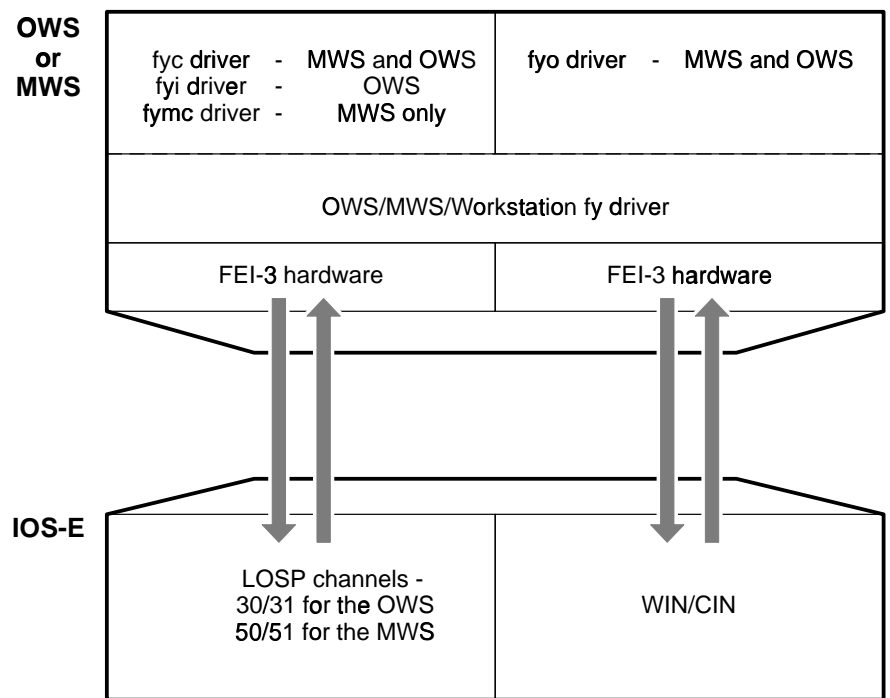
4.4.1 Pseudo-device drivers

There are four pseudo-device drivers:

• fyc - character special; this driver uses multiple paths

- fyi - TCP/IP

- fyo - OWS WIN/CIN control

- fym - MWS maintenance (one of which is the fymc - character special for maintenance testing)

Figure 23 shows how the four pseudo-drivers interact with the fy driver.

OWS or MWS

fyc driver	-	MWS and OWS
fyi driver	-	OWS
fymc driver	-	MWS only

fyo driver - MWS and OWS

OWS/MWS/Workstation fy driver

FEI-3 hardware   FEI-3 hardware

IOS-E

LOSP channels -
30/31 for the OWS
50/51 for the MWS

WIN/CIN

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Figure 23. Pseudo-device drivers

Table 6 shows the device names for the pseudo-drivers.

Table 6. Device names for pseudo-drivers

Pseudo-driver	Device names	Variables	Example

WIN	`/dev/fy0/c0i0`
	.
	.
	`/dev/fyC/cIiN`
		C - channel number
		I - I/O cluster number
		N - IOP number
			`/dev/fy0/c1i3` uses channel 0 to IOS cluster 1, IOP 3.

Character special with header	`/dev/fycC-00`
	.
	.
	`/dev/fycC -NN`
		C - channel number
		N - logical path
			`/dev/fy1_02` uses channel 1, logical path 2.

Character special without header (MWS only)	`/dev/fymc0`
	.
	.
	`/dev/fymcC`
		C - channel number	`/dev/fymc0` uses channel 0.

Testing of the FEI-3 connections can be performed by OLNET from the Sun Workstation (OWS or MWS) as follows:

- Character special (LOSP) (OWS or MWS)

  – Active/passive

  – Asynchronous active/passive

  – Cable loopback

- WIN (OWS or MWS)

  – WIN echo (WE) - Echoes an OLNET data packet sent by the OWS to the WIN through a software-selected hardware option. The WIN returns the packet to the workstation. This tests the WIN/CIN path between the OWS and the WIN.

  – IOS software echo (SE) - Echoes an OLNET data packet sent by the OWS to the IOS system software in the specified cluster/IOP. The IOS system software returns the packet to the workstation. This tests the path between the OWS and the specified cluster/IOP. The IOS system software must be running for this test to work.

- Character special without header (MWS only)

  - fymc test (FY) - Sends OLNET data packet across the selected channel. For the test to work, the channel must either 1) have a loopback cable connected; 2) be connected to another (FEI-3) channel with a second copy of OLNET running the same test (for example, cable MWS channel 0 to channel 1 and run a copy of OLNET on each channel); or 3) be connected to an IOS (CCA-1) running the offline diagnostic FEIT (to return the data).

  - Control cable test (CC) - Sends control signals across the loopback cable. A loopback cable must be used for this test to work.

4.4.2 Suggested scenarios for testing FEI-3 connections

The following are suggested scenarios for testing FEI-3 connections using OLNET:

- OWS Cray Research LOSP with OWS fy driver

  - Active/passive (end-to-end) test with OLNET active or passive test executing on the OWS and OLNET passive or active test executing on the Cray Research system

  - Execute cable loopback on the FEI-3 LOSP from the Cray Research system

  - Execute cable loopback on the FEI-3 LOSP from the OWS

- OWS/MWS WIN/CIN - fy driver

  - WIN echo

  - IOS software echo

- MWS character special - fymc driver

  - FY fymc test

4.5 VME network message format

The VME network message consists of a 64-byte message proper and optional, variable-length associated data (see Figure 24). The message proper contains 16 bytes (2 Cray words) of VME network information and 48 bytes (6 Cray words) of OLNET diagnostic data.

VME network header

16 bytes

Remote address

Remote address

Message proper

OLNET user data

48 bytes

48 bytes of data

OLNET user data

8 to 32 Kbytes †

Data must be in 8-byte multiples or 1 Cray word.
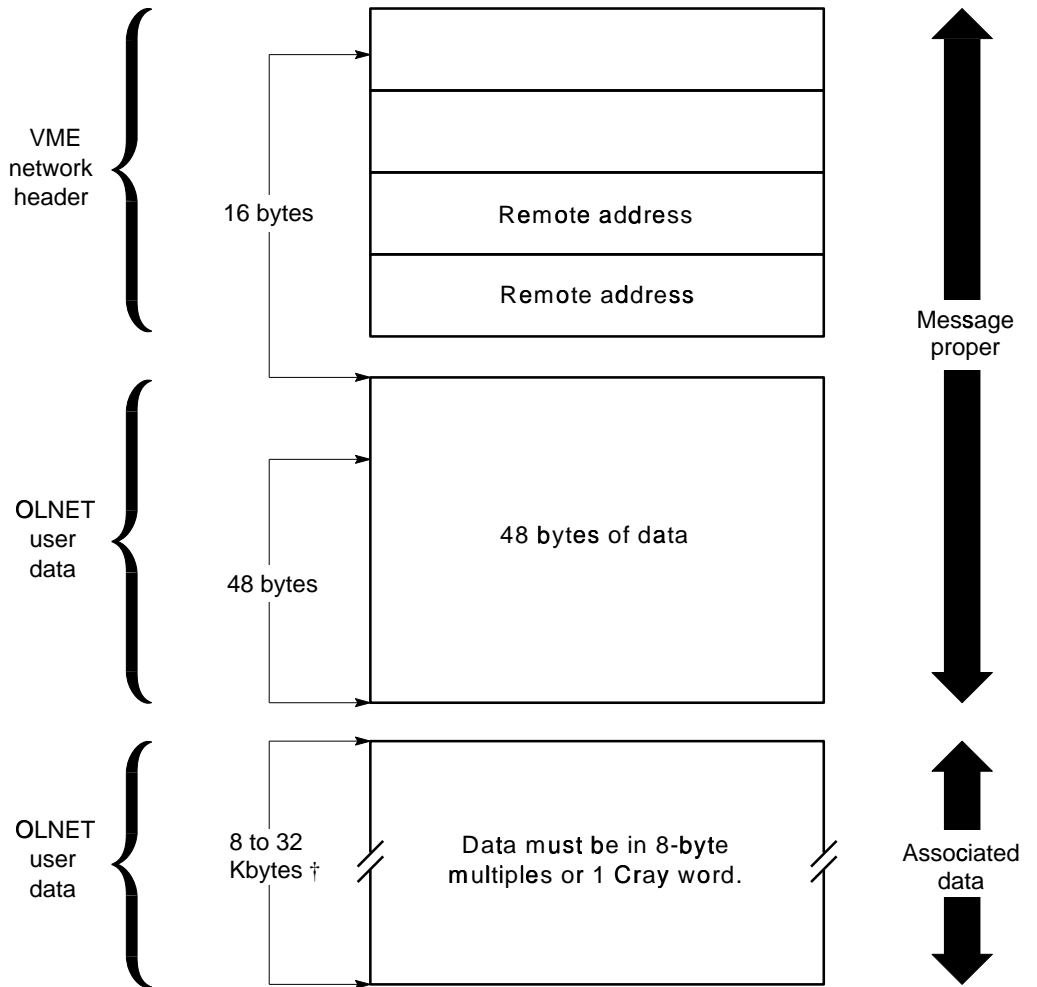
Associated data

† Maximum loopback associated data size is 4096 bytes

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Figure 24. VME network message format

4.6 VME 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 VT from the Main menu to display the VME menu. Figure 25 shows the VME menu.

```
   IOS Configuration information for VME
   ---------------------------------------
    Driver mode = parameter block (FEI-3 fy.c)
    Local path(hex) = 2

   Test Parameter Commands          Value
   ------------------------          -----
    PC - Pass count --------------->  1
    MP - Messages pass ----------->  10
    AL - Associated data length -->  100
    PT - Pattern type ------------>  ADDRESS
    RA - Remote path ------------->  undefined
    TM - Test mode --------------->  Active mode
   Execute & miscellaneous commands
   --------------------------------
    HELP - Get HELP information about this menu.
    EX - Execute: Active mode for VME.
    CFG - Display/change IOS E configuration
    TR - VME driver trace:  DISABLED
    RT - Return to the Initial Menu.

 Enter a command:
```

Figure 25. VME menu

4.7 VME test commands

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

VME test commands are as follows:

Command   Description

AL,*al*   Associated data message length in 64-bit words. The valid range for *al* depends on TM (see Table 7).

            AL,*al* is not applicable to the following test modes (see the TM command): DC, DL, IO, MC, and VR. However, if allowed to default in these modes, AL will have no adverse effect on the test.

Table 7. Associated data message length

Testmode (TM)	Associated data message length (AL)	AL default
AM or PM AA or AP	0 (no associated data) or 1-4087 or RN (random)	100

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.

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.

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 VME 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.

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 a VME device path (assuming standard VME device path naming conventions were used). See vme(4) for more information about device path naming conventions.

               After the DPM command has been executed and if more than one VME is connected to your system, a menu option is displayed to choose one of the VME connections 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.

               On a typical UNICOS system, the IOS-E channel 30(8) is connected to the OWS.

               This command is valid for UNICOS systems only.

DV,*dv*   Device path name (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.

               The *dv* variable is case-sensitive. Enter *dv* exactly as it appears in the device table. See Section 4.1, page 99, for information on finding the device path name used by OLNET.

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

errorfile   Specifies the file to which error output is written. This option does not appear on the VME 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.

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 named NETOUT. NETOUT is saved in your current directory.

Under UNICOS and UNIX operating systems, you must define the output file name and path before the output information can be saved.

If you return to the Main menu for OLNET, `NETOUT` is closed and will be overwritten during the next interactive OLNET session.

MD,*md* Enables (`EN`) or disables (`DB`) message-proper data generation or compare. See Figure 24, page 116, for a description of the VME message format.

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.

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

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, thereby increasing the total elapsed execution time. The patterns are processed in the following order: `AD`, `AO`, `AZ`, `SO`, `SZ`, `RN`, `BT`. OLNET builds a new pattern for each message, thereby requiring extra CPU cycles and possibly reducing the data rate (bytes/second).

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, thereby increasing the total elapsed execution time.

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 address or path (in hexadecimal). Table 8 shows the test modes for which *ra* must be defined. If allowed to default, *ra* is not defined.

You can obtain the RA,*ra* value when you update the device path value (DV,*dv*) on the remote system. When you update DV,*dv* on the remote system, the VME local address in the Local Information field (which corresponds to RA,*ra*) is automatically updated.

Table 8. Remote address requirements

Remote address (RA) (hexadecimal)	Test mode
Two digits	AA (asynchronous active)
	AM (synchronous active)

Remote address (RA) (hexadecimal)	Test mode
	AP (asynchronous passive)
	PM (synchronous passive)
TM,*tm*	Test mode. *tm* is one of the following values:
AA	Asynchronous active
AM	Synchronous active (default)
AP	Asynchronous passive
CC	Control cable test
CL	Cable loopback
DL	Display driver statistics
DC	Disable cable interrupts (VME front-end system only)
fy	fymc test
IO	I/O master clear (OWS only)
MC	Master clear (VME front-end system only)
PM	Synchronous passive
SE	IOS software echo
WE	WIN echo
VR	Dump VME registers (VME front-end system only)
TR	Enables or disables the capture of a driver call and associated information in a user-defined file (Cray Research system only).
VT	Calls the VME test (required).

4.8 VME test modes

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

- Synchronous active-and-passive mode (synchronous active mode is the default)

- Asynchronous active-and-passive mode

- Cable loopback mode

- Disable cable interrupts mode (VME front-end system only)

- I/O master clear mode (OWS only)

- Master clear mode (VME front-end system only)

- Dump VME registers mode (VME front-end system only)

- WIN echo mode

- IOS software echo mode

- Control cable test mode (MWS fy driver only)

- fymc test mode (MWS fy driver only)

- Display driver statistics mode

The following sections describe the execution of each mode.

4.8.1 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 computer system is assigned as active and the other as passive. The active computer system generates and sends synchronous messages to the passive computer system. In turn, the passive 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.

Active-and-passive mode is used to verify or detect faults in the communications link between a Cray Research system and another computer system when the link consists of a VME and a Sun Workstation.

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 `VT` to display the VME menu (Figure 25, page 117).

3. Set the VME device entry (`DV`,*dv* command) on both active and passive systems. The local address field in the VME menu is updated when you define the device entry.

4. Designate one system as active by setting the test mode to synchronous active (`TM`,`AM`) or asynchronous active (`TM`,`AA`). Then set the test mode for the other system to synchronous 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 systems:

`AL`,*al*	Associated data message length
`MP`,*p*	Messages per pass
`PC`,*pc*	Pass count
`PT`,*pt*	Pattern type

   Modify any other command values from the VME menus.

5. Enter the local address or local path (displayed in the VME menu for the active computer system) as the value for the remote address (`RA`,*ra* command) of the passive system. This provides a logical connection from the active to the passive system.

   Enter the local address or local path (displayed in the VME menu for the passive computer system) as the value for the remote address (`RA`,*ra* command) of the active system.

6. Enter `EX` from the VME menu for the passive system to execute the VME test.

   Note: Always start test execution from the passive computer 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 computer system before the program times out.

7. Enter EX from the VME menu for the active system to execute the VME test.

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

```
OLNET mode                Test mode
Current pass count        n
Passes remaining          n
```

> **Note:** You can attempt to clear an error condition by reentering the VME device entry (DV,*dv* 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            = n bytes/second
```

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

4.8.2 VME cable loopback mode

In cable loopback mode, the Cray Research system or the VME front-end system sends synchronous messages through a loopback connector that has been installed in the cable connection between the Cray Research system and the VME front-end system.

Note: It is important to read Section 4.8.2.1 and Section 4.8.2.2 before attempting to execute cable loopback as described in Section 4.8.2.3.

4.8.2.1 Device channel

This section describes configuration for cable loopback from both the Cray Research computer system and its associated computer system. It applies only to the execution of the VME test from UNICOS systems.

Cray Research supports two low-speed channel (LOSP) modes of operation (protocols):

- 6-Mbyte LOSP

- 12-Mbyte LOSP

The 6-Mbyte LOSP is symmetrical, so it can be looped back directly (input-to-output) without requiring special cabling or modifications to its signaling protocol.

The 12-Mbyte LOSP is not symmetrical, so the output channel side uses a signaling protocol that is not compatible with the input channel side and thus cannot be looped back directly. In other words, the channel and the device to which it is connected use different signaling protocols. They are mirror images of each other rather than identical copies.

To test the 12-Mbyte input channel, you must hook it up to a 12-Mbyte device or to a device that emulates 12-Mbyte device operation. Hooking it directly to the 12-Mbyte output channel does not work, because the signal sequences are different.

A device mode is provided to allow the LOSP output channel to emulate the way a device connected to a 12-Mbyte input channel would operate. Normal 12-Mbyte LOSP channel operation is often called *channel mode*, to differentiate it from 12-Mbyte *device mode* operation.

The LOSP output can be set to 6-Mbyte mode, 12-Mbyte channel mode, or 12-Mbyte device mode. The IOS LOSP input channel can run only in 6-Mbyte and 12-Mbyte channel modes.

> **Note:** The device channel is intended for use only in diagnostic loopback testing.

4.8.2.2 IOS-E LOSP/VME multiplexer channels

This section describes the procedure for reconfiguring Cray Research IOS-E LOSP channels for VME devices. (It is important to read Section 4.8.2.1 before beginning this procedure.)

1. From the OLNET VME menu, enter the `CFG` command to display the current LOSP configuration. The following is a sample Configuration menu:

```
         IOS E LOSP (CCA1) CONFIGURATION MENU


 OPTIONS    DESCRIPTION                 CURRENT VALUE
 -------    -----------                 -------------
  ICHN - LOSP(CCA1) input channel ---> 30 (octal)
  CMDE - CONTROLLER MODE ------------> 6 Mbytes mode
  DRVM - DRIVER MODE ----------------> parameter block (FEI-3 fy.c)
  INTO - INPUT TIMEOUT --------------> 100 (tenths) of a second
  OUTO - OUTPUT TIMEOUT -------------> 100 (tenths) of a second
  CDBE - DOUBLE BIT ERRORS ----------> DISABLED


  RT - return to the previous menu.


 Enter a command:
```

2. Use the `CMDE` command to modify the controller mode to either CM6 6-Mbyte mode or CM12LB 12-Mbyte loopback mode.

4.8.2.3 Execution procedure

To run the cable loopback test from either the Cray Research computer system or the VME front-end system, do the following.

The following guidelines apply to performing the cable loopback test for an OWS:

- You cannot disconnect an active OWS's VME-to-Cray Research LOSP channel connection when UNICOS is active. To execute the cable loopback test from an OWS, bring down UNICOS before disconnecting the active OWS's VME-to-Cray Research system LOSP channel cables.

- You cannot execute the cable loopback test from the Cray Research system to an active Cray Research system-to-OWS connection. This occurs because UNICOS is required to execute OLNET. Because UNICOS cannot be active when you disconnect active OWS-to-Cray Research system channel cables and UNICOS is required to execute OLNET, the ability to execute OLNET in this configuration is disabled.

1. For the cable loopback test to work properly from the Cray Research system, you must configure the FEI-3-to-Cray Research channel in either 6-Mbyte channel mode or device mode. See Section 4.8.2.1, page 126.

2. For cable loopback to work properly from the front-end system, you must configure the VME device as a 50-megabit (6-Mbyte) channel. See the *FEI-3 (VMEbus Interface) Installation and Maintenance Manual*, publication CMM-1100-0A0, for the procedure to change to 6-Mbyte.

3. Terminate the VME communication software on the Cray Research system and other systems by entering the following command on both systems (this step is typically performed by the system operator or network administrator):

   `ifconfig` *interface* `down`

4. Initialize OLNET on both the Cray Research and other systems, 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 `VT` to display the VME menu (Figure 25, page 117).

6. For cy driver systems only, set the VME device path (`DV`,*dv* or `DPM`).

7. Execute disable cable interrupts mode on the front-end system (`TM`,`DC`). See Section 4.8.3, page 130. The execution of this mode prevents the front end from receiving a flood of interrupts from the open cables.

8. Disconnect the Cray Research-to-VME low-speed channel cables. See Figure 21, page 98.

9. Install a loopback connector as follows (see Figure 21, page 98):

   • To run cable loopback from the Cray Research system, install a loopback connector, part number 2203405, at point A. You must run cable loopback from an interactive terminal that is not associated with the VME loopback connection being tested.

   • To run cable loopback from the VME front-end system, install a loopback connector, part number 2203405, at point B.

10. Select cable loopback mode (`TM`,`CL`) from the VME menu.

11. Modify any other command values as necessary, and enter `EX` from the VME menu to execute the test. The following message is displayed during test execution:

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

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              = n bytes/second
```

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

To return the Cray Research-to-VME link to normal system operation, do the following.

1. Reconnect all disconnected cables.

2. If applicable, return the Cray Research channel and/or VME device to the correct speed (6 through 12 Mbytes).

3. For IOS-E systems, if necessary, reconfigure the LOSP VME channel to CM6 6-Mbyte mode or CM12 12-Mbyte mode. Alternatively, if you try to exit OLNET without reconfiguring the channel, you will be prompted to restore the channel to its original configuration.

4. For cy driver systems only, from the front-end system, execute master clear mode (TM,MC). The execution of this mode reenables interrupts.

5. To verify that the Cray Research system-to-front end VME link is operational before activating the network software, you can execute active-and-passive mode (TM,AM and TM,PM).

6. Execute the following command on both the Cray Research and other systems (this step is typically performed by the system operator or network administrator):

   hyroute interface

7. Execute the following command on both the Cray Research and other systems (this step is typically performed by the system operator or network administrator):

    ```
    ifconfig interface up
    ```

    The network software should now be operational. To verify the connection, you can execute the following command from both the Cray Research and other systems:

    ```
    ping host
    ```

4.8.3 Disable cable interrupts mode (cy driver only)

In disable cable interrupts mode (VME front-end system only), you can avoid receiving a flood of interrupt messages on the console when uncabling the interface. Interrupts can be reenabled by executing master clear mode (`TM,MC`). See Section 4.8.5, page 131, for a description of master clear mode.

To execute disable cable interrupts mode under the UNIX operating system, do the following:

1. Initialize OLNET on the VME front-end 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 `VT` to display the VME menu (Figure 25, page 117).

3. Set the VME device entry (`DV,dv`).

4. Select disable cable interrupts mode (`TM,DC`) from the VME menu.

5. Modify any other command values as necessary, and enter `EX` from the VME menu to execute the test.

    The following message is displayed on the MWS/OWS console on successful test completion:

    ```
    Test passes have completed for
    DISABLE CABLE INTERRUPTS MODE
    ```

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

4.8.4 I/O master clear mode

In I/O master clear mode (OWS only), you can perform output and input clear functions.

⚠ **Caution:** Do not execute I/O master clear mode (TM,IO) from an OWS on an active UNICOS system; doing so causes UNICOS to crash. Ensure that your UNICOS system is down before executing this mode. Executing I/O master clear mode from a non-OWS system is effectively a no-op test.

To execute I/O master clear mode under the UNIX operating system, do the following:

1. Initialize OLNET on the VME front-end 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 `VT` to display the VME menu (Figure 25, page 117).

3. Set the VME device entry (`DV,`*dv*).

4. Select I/O master clear mode (`TM,IO`) from the VME menu.

5. Modify any other command values as necessary, and enter `EX` from the VME menu to execute the test.

   The following message is displayed on the MWS/OWS console on successful test completion:

   ```
   Test passes have completed for
   I/O MASTER CLEAR MODE
   ```

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

4.8.5 Master clear mode

In master clear mode (front-end system only), you can perform interrupt, input, and output clear functions and enable cable interrupts.

To execute master clear mode under the UNIX operating system, do the following:

1. Initialize OLNET on the VME front-end 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 `VT` to display the VME menu (Figure 25, page 117).

3. Set the VME device entry (`DV`,*dv*).

4. Select master clear mode (`TM`,`MC`) from the VME menu.

5. Modify any other command values as necessary, and enter `EX` from the VME menu to execute the test.

   The following message is displayed on the MWS/OWS console on successful test completion:

   ```
   Test passes have completed for
   MASTER CLEAR MODE
   ```

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

4.8.6 Dump VME registers mode

In dump VME registers mode (VME front-end system only), you can dump the contents of the hardware registers of the VME board set.

To execute dump VME registers mode, do the following:

1. Initialize OLNET on the VME front-end 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 `VT` to display the VME menu (page Figure 25, page 117).

3. Set the VME device entry (`DV`,*dv*).

4. Select dump VME registers mode (`TM`,`VR`) from the VME menu.

5. Enter `EX` from the VME menu to execute the test. The VME Dump Registers menu is displayed (Figure 26).VME Dump Registers menu

```
Select one of the following:

DP - Display the VME registers.
LT - Save the VME registers on NETOUT.
RT - Return to the VME menu.
```

Figure 26. VME Dump Registers menu

6. To display the VME Dump Registers display, enter DP from the VME Dump Registers menu. Figure 27 shows a sample VME Dump Registers display.

```
VME registers information
 Note - All values in Hex.

 VME status register              = 0018

Interrupt Control registers:
  Mainframe output disconnect      = 16
  Mainframe channel master clear   = 16
  DMA1 done flag & out data buff   = 00
  DMA0 done flag & inp buff empty  = 0B

Interrupt Vector registers:
  Mainframe output disconnect      = CC
  Mainframe channel master clear   = CD
  DMA1 done flag                   = CE
  DMA0 done flag                   = CF

Input control register F8F8
Input word counter register(DMA0   = 0000
Input address counter register     = 212A

Output control register           = F8F8
Output word counter register(DMA0) = 0000
Output address counter register    = 2107

DATE = 10/03/95 TIME = 13:20:13
```

Figure 27. VME Dump Registers display

Press `RETURN` to return to the VME Dump Registers menu. Then enter `RT` to return to the VME menu. You can modify the command values and rerun the test, or enter `RT` to return to the Main menu for OLNET.

4.8.7 WIN echo mode

WIN echo mode (Cray Research IOS-E and MWS or OWS fy drivers only) echoes diagnostic packets from and to the OWS and IOS-E WIN board.

To execute WIN echo mode, do the following:

1. Initialize OLNET on the VME front-end system, and access the Main menu as described in page Section 1.2, page 2, and Section 1.3, page 4.

2. After you initialize OLNET and access the Main menu, enter `VT` to display the VME menu (Figure 25, page 117).

3. Set the VME device entry with the `DV` or `DPM` command.

4. Select WIN echo (`TM,WE`) from the VME menu.

5. Enter `EX` from the VME menu to execute the test.

4.8.8 IOS software echo mode

IOS software echo mode (Cray Research IOS-E and MWS or OWS fy drivers only) echoes diagnostic packets to and from the IOS-E network driver.

To execute dump IOS software echo mode, do the following:

1. Initialize OLNET on the VME front-end 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 `VT` to display the VME menu (Figure 25, page 117).

3. Set the VME device entry with the `DV` or `DPM` command.

4. Select IOS software echo (`TM,SE`) from the VME menu.

5. Enter `EX` from the VME menu to execute the test.

4.8.9 Control cable test mode

Control cable test mode (MWS fy driver only) sends control signals over the loopback cable and verifies that the signals are received properly.

To execute control cable test mode, do the following:

1. Install a loopback connector, part number 2203405, at point B (see Figure 21, page 98).

2. Initialize OLNET on the VME front-end 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 VT to display the VME menu (Figure 25, page 117).

4. Set the VME device entry with the DV or DPM command.

5. Select control cable test mode (TM,CC) from the VME menu.

6. Enter EX from the VME menu to execute the test.

4.8.10 fymc maintenance character special test mode

The fymc maintenance character special test mode (MWS fy driver only) sends and receives data packets over a loopback channel. It differs from the cable loopback test in that it does not use a packet header.

To execute fymc maintenance character special test mode, do the following:

1. For Sun Workstation IOS-E systems, install a loopback connector, part number 12166400. This cable connects the **To Cray** FEI-3 connector to the **From Cray** FEI-3 connector on the workstation (see Figure 21, page 98).

2. Initialize OLNET on the VME front-end 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 VT to display the VME menu (Figure 25, page 117).

4. Set the VME device entry with the DV or DPM command.

5. Select fymc test mode (TM,fy) from the VME menu.

6. Enter EX from the VME menu to execute the test.

4.8.11 Display driver statistics mode

Executing display driver statistics mode (Cray Research mainframe only) displays information from the Cray (software) driver about the channel.

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 VT to display the VME Initial menu.

3. Set the VME device entry (DV,*dv*).

4. Enter TMM to go to the VME 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. The following is sample output from the DP command:

```
IOS NP DRIVER STATISTICS:

  Device ordinal(decimal)    =  0
  Minor number(hex)          =  9
  IOS Cluster number(decimal)=  0
  IOP Number(decimal)        =  0
  LOSP Channel number(octal) =  30
  Device type(octal)         =  102 [parameter block (FEI-3 fy.c) ]
  OLNET Process ID(decimal)  =  75395
  Channel status             =  UP
  Driver type                =  parameter block (FEI-3 fy.c)
  Controller mode            =  6 Mbyte mode
  Detect double bit errors   =  DISABLED
  No. of Logical paths open  =  2


  Tues Jun 20 13:25:25 1995
```