DSH80 Option
Installation and Owner's Manual

Order Number EK–DSDSH–IN–001

Digital Equipment Corporation
Maynard, Massachusetts

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Preface

This manual provides information for Digital service representatives on installing, configuring, and diagnosing the DSH80 Synchronous /Asynchronous communications controller option. This manual provides customers with information on DSH80 option protocols, cabling, and power-up self-tests.

NOTE: *The DSH80 option must be installed and serviced by Digital service personnel or self-maintenance customers only.*

Since in most cases the DSH80 option will be a replacement for the DHT80 Asynchronous option, procedures are included for removing the DHT80 if it is present. The manual is organized as follows:

- Chapter 1 is an introduction to the DSH80 option.

- Chapter 2 contains information for the customer on power-up self-tests, minimum software requirements, protocols, and external cables.

- Chapter 3 describes the installation procedures for the DSH80 modules.

- Chapter 4 gives explicit procedures for power-up, configuration of the hardware, and the use of hardware diagnostics.

- Appendix A lists the field-replaceable units of the DSH80 and their part numbers.

- Appendix B lists the cables that can be ordered by the user.

- Appendix C lists the electrical and cable specifications.

- Appendix D gives details on connectors, cables, and loopbacks.

- Appendix E includes specifications for use in the United Kingdom.

Conventions

The following naming conventions are used in this manual:

- DHT80 Asynchronous option is called the **DHT80 option**.

- DSH80 Synchronous/Asynchronous option is called the **DSH80 option**.

- The two modules in the DSH80 option are called **Sync Module One** and **Sync Module Two**.

The following typeface and character conventions are used in this manual:

Convention	Meaning
Return	A key name is shown enclosed to indicate that you press a named key on the keyboard.
Ctrl/x	A sequence such as Ctrl/x indicates that you must hold down the key labeled Ctrl while you press another key.
bold	Boldface type indicates user input. For example: >> **boot**
NOTE	Notes provide general information about the current topic.
CAUTION	Cautions provide information to prevent damage to equipment or software. Read these carefully.
WARNING	Warnings provide information to prevent personal injury. Read these carefully.

Chapter 1

Introduction to the DSH80 Option

On the DECsystem 5100, either a DHT80 option or a DSH80 option may be installed. This chapter describes the basic features of the DSH80 option.

The protocols recognized by the DSH80 option are HDLC (High-Level Data Link Control) and SDLC (Synchronous Data Line Control).

The DSH80 option consists of two modules, Sync Module One and Sync Module Two, that together contain two synchronous lines and four asynchronous lines.

Sync Module One is the larger of the two modules, and mounts on the lower drive mounting panel. It contains the following:

- One synchronous line with a 50-pin D-sub connector
- Four DEC–423–compatible asynchronous lines with four MMJ connectors

This module also contains three captive screws for mounting, a 100-way high-density connector, and a 50-way high-density connector.

Sync Module Two is the smaller of the two modules, and mounts on top of Sync Module One. It contains the following:

- One synchronous line with a 50-pin D-sub connector

Figure 1–1 shows the two modules.

Figure 1–1:   DSH80 Synchronous/Asynchronous Option

Sync Module Two

50-Way Connector
for Sync Module
One Cable

Sync Module One

Connector for
Signal Cable
from System Module

Captive Screws (3)
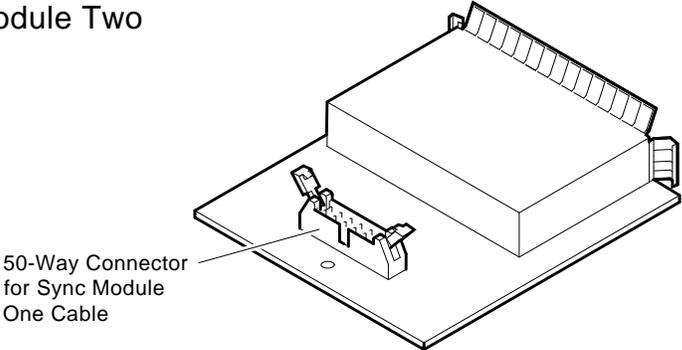
50-Way Connector for
Second Sync Module Two Cable
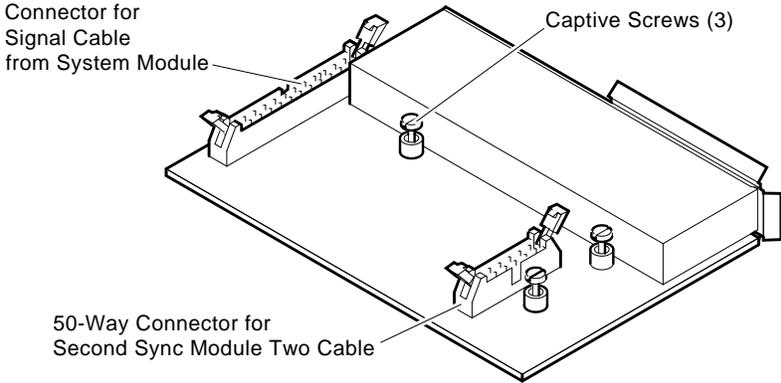
MLO-006313

Figure 1–2 shows the rear view of the DECsystem 5100, including the DSH80 option.

Figure 1–2:   DECsystem 5100 with DSH80 Option Installed

MLO-006328
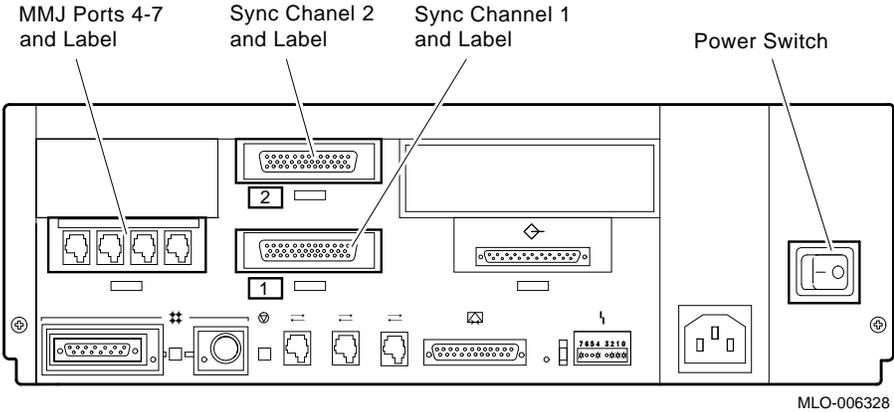
Chapter 2
Owner Information and System Requirements

This chapter contains information for the owner or user of the DSH80 module.

2.1 Software Requirements

Software requirements are as follows:

ULTRIX 4.2
DECnet Phase V (contains DEC WAN device driver for V2.0)

2.2 Asynchronous Ports

Standard asynchronous serial lines (data leads only) are shown in Table 2–1, which correlates TTY numbers with the port numbers on the rear of the DECsystem 5100.

Table 2–1: Asynchronous Ports

Number	Port Number
3	4
4	5
5	6
6	7

2.2.1 Baud Rates

The following baud rates are supported: 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, and 9600. (Baud rates of 19 200 and 38 400 are available using alternate clocks.)

2.3 Synchronous Ports

This section covers the connection to synchronous ports, the adapter, the protocols, and cables.

2.3.1 Connection to Synchronous Ports

With the DSH80 option installed in the DECsystem 5100, there are two synchronous serial 50-pin ports on the rear of the chassis. The lower port, labelled 1, is port dsh0; the upper port, labelled 2, is port dsh1. The 50-pin connector contains the composite connections to all the standards supported by the DSH80. An adapter cable is required to connect to the synchronous service available at the site. Match the correct interface with the correct adapter.

2.3.2 Adapter Cables and Protocol Standards

Use a separate adapter cable for each protocol standard. Table 2–2 shows the standards along with cables, baud rates, and loopbacks. Also see Table B–2 for cable order numbers.

The V.24/EIA–232–C adapter (12–27591) must be fitted between the device cable and the server if the modem or modem eliminator has DCE-sourced signal on pin 18, signal quality implemented on pin 21, and/or data signal rate selector (DCE) on pin 23.

Table 2–2:   Protocols, Cables, and Loopback Connectors

Interface	Pins	Baud Rate	Adapter Cable	Loopback Connector
EIA–232–E	25	19 200	BC19D–02	H3248
			BC23V–02	H3266
V.28/V.24/ISO2110.5	25	19 200	BC19D–02	H3248
			BC23V–02	H3266
EIA–423A/EIA–449	37	64 000	BC19E–02	H3198
V.10/ISO4902	37	64 000	BC19E–02	H3198
EIA–422–A/EIA–449	37	64 000	BC19B–02	H3198
V.11/ISO4902	37	64 000	BC19B–02	H3198
V.35/ISO2593	34	64 000	BC19F–02	H3250

NOTE: *An H3199 total loopback connector may be used for all interfaces.*

CAUTION: *Failure to fit an adapter can result in damage to the interface module and modem or modem eliminator. If you are unsure what signals the modem or modem eliminator provide, contact your Digital service representative.*

2.4 Power-Up Self-Tests and Consequences

The power-up self-test for the DECsystem 5100 is activated whenever the system is turned on. The first example below shows a successful test, and the second example shows an unsuccessful test.

```
26..25..24..23..22..21..20..19..18..17..16..15..14..14..14..
13..12..11..10..09..08..07..06..05..04..03..

KN230 V1.x
08-00-2b-17-48-7a
0x10000000
>>
```

The string *?40* indicates a failure in the DSH80 option (test 40). Such a failure of the DSH80 option is displayed as follows.

```
26..25..24..23..22..21..20..19..18..17..16..15..14..14..14..
13..12..11..10..09..08..07..06..05..
?40 21 ff 0001

P1= 00000040 P2= 00000051 P3= b52ffffd P4= 000000a5 P5= 000000a4
P6= 00000000 P7= 00000000 P8= 00000000 P9= 00000000 P10=00000000
gp= 00800000 sp= a000f794 fp= 00000000 sr= b0480000
epc=bfc2a1e4 badvaddr=00060000 cause=00000000

04..03..
KN230 V1.x
08-00-2b-17-48-7a
0x10000000
```

Contact your Digital service representative if the test is unsuccessful.

2.5 Software Documentation for WAN Device Drivers

At this point the hardware verification is finished. You should now review the following documents covering Wide Area Network Device Drivers:

WAN DD Programmer's Guide (AA–NX52A–TE)
WAN DD Installation Manual (AA–NX50A–TE)

Chapter 3

Installing the DSH80 Synchronous/Asynchronous Option

NOTE: *Installation is to be done only by Digital service representatives or by qualified self-maintenance personnel.*

The sequence for installing the DSH80 option depends on whether the DHT80 option is already installed in the DECsystem 5100. If so, it must be removed and the DSH80 option mounted in its place. Two separate modules make up the DSH80 option. Installing the DSH80 option follows this procedure:

1. Shutting down the system and removing the DECsystem 5100 cover

2. Removing the DHT80 option (if present)

3. Removing the blank cover plates (if present)

4. Removing the upper and lower drive shelves

5. Adding standoffs and the 100-way cable

6. Trimming two of the standoffs

7. Installing Sync Module One

8. Installing Sync Module Two and connecting both modules

9. Adding labels to the ports

10. Replacing the DECsystem 5100 cover

11. Removing the DSH80 option if faulty

If there is a DHT80 Option in place now, go to Section 3.1, Section 3.2, and then Section 3.6 to the end.

If there is NOT a DHT80 Option in place now, go to Section 3.1, and then Section 3.3 to the end.

3.1 Shutting Down the System and Removing the DECsystem 5100 Cover

1. Perform an orderly system shutdown of the ULTRIX operating system from the console.

2. Set the Power switch to off (0) on the DECsystem 5100 and all expansion enclosures.

3. Mark and disconnect all cables to the DECsystem 5100.

4. Loosen the two Phillips screws holding the cover. (See Figure 3–1.) From the rear of the DECsystem 5100, slide the cover forward and lift it away from the system.

Figure 3–1: Cover Screw Locations

Cover Screw   Cover Screw

MLO-006314
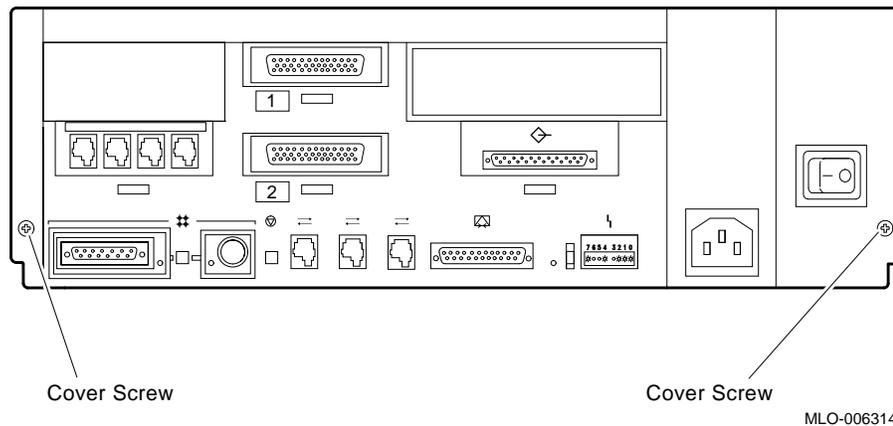
3.2 Removing the DHT80 Option

If the system contains the DHT80 option, remove the option and the modem port as described below. If not, proceed to Section 3.3.

1. Disconnect the modem ribbon cable (25-way, 17–02908–01) from the connector on the DHT80 option as shown in Figure 3–2. (For clarity, the upper drive shelf is not pictured in Figure 3–2.)

2. Remove the two outer Phillips screws that hold the modem cable and the connector (74–41591–01) to the chassis. Remove the modem cable and the connector.

Figure 3–2: Disconnecting the Modem Cable and Port
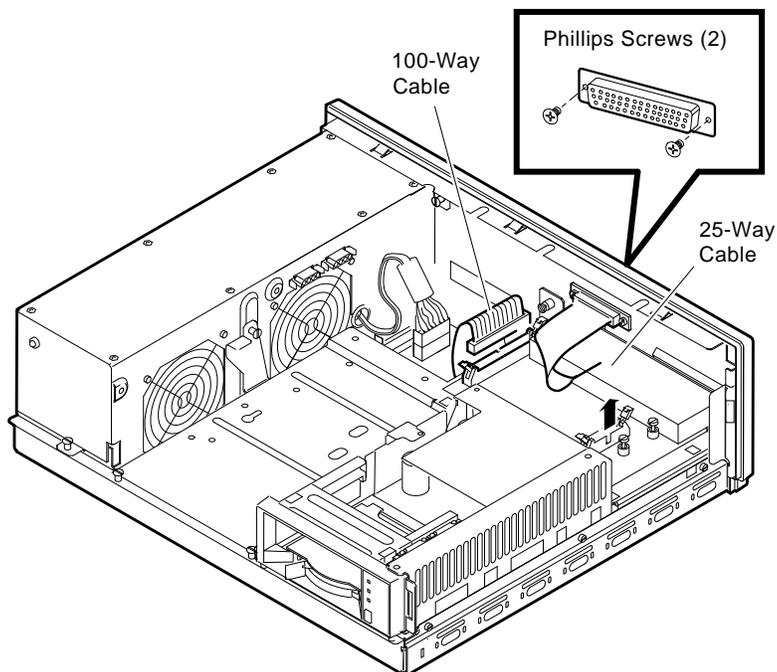
MLO-006315

3. Disconnect the 100-way cable (17–02295–02) from the DHT80 option as shown in Figure 3–2.

4. Loosen the three captive screws on the DHT80 option shown in Figure 3–3. For the sake of clarity, the upper drive shelf is not shown.

Figure 3–3: Removing the DHT80 Asynchronous Module

Captive Screws(3)
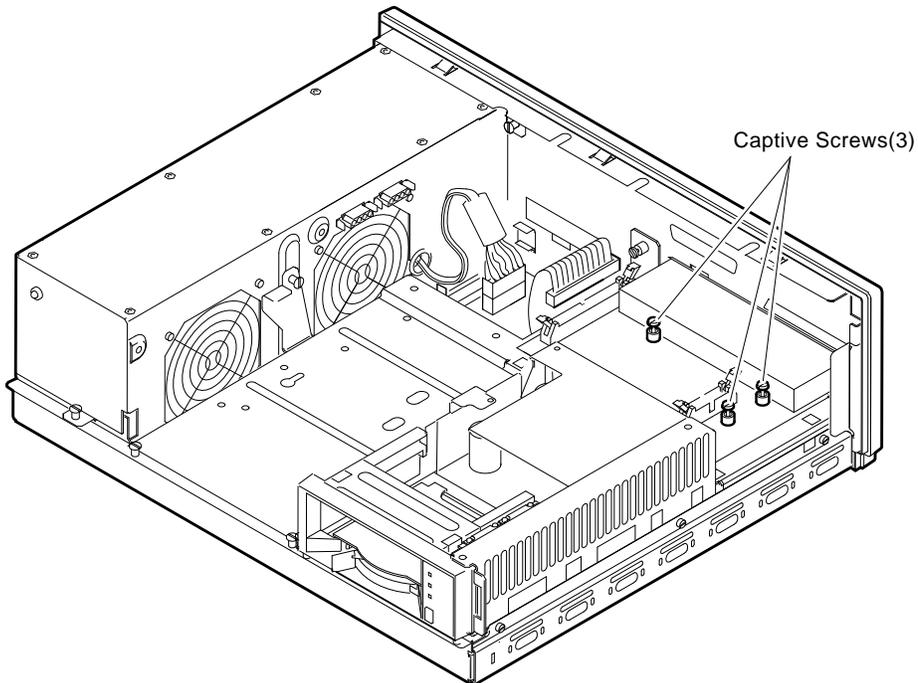
MLO-006316

5. Pull the DHT80 option off the standoffs and out of the system. Go to Section 3.6.

3.3 Removing Blank Cover Plates (No DHT80 Option)

If the system does not have a DHT80 option, then it has blank cover plates. Remove the plates as shown in Figure 3–4.

1. Remove the two Phillips screws on the upper blank plate (74–38986–01), and remove the upper blank plate, as shown in Figure 3–4.

2. Loosen the captive screw on the lower blank plate (74–41590–01) and remove.

Figure 3–4: Removing Blank Cover Plates
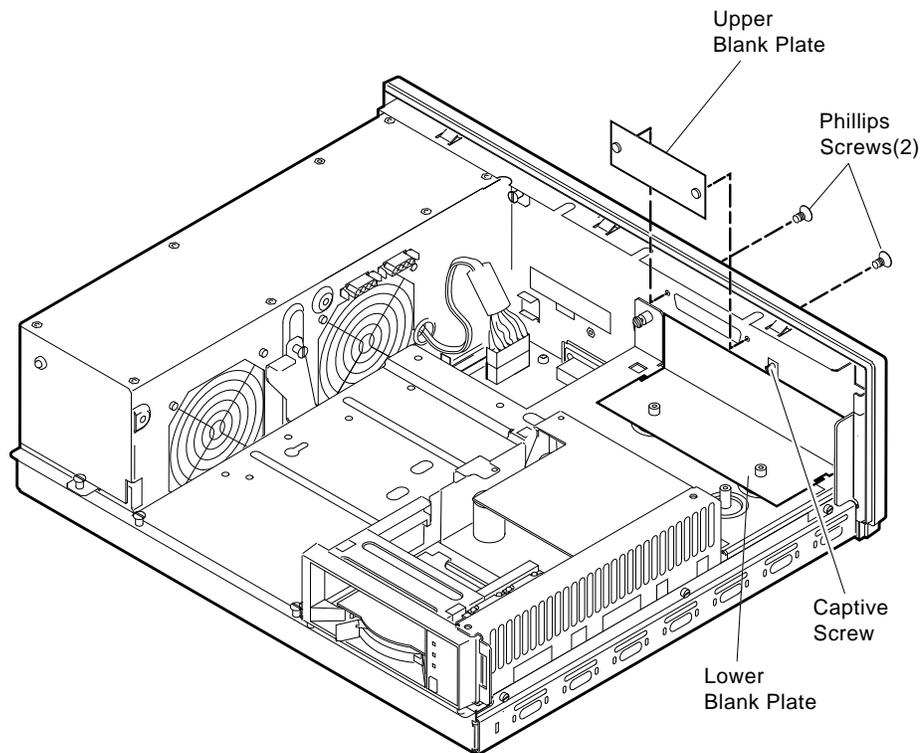
MLO-006317

3.4 Removing Upper and Lower Drive Shelves

Removal of upper and lower drive shelves is detailed below.

1. Note the position of the mass storage drives, and mark the cables accordingly. Disconnect the power cables and SCSI bus cable(s) from the drives on the upper drive shelf. (See Figure 3–5 for a symbolic wiring diagram.)

Figure 3–5: Disconnecting Cables from Upper Drive Shelf
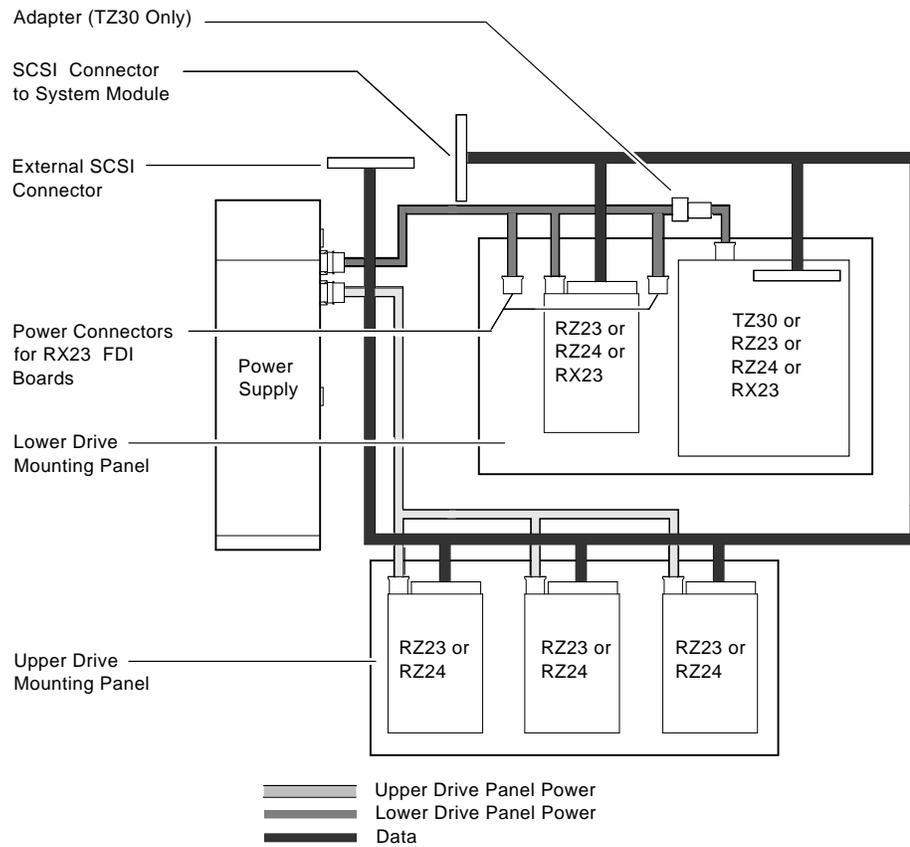
MLO-006318

2. Loosen the four captive screws. (See Figure 3–6.)

3. Lift the upper drive shelf away from the lower drive shelf and gently set it aside.

4. Mark and disconnect the SCSI cable(s) and the power cable connected to the drives on the lower drive shelf. (See Figure 3–5.)

Figure 3–6:   Removing Upper Drive Shelf

Captive
Screws (2)

Upper Drive
Shelf
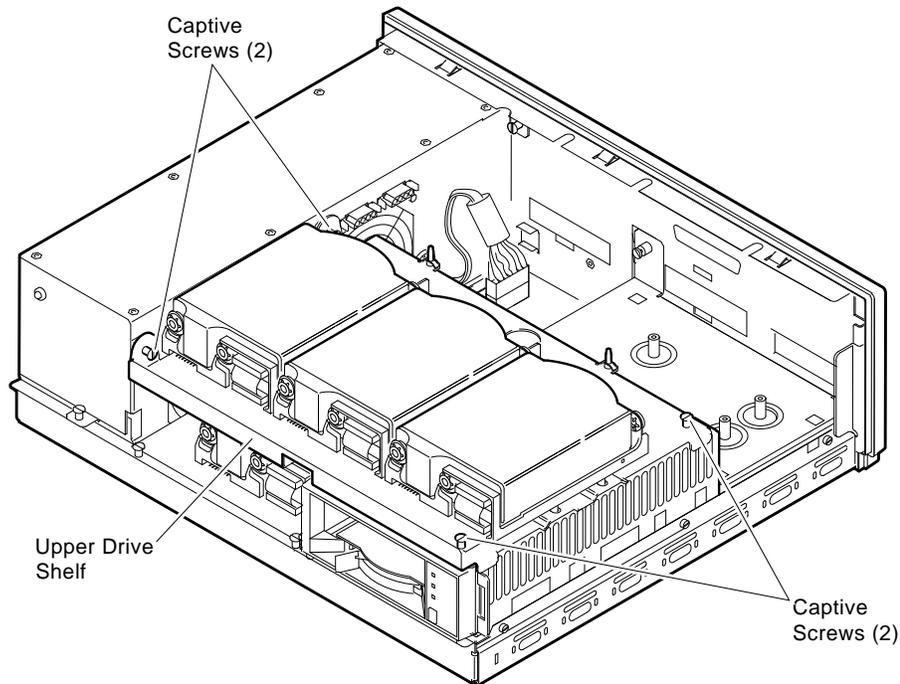
Captive
Screws (2)

MLO-006319

5. Loosen the four captive screws and remove the three Phillips screws and store safely. (See Figure 3–7.)

6. Slide the lower drive shelf toward you and lift it from the unit.

Figure 3–7: Removing Lower Drive Shelf
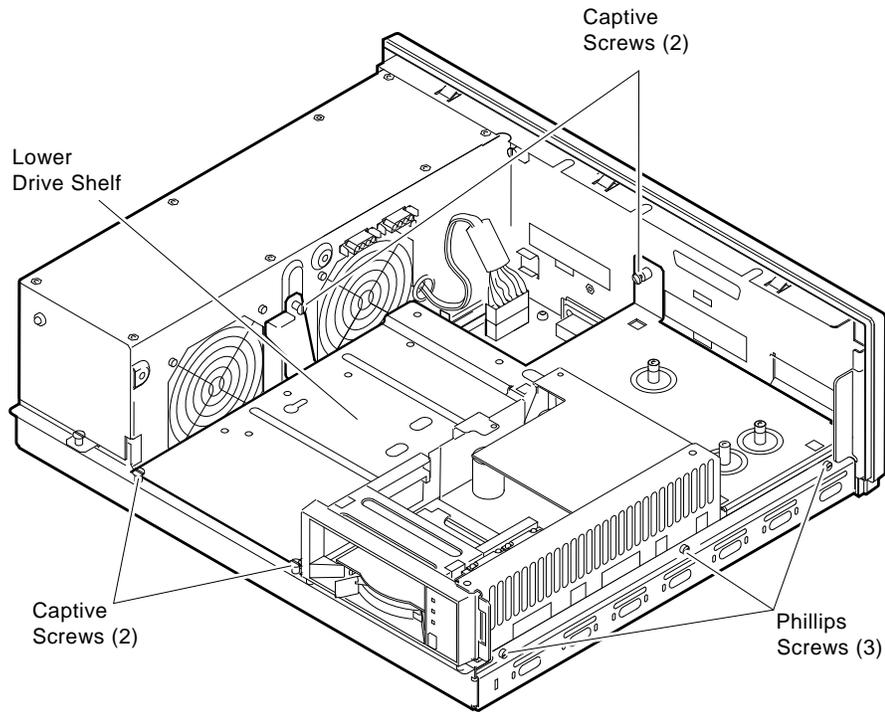
MLO-006320

3.5 Add Standoffs and 100-Way Cable (No DHT80)

After removing the upper and lower drive shelves, add standoffs to the lower drive mounting panel as follows:

1. Through the bottom of the lower drive mounting panel, add five standoffs in the positions shown in Figure 3–8. The lip of each standoff is to face the outside of the panel.

Figure 3–8: Inserting Five Standoffs on Lower Drive Mounting Panel
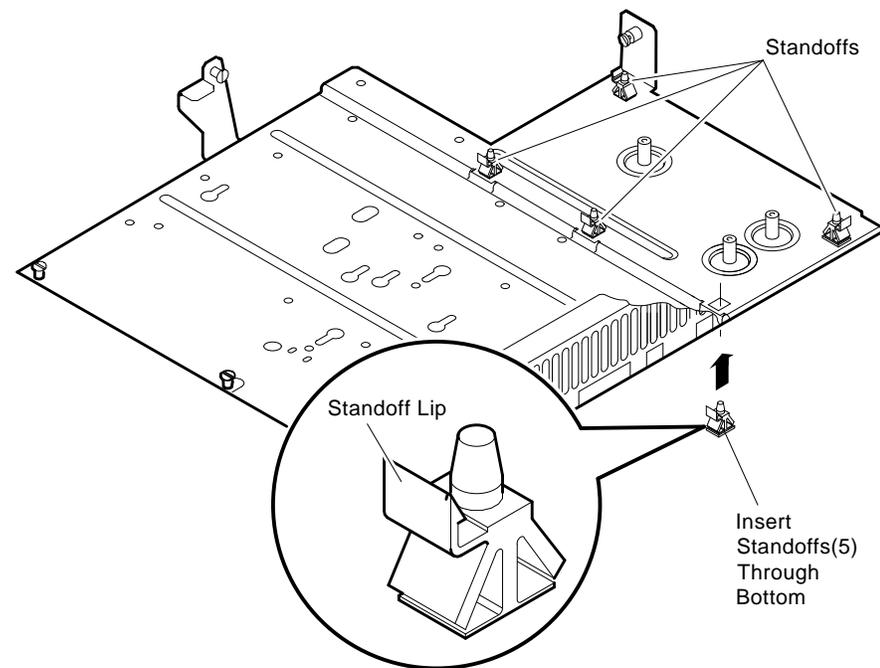
MLO-006321

2. Connect the 100-way ribbon cable (17–02295–02) to the system board, as shown in Figure 3–9. Fit the connector key correctly to the connector slot on the system board, and lock the 100-way connector in place with the connector locks.

3. Replace the lower drive shelf, the three Phillips screws, and the four captive screws shown in Figure 3–6.

CAUTION: *Failure to fit the key of the ribbon cable connector into the slot on the system connector can later cause damage to the components.*

Figure 3–9:   Connecting 100-Way Connector to System Board

100-Way
Cable
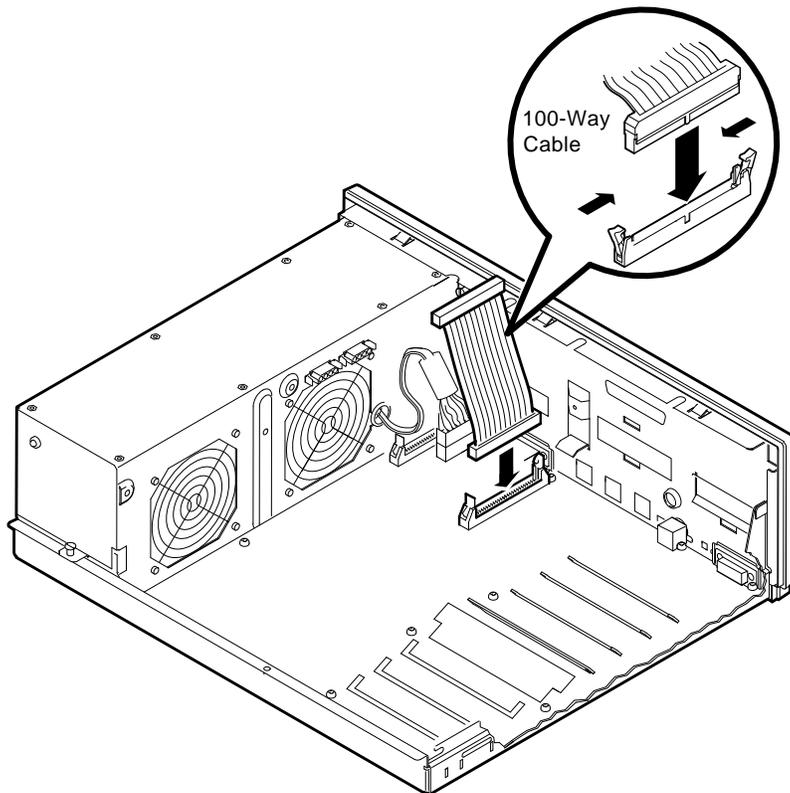
MLO-006322

3.6 Trimming Two of the Standoffs

Trim the tabs on two of the standoffs (12–21566–05) as shown in Figure 3–10.

1. See Figure 3–10 for the location of the two standoffs to be trimmed.

2. Use wire cutters to trim the standoffs, and replace the standoffs. Be sure to retrieve and dispose of the trimmed pieces.

Figure 3–10: Locating the Two Standoffs to Be Trimmed
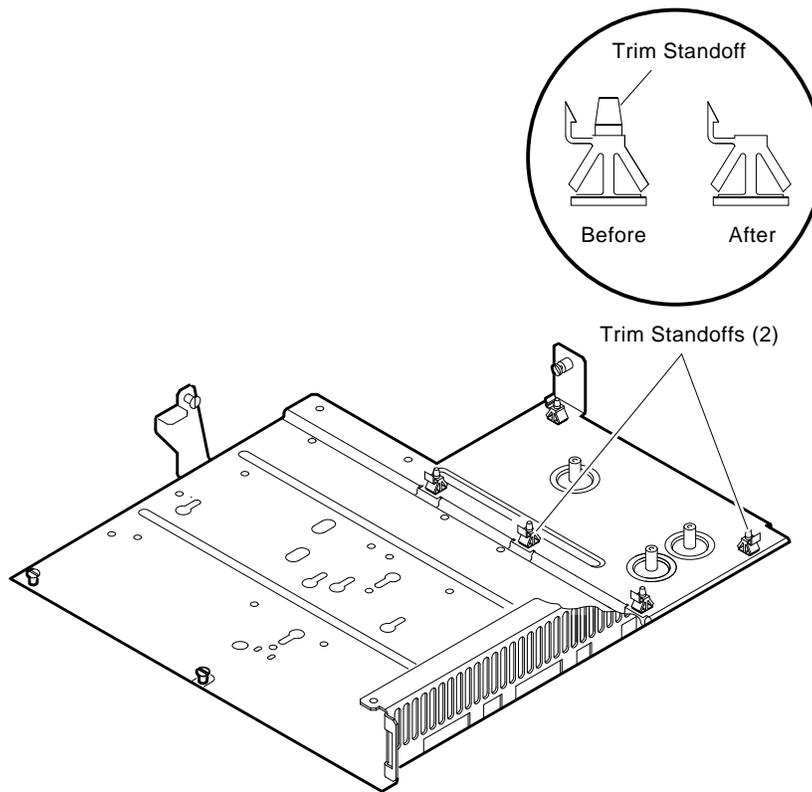
MLO-006323

3.7 Installing Sync Module One

Sync Module One (54–20472–01) is the larger of the two modules, and contains the asynchronous ports. Install as follows:

1. Align the connectors on Sync Module One with the openings in the rear of the chassis.

2. Match the three captive screws on Sync Module One to the three holes on the lower drive mounting panel.

3. Press the module into the five standoffs on the lower drive mounting panel, as shown in Figure 3–11, and tighten the three captive screws on Sync Module One.

Figure 3–11:   Installing Sync Module One
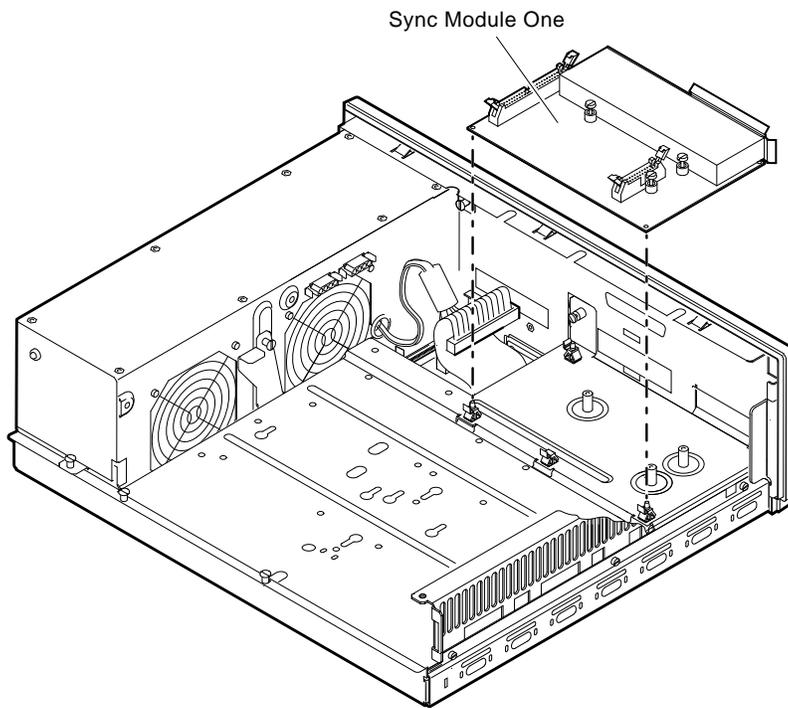
MLO-006324

4. Connect the 50-way ribbon cable (17–01243–04) to the 50-way connector on Sync Module One. Lock the connector in place with connector clips. (See Figure 3–12.)

5. Connect the 100-way ribbon cable (17–02295–02) from the system board to the 100-way connector on Sync Module One. Lock the connector in place. (See Figure 3–12.)

6. Install the upper drive shelf.

CAUTION: *Failure to fit the key of the ribbon cable connector into the slot on the system connector can later cause damage to the components.*

Figure 3–12: Locking the Connector Clips
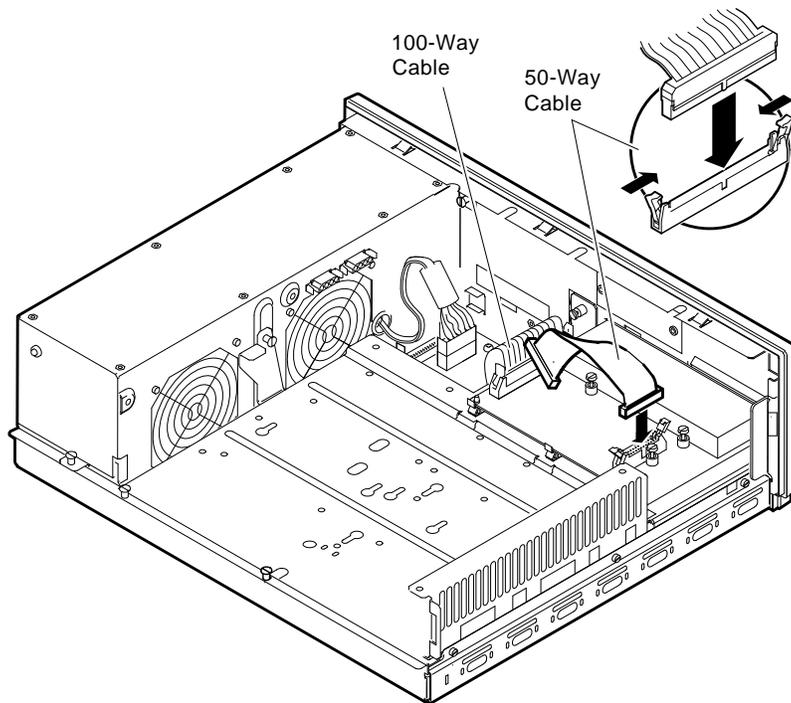
MLO-006325

3.8 Installing Sync Module Two and Connecting Both Modules

Sync Module Two (54–20874) is installed directly above Sync Module One.

1. Use a nut driver to remove the two 3/16-inch hex nuts from the 50-way D-sub connector on Sync Module Two. (See Figure 3–13.)

2. Fit the 50-way D-sub connector through the opening in the rear of the chassis.

3. Press the module onto the single standoff located on the upper drive shelf. (See Figure 3–14.)

Figure 3–13:   Removing Two Hex Nuts from Sync Module Two

Hex Nuts (2)

MLO-006326
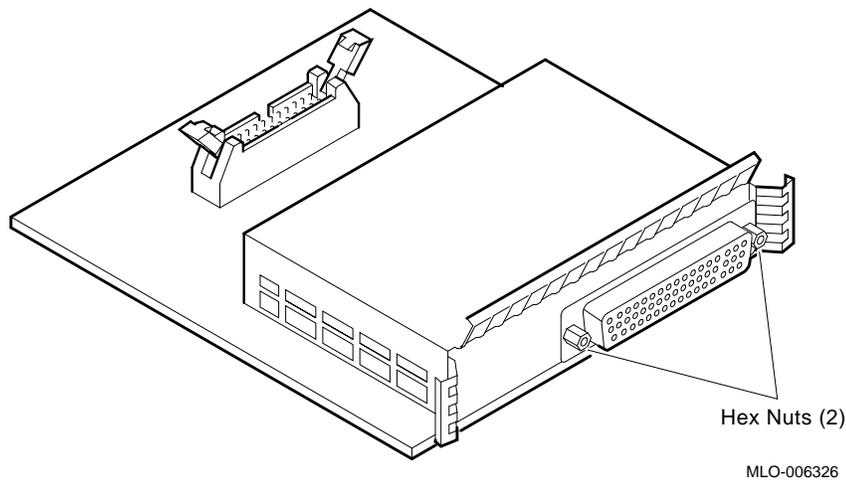
4. Replace and tighten the two 3/16-inch hex nuts. The hex nuts go through the chassis to secure the D-sub connector.

5. Connect the 50-way ribbon cable (17–01243–04) joining Sync Module One to the 50-way connector on Sync Module Two.

   See Figure 3–14 for the correct cable bend. Lock the connector in place.

CAUTION: *Failure to fit the ribbon cable connector tab into the slot on the system connector can later cause damage to the components.*

Figure 3–14: Installing Sync Module Two
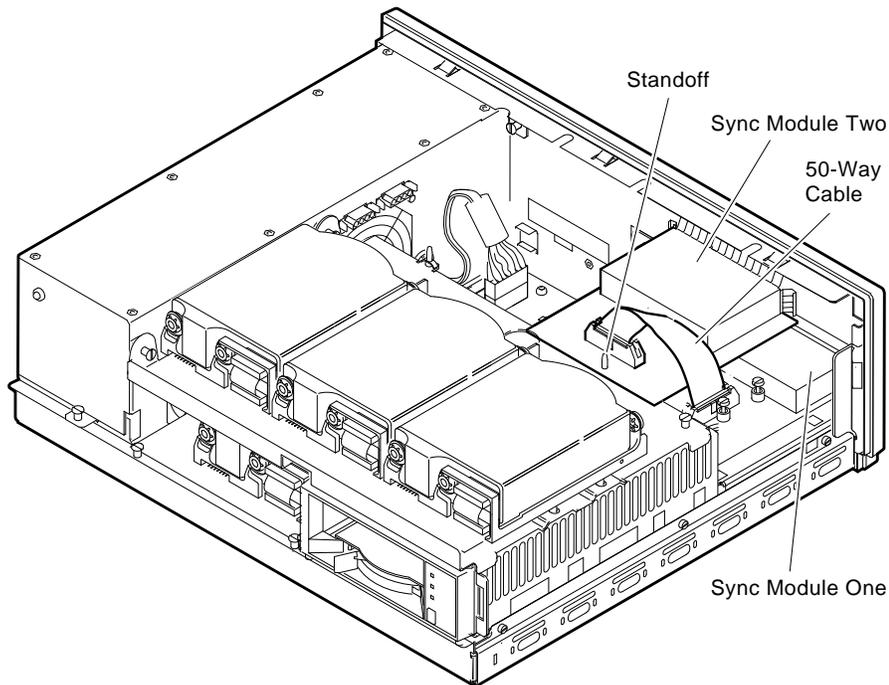
MLO-006327

If you replaced a DHT80 option with the DSH80 option, you will have the following items left over from your DSH80 kit: a 100-way cable, five standoffs, and the label "4, 5, 6, 7."

3.9 Adding and Removing Labels

Once the DSH80 option is installed, labels must be added to distinguish the two D-sub connectors (synchronous) and the MMJ connector (asynchronous) ports. See Figure 3–15 for placement of these labels, and Table 3–1 for port names, line numbers, and label part numbers.

From the rear of the chassis, remove the label marked "8, 9, and 10," if it is there.

Figure 3–15: DECsystem 5100 with DSH80 Option Installed

MLO-006328
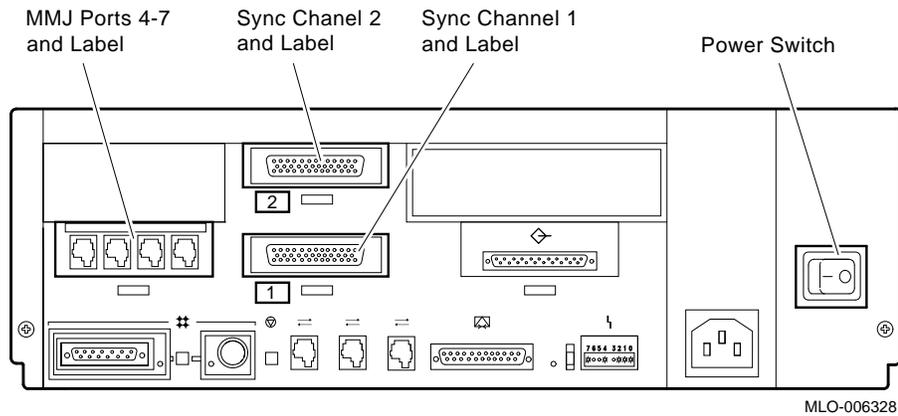
Table 3–1: Connectors, Their Associated Line Numbers, and Labels

Port Name	Line No.	Label Part No.
MMJ 4	0	36–33715–03
MMJ 5	1	"
MMJ 6	2	"
MMJ 7	3	"
Upper D-sub	Sync channel 2	36–35733–01
Lower D-sub	Sync channel 1	36–35733–01

3.10 Replacing the System Cover

Replace the cover of the DECsystem 5100 as follows:

1. From the front of the system, slide the cover on.

2. Replace and tighten the two Phillips screws.

Hardware installation is complete. Go to Chapter 4 to make sure the system recognizes the new option.

3.11 Removing a Faulty DSH80 Option

If the diagnostics described in Chapter 4 show the DSH80 option to be faulty, you can remove it as follows:

1. Disconnect the 50-way ribbon cable (17–01243–04) connecting Sync Module One to Sync Module Two.

2. Remove the two 3/16-inch hex nuts from the 50-way D-sub connector on Sync Module Two.

3. Lift Sync Module Two off the standoff and out of the chassis.

4. Disconnect the 100-way ribbon cable (17–02295–02) connecting the system board with Sync Module One.

5. Loosen the three captive screws holding Sync Module One to the system board.

6. Lift Sync Module One off the five standoffs and out of the chassis.

Chapter 4

Advanced Diagnostics

NOTE: *Troubleshooting and module replacement is to be done only by Digital service representatives or by qualified self-maintenance personnel.*

To ready the system for booting, you must turn it on, configure the system, and run diagnostics.

4.1 Power-Up Test

Cable the system to its expansion enclosure(s) and turn on the system power. You will see the following:

```
26..25..24..23..22..21..20..19..18..17..16..15..14..14..14..
13..12..11..10..09..08..07..06..05..04..03..

KN230 V1.x
08-00-2b-17-48-7a
0x10000000
>>
```

A failure of the DSH80 option (test 40) is displayed as follows:

```
26..25..24..23..22..21..20..19..18..17..16..15..14..14..14..
13..12..11..10..09..08..07..06..05..
?40 21 ff 0001

P1= 00000040 P2= 00000051 P3= b52ffffd P4= 000000a5 P5= 000000a4
P6= 00000000 P7= 00000000 P8= 00000000 P9= 00000000 P10=00000000
gp= 00800000 sp= a000f794 fp= 00000000 sr= b0480000
epc=bfc2a1e4 badvaddr=00060000 cause=00000000

04..03..

KN230 V1.x
08-00-2b-17-48-7a
0x10000000
```

4.2 Including the DSH80 in the Environment Variable Table

For the system to recognize the newly installed option, the iooption environment variable must be set to 3. The three possible environment variable notations are as follows:

- 0 = nothing installed

- 1 = DHT80 Asynchronous option installed

- 3 = DSH80 Synchronous/Asynchronous option installed

Run the following console test to see if the iooption is equal to 0x3. The following example shows iooption=0, meaning no option installed. If you simply replace a DHT80 option with a DSH80 option, the environment variable reads 1 until it is changed.

```
>> printenv
bootp=
bootmode=*
console=0
scsiid=7
systype=0x820c1401
inetaddr=0
baud=9600
baud2=9600
baud3=9600
bitmap=0xa07ff800
bitmapen=0x200
iooption=0
```

If the iooption is not 0x3, then set the environment variable as follows:

```
>>setenv iooption 0x3
```

To verify that the system can see the DSH80 option, enter:

>>**conf -f**

The following is an example of the output, which shows that the system now includes the DSH80 option in its environment variable table.

```
hardware: revision 1OB
firmware: revision 4
cpu: revision 2.32
fpu: revision 3.32
security switch: secure mode
password: clear
eeprom: valid
ethernet hardre address: 08-00-2b-19-28 1d
option board: DSH80 - Sync/Async Option, Vx.x
memory: total size   8MBs
    bank0   4 MB    SIMMS  size    8MBs         0 bad pages
scsi peripherals
    unit type    product                removable/fixed      capacity

    0    disk    RZ24     (C) DEC     fixed                 200 MBs
    3    disk    RZ24     (C) DEC     fixed                 200 MBs
    5    tape    TZK10        removable
```

NOTE: *If the system module is ever replaced, the iooption number will have to be reentered in the environment variable table.*

4.3 Testing Sync and Async Lines Together

To test all of the asynchronous lines and the synchronous lines with no external loopbacks, simply enter the following command at the **>>** prompt:

```
>>test -v 0x40
```

NOTE: *This command tests the asynchronous lines on the DSH80 modules, but not those on the system board.*

If H3199 loopbacks are on the synchronous lines, they will be tested externally during this test.

The following is the output from a successful test, annotated to tell which part of the diagnostics tests each of the various components.

```
16:c0200000:80050000:133c835
-040-08 DSH-80 Sync/Async Option test
***Async lines from here
-040-0b DSH-80 dz ln 00 int lpback rx/tx tst
-040-0c DSH-80 dz ln 00 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 00 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 00 int lpback mul line silo tst
-040-0f DSH-80 dz ln 00 silo alarm tst
-040-0b DSH-80 dz ln 01 int lpback rx/tx tst
-040-0c DSH-80 dz ln 01 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 01 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 01 int lpback mul line silo tst
-040-0f DSH-80 dz ln 01 silo alarm tst
-040-0b DSH-80 dz ln 02 int lpback rx/tx tst
-040-0c DSH-80 dz ln 02 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 02 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 02 int lpback mul line silo tst
-040-0f DSH-80 dz ln 02 silo alarm tst
-040-0b DSH-80 dz ln 03 int lpback rx/tx tst
-040-0c DSH-80 dz ln 03 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 03 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 03 int lpback mul line silo tst
-040-0f DSH-80 dz ln 03 silo alarm tst
***Async lines to here
-040-20 DSH-80 Shared RAM Buffer byte tst
-040-23 DSH-80 Shared RAM Buffer word tst
***RAM to here
-040-30 DSH-80 68302 self tst    *Sync lines tested here
-040-50 DSH-80 Dual Access Memory tst
-040-60 DSH-80 Interrupt tst
>>
```

The following is the output from a failed test; the failure (chn : 0001) below refers to the upper port, labelled as sync channel 2 on the rear of the chassis (see Figure 3–15. The error in sync channel 2 could result from a problem on either Sync Module One or Sync Module Two.

```
>> test -v 0x40
16:c0200000:80050000:133c835
-040-08 DSH-80 Sync/Async Option test
-040-0b DSH-80 dz ln 00 int lpback rx/tx tst
-040-0c DSH-80 dz ln 00 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 00 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 00 int lpback mul line silo tst
-040-0f DSH-80 dz ln 00 silo alarm tst
-040-0b DSH-80 dz ln 01 int lpback rx/tx tst
-040-0c DSH-80 dz ln 01 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 01 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 01 int lpback mul line silo tst
-040-0f DSH-80 dz ln 01 silo alarm tst
-040-0b DSH-80 dz ln 02 int lpback rx/tx tst
-040-0c DSH-80 dz ln 02 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 02 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 02 int lpback mul line silo tst
-040-0f DSH-80 dz ln 02 silo alarm tst
-040-0b DSH-80 dz ln 03 int lpback rx/tx tst
-040-0c DSH-80 dz ln 03 int lpback sngle ln silo tst
-040-0d DSH-80 dz ln 03 int lpback silo ovrflow tst
-040-0e DSH-80 dz ln 03 int lpback mul line silo tst
-040-0f DSH-80 dz ln 03 silo alarm tst
-040-20 DSH-80 Shared RAM Buffer byte tst
-040-23 DSH-80 Shared RAM Buffer word tst
-040-30 DSH-80 68302 self tst
-040-1f DSH-80 Display Status Block

stat: 00ce - 68302 no carrier detect
----------
csr : 001e   sb  : 00ce   hwv  : 0002   swv  : 0012
cc1 : 0000   cc2 : 0000   i/e  : 0001   ecnt : 0002
chn : 0001   sel : 0001   prot : 0000   scm  : f0cc   bps : 0078
ahi : 0002   alo : 8000   size : 0008   exp  : 5f00   act : 0000

DSH-80 - 68302 self test failure - _exp _ret _test
?40 1f ff 0001

P1= 00000040 P2= 00000054 P3= 00000001 P4= 000000ce P5= 0000001e
P6= 00000000 P7= 00000000 P8= 00000000 P9= 00000000 P10=00000000
gp= 00800000 sp= a000c088 fp= 00000000 sr= b0480000
epc=bfc2a1ec  badvaddr=00060000 cause= 10000000
```

4.4 Testing Async Lines Together or Separately

The asynchronous lines can be tested either as a group or as individual lines.

To test all asynchronous lines only:

```
>>test -v 0x40 0
```

The zero at the end of the command means test all the asynchronous lines.

To test individual asynchronous lines:

To test one asynchronous line, specify whether to test it internally or externally. Use Table 3–1 to identify the line number for the MMJ port you want to test. Use the following command:

```
>>test -v 0x40 0 [0=internal/1=external] [line no.]
```

The H3103 loopbacks (12–25083–01) are used for external loopback testing.

The following example shows the output of a successful external test of line 3 (MMJ7):

```
>> test -v 0x40 0 1 3

    -040-0b dz ln 03 ext rx/tx lpback tst
    -040-0c dz ln 03 ext sngle ln silo tst
    -040-0d dz ln 03 ext silo ovrflow tst
    -040-0e dz ln 03 ext mul line silo tst
    -040-0f dz ln 03 silo alarm tst
>>
```

If a failure is detected in an asynchronous line, replace Sync Module One and retest.

4.5 Testing the Sync Lines

The synchronous lines can also be tested by internal or external loopback. To test the internal loopback, enter the following command:

>>**test -v 0x40 2**

To test the sync lines externally, put H3199 loopbacks on the sync lines (one or both) and enter the following:

>>**test -v 0x40 2**

The loopback will be detected by the diagnostics.

The following is an example of a successful test:

```
>> test -v 0x40 2
16:c0200000:80050000:133c835
-040-08 DSH-80 Sync/Async Option test
-040-30 DSH-80 68302 self tst
>>
```

The following is an example of a failed test:

```
>> test -v 0x40 2
16:c0200000:80050000:133c835
-040-08 DSH-80 Sync/Async Option test
-040-30 DSH-80 68302 self tst
-040-1f DSH-80 Display Status Block

stat: 00ce - 68302 no carrier detect
----------
csr : 001e   sb  : 00ce   hwv  : 0002   swv  : 0012
cc1 : 0000   cc2 : 0000   i/e  : 0001   ecnt : 0002
chn : 0001   sel : 0001   prot : 0000   scm  : f0cc   bps : 0078
ahi : 0002   alo : 8000   size : 0008   exp  : 5f00   act : 0000

DSH-80 - 68302 self test failure - _exp _ret _test
?40 1f ff 0003

P1= 00000040 P2= 00000054 P3= 00000001 P4= 000000ce P5= 0000001e
P6= 00000000 P7= 00000000 P8= 00000000 P9= 00000000 P10=00000000
gp= 00800000 sp= a000c088 fp= 00000000 sr= b0480000
epc=bfc2a1ec  badvaddr=00060000 cause= 10000000

>>
```

Appendix A

Field-Replaceable Units for the DSH80 Synchronous/Asynchronous Option

Table A–1: FRUs for the DSH80 Option

Unit	Part Number
Sync module one	54–20472–01
Sync module two	54–20874–01
Ribbon cable (50-way)	17–01243–04
Ribbon cable (100-way)	17–02295–02
Lower blank cover plate	74–41591–01
Upper blank cover plate	74–38986–01
Standoff	12–21566–05
Async loopback (H3103)	12–25083–01
Sync loopback (H3199)	12–25852–01
Label (1), async lines 0-3	36–33715–03
Labels (2), sync lines 1 and 2	36–35733–01

Appendix B

Cable Lengths and Order Numbers

B.1 Distance Specifications for Cables

Table B–1 lists protocol standards, their data rates, and the recommended cable length.

Table B–1: Maximum Communication Distances

Protocol	Data Rate (kbits/s)	Cable Length
EIA–232–E/V.24/V.28	Up to 20	15 m (50 ft)
EIA–423–A	Below 1 20 48 64	1200 m (3900 ft) 400 m (1300 ft) 150 m (500 ft) 130 m (400 ft)
EIA–422–A	Below 90	120 m (3900 ft)
V.35	48	60 m (200 ft)

Table B–1 assumes the following capacitance and length:

- V.24 cable capacitance is 50 pF/ft.

- EIA–423–A cable capacitance is 15 pF/ft.

- EIA–422–A cable capacitance is 15 pF/ft, terminated with 100 ohms.

- V.35 maximum length (60 m) is a recommended figure only.

Table B–2: Cables for Customer Ordering

Cable	Part Number[1]
DEC office cable, 6-wire	BC16E
Extension cable for BC19E–02 (EIA–423/V.36)	BC55D–xx
Extension cable for BC19F–02 (V.35)	BC19L–xx
Extension cable for BC19D–02 or BC23V–02	BC22F–xx
Extension cable for BC19B–02 (EIA–422)	BC55D–xx
Loopback for universal 50-pin	H3199
Loopback for EIA–423, EIA–422	H3198
Loopback for V.35	H3250
Loopback for 25-pin D-sub connector	H3248
Loopback for 25-pin D-sub connector	H3266
Loopback for async MMJ connectors	H3103
Modem cable, 25-wire, fully-shielded EIA–232–C/V.28	BC22F–yy
Null modem, 6-wire, fully-shielded EIA–232–C/V.28	BC22D–yy
Null modem, 10-wire, fully-shielded EIA–232–C/V.28	BC17D–yy
Sync line adapter cable for EIA–422–A/V.11	BC19B–02
Sync line adapter cable for EIA–423–A/V.10	BC19E–02
Sync line adapter cable for V.35	BC19F–02
Sync line adapter cable for EIA–232–E/V.24	BC19D–02, BS19D–02[2]
Sync line adapter cable for EIA–232–E/V.24	BC23V–02, BS23V–02[3]

[1]xx and yy represent one of the following:

    10: 10 ft (3.1 m) (xx)
    25: 25 ft (7.6 m) (xx, yy)
    35: 35 ft (10.7 m) (yy)
    50: 50 ft (15.2 m) (xx, yy)
    75: 75 ft (22.9 m) (xx, yy)
    A0: 100 ft (30.5 m) (xx)

[2]Includes BC19D–02 and 12–27591–01 adapter.
[3]Includes BC23V–02 and 12–27591–01 adapter.

Appendix C

Connectors, Cables, and Loopbacks

D-sub connectors are for synchronous ports and MMJ connectors are for asynchronous ports.

C.1 Synchronous (D-Sub) Connectors

Use the 50-pin D-sub connector (port 1) to connect devices that support any of the following standards:

- EIA–232–E/V.24/V.28

- EIA–423–A, EIA–449/V.10, V.36

- EIA–422–A, EIA–449/V.11, V.36

- V.35

Table C–2 shows the pinouts for the D-sub connector.

C.2 Asynchronous (MMJ) Connectors

The MMJ connectors each have the pin numbers and signals as shown in Table C–1.

Table C–1:   MMJ Connectors

Pin	Signal Name
1	Tied to Vcc by 150-ohm resistor
2	Txdata
3	Txcommon
4	Rxcommon
5	Rxdata
6	Tied to GND by 3K-ohm resistor

Table C–2: D-Sub Full Function Connector Pinouts

50-Way Pin	Signal Name	V.35 Pin	232–E Pin	422–A Pin	423–A Pin	Null Modem
1	Code ground	†	†	†	†	†
2	Code 0	†				
3	Code 1		†		†	†
4	Code 2			†		†
5	Code 3					
6	TX Data A	2	4		11	
7	TX Data B	9	22		12	
8	TX Data			4		
9	RTX/CA		7			
10	RTS/CB		25			
11	RX Data A	4	6	6	6	
12	RX Data B	11	24	24	7	
13	Local Loop		10	10		
14	Speed Indicate		12	2	2	
15	Test I		18	18		
16	Rem Loop		14	14		
17	RI	J	22	15	15	
18	RX Clock A		17	8	8,20,47	
19	RX Clock B		‡	26	26,21,48	
20	TX Clock A		15	5	5, 18	
21	TX Clock B		‡	23	23,19	
22	Clock		24		17	
23	V.35 TX Clock A	Y				
24	V.35 TX Clock B	a				
25	V.35 Clock A	U				

†Connected to DCE ground (pin 41)

‡Connected to Code ground (pin 1); Code ground does not run down the cable; on null modem cable each end has code signals

Table C–2 (Cont.): D-Sub Full Function Connector Pinouts

50-Way Pin	Signal Name	V.35 Pin	232–E Pin	422–A Pin	423–A Pin	Null Modem
26	V.35 Clock B	W				
27	V.35 RX Data A	R				
28	V.35 RX Data B	T				
29	V.35 TX Data A	P				
30	V.35 TX Data B	S				
31	V.35 RX Clock A	V				
32	V.35 RX Clock B	X				
33	DTR	H			12	
34	DSR A	E		11	11	
35	DSR B	‡	29	29		
36	RTS	C	4		7	
37	DCD/I A	F	13	13		
38	DCD/I B	‡	31	31		
39	CTS A	D	9	9		
40	CTS B	‡	27	27		
41	DCE Ground	‡	‡	20	20	
42	TEST1					
43	TEST2					
44	DTE Ground	B‡	7‡	19,37	19, 22,25, 30,35,37	
45	DTR A			12		
46	DTR B			30		
47	Clock A			17		18
48	Clock B			35		19
49	TEST3					
50	Speed Select		23	16	16	

‡Connected to Code ground (pin 1); Code ground does not run down the cable; on null modem cable each end has code signals

C.3 Synchronous Line Adapter Cables

The following synchronous line adapter cables are used:

BC19B–02 (EIA–422–A/V.11)

For connection of the DECsystem 5100 to EIA–422–A devices. The BC19B–02 is a 28-wire cable with a 50-pin connector at one end and a 37-pin connector at the other.

BC19D–02 (EIA–232–E/V.24)

For connection of the DECsystem 5100 to EIA–232–E or V.24 devices. The BC19D–02 is a 15-wire cable with a 50-pin connector at one end and a 25-pin connector at the other. Cable BC19D–02 is similar to BC23V–02.

BC19E–02 (EIA–423–A/V.10)

For connection of the DECsystem 5100 to EIA–423–A devices. The BC19E–02 is a 24-wire cable with a 50-pin connector at one end and a 37-pin connector at the other.

BC19F–02 (V.35)

For connection of the DECsystem 5100 to V.35 devices. The BC19F–02 is a 16-wire cable with a 50-pin connector at one end and a 34-pin connector at the other.

BC23V–02 (EIA–232–E/V.24)

For connection of the DECsystem 5100 to V.24 devices. The BC23V–02 is a 16-wire cable with a 50-pin connector at one end and a 25-pin connector at the other. Cable BC23V–02 is similar to the BC19D–02.

V.24/EIA–232–C Adapter (12–27591–01)

For converting the 25-pin D-sub connectors to EIA–232–C format.

C.4 Asynchronous Line Adapter Cable

BC16E–xx

For connection to a terminal asynchronous port. The BC16E is an unshielded, 6-conductor flat cable terminated at both ends with an MMP.

C.5 Extension Cables

Use the cables in Table C–3 with the line adapter cables.

Table C–3:   Synchronous Line Extension Cables

Type	Description
BC55D–xx	Extends BC19B–02 adapter cable (EIA–422)
BC22F–yy	Extends BC19D–02 or BC23V–02 adapter cable (V.24)
BC55D–xx	Extends BC19E–02 adapter cable (EIA–423–A)
BC19L–xx	Extends BC19F–02 adapter cable (V.35)

C.6 Synchronous Loopbacks

H3199 Total Loopback

For testing 50-pin D-sub connector driver and receiver circuits.

H3198 (EIA–422–A/EIA–423–A)

For testing EIA–422–A and EIA–423–A interfaces on the 50-pin D-sub connector, as well as the EIA–422–A and EIA–423–A adapter cables.

H3250 (V.35)

For testing the V.35 interface on the 50-pin D-sub connector and the BC19F–02 adapter cable.

H3248 (EIA–232–D/V.24)

The H3248, a 25-pin loopback similar to the H3266, is used to loop back EIA–232–E/V.24 cables.

H3266 (EIA–232–E/V.24)

This loops back the 25-pin D-sub connector and the BC22F cable. The H3266 is a 25-pin loopback similar to the H3248.

C.7 Asynchronous Loopback

H3103 MMJ Loopback Connector

To loop signals back on the asynchronous (MMJ) ports.

United Kingdom Specifications

This appendix is for use with Digital's DSH80 option in the United Kingdom, and meets the requirements of BABT/SITS/89/43 Section 7.1.

D.1 Service Category Specifications

Table D–1 lists the service categories (SC) and their specifications.

Table D–1: Specifications for Service Categories (SC) 1 and 2

SC	Interface	Baud Rates	Physical	Electrical	PTO:[1] BT	Hull	MCL
1	CCITT recommend X.21bis	2400 4800 9600 19 200	ISO 2110 BS.6623: Part 1 1985	V.24[2]/V.28 Cable: BC19D–02 BC22F–25	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes Yes
2	CCITT recommend X.21bis	48 000 56 000 64 000	ISO 2593 BS.6623: Part 4 1986	V.35[3] Cable: BC19F–02 BC19L–25	Yes Yes	Yes	Yes Yes Yes

[1]BT = British Telecommunications plc; Hull = Kingston Communications (Hull) plc; MCL = Mercury Communications Ltd

[2]2 ft for adapter cable BC19D–02; 25 ft for extension BC22F–25

[3]2 ft for adapter cable BC19F–02; 25 ft for extension BC19L–25

D.2 Direct Connection (BABT/SITS/89/43 Section 4.2)

The DSH80 option is approved for direct connection to a particular digital circuit, including interconnecting cables with mating connectors conforming to BS.6623 part 1 and part 4.

D.3 Apparatus Between DECsystem 5100 and Digital Circuit (PTT)

If any other apparatus, including cable or wiring, is to be connected between the DECsystem 5100 and the point of connection to any particular digital circuit, then all the other apparatuses shall conform as follows:

1. The overall transmission characteristics of all other apparatuses shall introduce no material effect upon the electrical conditions presented to one another by an apparatus and a digital circuit.

2. All the other apparatus shall comprise only:

   - Apparatuses approved (such apparatuses may be subject to limitations on their use) for the purpose of connection between the apparatus and a particular digital circuit.

   - Cable or wiring complying with code of practice for installation of apparatuses covered by the standard or other applicable requirements.

D.4 Safety Warning for UK Installations

The DSH80 option has a label regarding safety requirements of communications modules installed in the United Kingdom. The label states:

```
SAFETY WARNING. See instructions for use
```

The following warning applies in the UK:

CAUTION: *The port indicated by the safety label is not intended to provide electrical and mechanical isolation to satisfy the requirements of BS6301. Connect only apparatus conforming with BS6301 to the device ports, or apparatus that has previously been evaluated against British Telecom Technical Guides 2 or 26 and given clearance to attach. Other usage will invalidate any approval given to this apparatus.*

Connecting apparatuses to which this warning applies, whether the ports are so marked, may produce hazardous conditions on the network. Seek advice from a competent engineer before making any such connection.

Products complying with the Oftel's General Approval NS/G/23/J/1000003 may be connected to the DECsystem 5100 and need not carry the BS6301 warning text or label. **All products supplied by Digital comply with the General Approval.**