

Subject: Using SCSI Tape Drives with Hewlett Packard 9000 Computers	Initial Release Date: 1/8/92	Revision Date: 7/28/93	Revision: B
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1. Purpose and Scope

This application note provides the information necessary to allow you to interface a Qualstar SCSI tape drive to Hewlett Packard 9000 computers. This includes the Series 300/400, Series 600/800, and the Series 700 (Apollo).

2. Overview

The HP9000 uses the HP-UX operating system. A working knowledge of the HP9000 and the HP-UX operating system is assumed. If you need detailed information about these systems, please refer to the appropriate Hewlett Packard manual. You may also wish to refer to one of the following Qualstar User Guides for detailed information about configuring and using your Qualstar tape drive:

- **Qualstar 1054 - Document 500100**
- **Qualstar 1260S - Document 500250**
- **Qualstar 34XXS - Document 500300**

Installing a Qualstar tape drive on an HP9000 consists of the following steps:

1. Connecting the tape drive to the HP9000.
2. Configuring the tape drive to emulate an HP7980S tape device.
3. Configuring the HP9000 using either the System Administration Manager (SAM) or the HP-UX commands.
4. Testing the installation.

3. Connecting the Tape Drive to the HP9000

Qualstar SCSI nine-track, half-inch tape drives are configured as SCSI *sequential access devices* and as such, are to be connected to the SCSI port of the HP 9000 System Processing Unit (SPU).

The tape drive is shipped from the factory with internal terminators installed. This assumes that you will connect the tape drive at one end of the SCSI cable rather than in the middle. If you plan to connect the tape drive in the middle of the SCSI cable, you'll need to remove the tape drive's internal SCSI terminators. Failure to do so may result in improper system operation. If you choose to use external terminators on the tape drive instead of the supplied internal termination, you must remove the internal SCSI terminators.

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The following SCSI cables are available from Qualstar:

PN 738-0054-2 - For use with HP9000 Series 700 computers

PN 738-0014-6 - For use with HP9000 Series 300/400 and 600/800 computers

3.1 Connection Procedure

1. The SCSI ID is set at the factory to 5. Before installing the tape drive, use "ioscan" to list the SCSI devices already connected to your system.
2. Follow the system shutdown procedure. Refer to the HP System Administration manual if necessary for specific instructions on starting and stopping HP-UX.
3. Turn off the computer and unplug its power cord.

CAUTION

Do not connect (or disconnect) any SCSI device to the SCSI bus while power is applied to the system or the device.

4. If the system has no external SCSI devices attached:
 - a. Remove the external terminator plug from the SCSI port at the rear of the computer and keep it in case you decide to remove the tape drive at a later date.
 - b. Connect the SCSI cable between the SCSI port on the computer to either port on the rear of the tape drive. The total length of the SCSI cable must be at least 0.5 meter and must not exceed 6.0 meters.
5. If the system already has other external SCSI devices attached:
 - a. Turn off all other SCSI devices before proceeding.
 - b. Remove the terminator from the last device on the SCSI cable and connect a SCSI cable between this device and either port on the rear of the Qualstar tape drive. The total length of the SCSI cable must be at least 0.5 meter and must not exceed 6.0 meters.
 - c. Connect the AC power cord from the tape drive to an AC receptacle and apply power to the tape drive. All system components and SCSI devices in a system should be connected to a common electrical circuit. To avoid electrical noise from being injected into the system, high current devices such as copying machines, air conditioners, and industrial equipment should not be connected to this circuit.

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4. Configuring the Tape Drive

Configuring the tape drive consists of setting the SCSI ID and selecting the correct Inquiry data file. Refer to the *Supplemental SCSI Drive Information* chapter of the User's Guide for help with the following steps.

1. Verify that the *default drive configuration* settings reflect those given in the User's Guide. Different settings may result in improper operation.
2. To avoid contention on the SCSI bus, set the tape drive SCSI ID to an unused value between 0 and 7. The factory default setting of 5 can be used if not already assigned to another device.
3. The SCSI Inquiry data file is set at the factory to **QUALSTAR XXXX**, where **XXXX** is the model number. Following the instructions in the User's Guide, select the HP7980S Inquiry data file to all the tape drive to report as a **HP 7980S** (six blank spaces after HP). This is a nine-track, half-inch, open-reel, SCSI tape drive which supports both the 1600 cpi Phase Encoded and the 6250 cpi Group Coded Recording formats.

If the HP7980S inquiry data file is not available in your tape drive, you will need to create a custom data file by modifying the **QUALSTAR XXXX** data file to read **HP 7980S** by following the instructions in the User's Guide. When doing so, be sure to enter all letters as *upper case*, and to separate "HP" from "7980S" with exactly six spaces.

5. Configuring the HP9000 Using SAM

The HP9000 must be configured so that it can recognize the newly-installed tape drive. You may do this either by using SAM, or by using HP-UX commands as described in the following section. The instructions in this section are the same for all HP9000 computers.

1. When the tape drive has finished its power-on sequence, plug in the HP9000 and power it up.
2. At the end of the boot sequence, log in as "root".
3. Once the system has finished booting, go to the system prompt "#".
4. Type `/usr/bin/sam`.

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5. Select **Peripheral Devices, Tape Drives** and **Add Tape Drive**. The HP-UX operating system automatically adds the correct hardware paths to the HP-UX kernel for the new tape drive. Therefore, the Add Tape Drive menu should display the correct hardware path of the Qualstar tape drive known as "HP7980S".
6. If the correct hardware path is not displayed, press **Device Missing** and follow the directions to add the tape drive.
7. Move the cursor to the new tape drive displayed in the menu, then press **Done** and exit SAM.
8. Proceed to Section 7, *Testing the Installation*.

6. Configuring the HP900 Using HP-UX Commands

The SCSI device drivers and special device files may be added using HP-UX commands as described in this section.

6.1 Verifying the Device Drivers

1. To check and see if the drivers are present, enter the following commands:

```
cd /etc/conf
more dfile
```

2. You will see a list of driver names. Somewhere in the list, the lines **scsi** and **scsitape** must appear. If these lines are not present, add the lines to the file using the "vi" editor.
3. If you edited */dfile*, relink the kernel and reboot the computer. Relinking the kernel is described in the *System Administration Tasks Manual* under *Reconfiguring the HP-UX Kernel*.
4. Return to the system prompt "#".
5. Verify the hardware path and status of each device on the system by typing */etc/ioscan*.

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6.2 Creating Special Device Files

The system communicates with the tape drive via one or more special device files which define the tape drive to the system. If a special device file does not exist for the tape drive, you must create one. Before creating the file, use the following procedure to see if one already exists.

1. Go to the directory which contains the device files by typing `cd /dev`.

View the existing device files by typing `ls -l`.

Current devices and permissions in the `/dev` directory will be displayed. Devices for magnetic tape normally contain the letters "mt". Raw device files normally contain the letter "r". To list all device files which contain the letters "mt", type

```
ls -l /dev/*mt*
```

The following table lists a few examples of tape drive device files:

<code>/dev/mt/0m</code>	1600 cpi	Block mode
<code>/dev/mt/0h</code>	6250 cpi	Block mode
<code>/dev/mt/0mn</code>	1600 cpi	No rewind, block mode
<code>/dev/mt/0hn</code>	6250 cpi	No rewind, block mode
<code>/dev/rmt/0m</code>	1600 cpi	Raw mode
<code>/dev/rmt/0h</code>	6250 cpi	Raw mode
<code>/dev/rmt/0mn</code>	1600 cpi	No rewind, raw mode
<code>/dev/rmt/0hn</code>	6250 cpi	No rewind, raw mode

2. If no special device files exist for your tape drive, you must create one by using the `make node` command.

NOTE

HP-UX does not support 3200 cpi operation. If you want to use 3200 cpi with HP-UX, you must first disable the remote density select feature (34XXS drives) and manually select 3200 cpi locally at the tape drive.

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The command syntax is:

```
mknod /dev/[r]mt/#d[n] c <major#> <minor#>
```

mknod is the command name.

/dev/[r]mt/#d[n] is the file name and is preceded by a space.

dev - Indicates *device*.

r - Indicates a *raw* (character) device.

mt - indicates *magnetic tape*.

- Specifies the *logical device* number. Do not confuse this with the SCSI ID number.

D - Specifies the *tape density*: h = high (6250 cpi), or m = medium (1600 cpi).

n - This optional parameter, when present, specifies *no rewind on close*.

c - Indicates a character device and is followed by a space.

<major#> <minor#> - These are the major and minor device numbers and vary from one series to another as follows:

- **Series 300/400** major and minor device number-

a. The major number for SCSI tape drives is 54.

b. The minor device number is 0x0e0586 (a hexadecimal number), where:

0e0 - Specifies SCSI Select Code of 14.

5 - Specifies the SCSI ID number of the tape drive.

8 - Specifies a tape density of 6250 cpi (4 = 1600 cpi).

6 - Selects rewind on completion (7 = do not rewind on completion).

Series 300/400 Examples:

```
mknod /dev/rmt/0h c 54 0x0e0586
```

The preceding command creates a SCSI tape device whose SCSI ID is 5, operates at 6250 cpi and which automatically rewinds on close.

```
mknod /dev/rmt/0mn c 54 0x0e0347
```

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The preceding command creates a SCSI tape device whose SCSI ID is 3, operates at 1600 cpi and which does not rewind on close.

- **Series 600/800** major and minor device number:

To automatically assign the major and minor device numbers, first make sure you are in the */dev* directory, then type

```
insf -d tape2 -1 lu
```

where "lu" represents a new logical unit number for the new SCSI tape drive device. A complete set of special device files will be created in */dev*.

- **Series 700** major and minor device number:

a. The major device number for SCSI tape devices is 121.

b. The minor number is 0x201508, where

201 - Specifies the SCSI select code

5 - Specifies the SCSI ID number of the tape device

08 - Specifies the tape density and rewind mode as follows:

04	1600 cpi, auto rewind
05	1600 cpi, no rewind
08	6250 cpi, auto rewind
09	6250 cpi, no rewind

c. Before making new device files, add directory */dev/mt* to receive the new files by typing:

```
cd /dev  
mkdir mt
```

d. Add device files using "mknod".

Series 700 Examples:

```
mknod /dev/mt/0m c 121 0x201504
```

The preceding example creates a SCSI tape device file with a SCSI ID of 5, a density of 1600 cpi, and automatic rewind.

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```
mknod /dev/mt/0hn c 121 0x201509
```

The preceding example creates a SCSI tape device file with a SCSI ID of 5, a density of 6250 cpi, and no rewind on close.

Change to the `/dev/mt` directory and change permissions as follows:

```
cd /dev/mt
chmod 666 *
chown bin *
chgrp bin *
```

After creating your special device files, test the installation as described in the following section.

7. Testing the Installation

The tape drive may be tested using the HP-UX commands "tar", "cpio", "dd". The following examples may be used:

If no special device files exist for your tape drive, you must create one by using the *make node* command.

1. `tar cvbf 64 /dev/mt/0m filename`
2. `ls | cpio -oB /dev/mt/0m`
3. `dd if=filename of=/dev/mt/0hn bs=10k`