StorageTek™ Virtual Operator Panel

Customer User's Guide

Part Number: 96179
Revision JA

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Customer User's Guide

Sun Microsystems, Inc.
www.sun.com

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Revision History

EC	Date	Revision	Description
129914	February 2006	A	Initial Release
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129936	April 2006	C	Refer to this revision for a description of the changes.
129967	May 2006	D	Refer to this revision for a description of the changes.
129994	June 2006	E	Refer to this revision for a description of the changes.
135001	July 2006	F	Refer to this revision for a description of the changes.
135033	September 2006	G	Refer to this revision for a description of the changes.
135063	October 2006	H	Refer to this revision for a description of the changes.
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EC000471	June 2008	JA	Incorporated VOP application changes relative to VOP version 1.0.12. Because VOP 1.0.12 provides a second application to support the LTO Generation 4 tape drive, Chapter 1 was revised to discuss both VOP applications. Some information from Chapter 1 was moved to Chapter 4 as it was specific to the T-series tape drive VOP application. Created a new Chapter 3 to discuss how to start the VOP applications. Added a Chapter 5 to address the VOP application for the LTO4 tape drive.

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Preface

This publication is for the customer who is installing and/or operating the Virtual Operator Panel (VOP), whenever a Service Delivery Platform (SDP) is not present.

Note – When an SDP site server unit is installed on site, monitoring installed drives via an Ethernet private network, the drive Ethernet port is 100% dedicated to the SDP. Therefore, the drive Ethernet port is NOT available for customer connection, required for VOP interface with the drive.

Organization

The organization of this guide is:

Chapter 1	"Virtual Operator Panel Overview" provides an overview and prerequisite information regarding the virtual operator panel.
Chapter 2	"Software Installation" provides guidelines for installing Java Runtime Environment, and the virtual operator panel application software.
Chapter 3	"Starting VOP Programs" provides guidelines for starting the virtual operator panel application.
Chapter 4	"VOP Operation - T-series" provides guidelines for using the virtual operator panel to interface with a T10000 or T9840D tape drive.
Chapter 5	"VOP Operation - LTO" provides guidelines for using the virtual operator panel to interface with an LTO Generation 4 tape drive.
Appendix A	"Changing the Computer IP Address" provides guidelines for setting static IP address, and resetting for dynamic IP address.
Appendix B	"VOP to Drives on Private Networks" provides guidelines for configuring drives in the multi-drive environment with the VOP.
Glossary	The "Glossary"defines some terms and abbreviations used in this guide.
Index	The "Index" provides an additional means of locating information within this document.

Additional Information

This section offers several methods to obtain additional information.

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Related Documentation

Document Title	Part Number
T10000 Tape Drive Operator's Guide	96174
T9x40 Tape Drive User's Reference Manual	95739
Crypto Key Management Station Configuration and Startup Guide	96261
Crypto Key Management Station User's Guide	96262

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CHAPTER 1

Virtual Operator Panel Overview

Introduction

The Virtual Operator Panel (VOP) is a computer-based Graphical User Interface (GUI) that you can use to communicate with a T10000 tape drive, a T9840D tape drive, or a Linear Tape Open (LTO) generation 4 tape drive manufactured by Hewlett-Packard to monitor drive operations, perform cartridge operations, and complete several other functions that will be described in other chapters of this guide.

When you have connected your PC to the tape drive or library drive tray Ethernet port, the VOP provides an intuitive and user-friendly GUI to display drive-related information, configure the drive, or perform various drive operations and functions. There are two versions of the VOP:

- T-series (supports T10000A, T10000B, and T9840D tape drives)
- LTO-4 (currently supports only the Hewlett-Packard drive)

Prerequisites

Before you can install and operate the VOP application, your system must meet certain prerequisites. There are minimum hardware requirements, operating system certification, and Java Runtime Environment minimum release level requirement.

Computer Hardware Requirements

Minimum hardware requirements for the VOP application:

- 512 MB memory
- 1.0 GHz processor
- Monitor screen resolution 1024 x 768
- Ethernet port available for static IP addressing
- RJ45-RJ45 Ethernet cross-over cable (direct connection to drive)
- RJ45-RJ45 Ethernet cables (indirect connection through an Ethernet switch)

Note – See Appendix B for indirect Ethernet connection guidelines.

Operating System Certification

The following operating systems are certified for VOP:

- Linux–Redhat 9.0, ES
- Solaris–SunOS 5.8, SunOS 5.9, and SunOS 5.10
- Windows 2000 or XP

Note – Platforms with older operating systems likely do not meet the minimum hardware requirements (see "Computer Hardware Requirements").

Java Runtime Environment Requirement

The VOP software application is a Java-based program. Therefore, you need a compatible version of Java Runtime Environment (JRE) installed on your computer.

Note – Your computer must have version JRE 1.5, or higher, to properly install and run VOP release 1.0.10, or higher.

Before attempting to install and run VOP, verify the presence, and release level of JRE. On Windows OS, open the Control Panel, and double-click Add and Remove Programs. On Linux/UNIX OS, see your system administrator.

Ethernet Connection to the Drive

To interface with a drive using VOP, you must have an Ethernet connection from your computer to the Ethernet port on the tape drive or drive tray rear panel.

- Direct to the drive: You must use a single crossover Cat-5 Ethernet cable.
- Indirect (through an Ethernet switch): You must use a straight Cat-5 Ethernet cable to connect your computer to the switch. The switch-to-drive cable should already be connected.

Note – See Appendix B, "VOP to Drives on Private Networks" for additional guidelines when connecting through an Ethernet switch.

Also, your computer must be configured with a static IP address, compatible with the target drive.

Note – See Appendix A, "Changing the Computer IP Address" for guidelines.

When you have Ethernet connection to a drive, and a compatible static IP on your computer, you are ready to operate VOP.

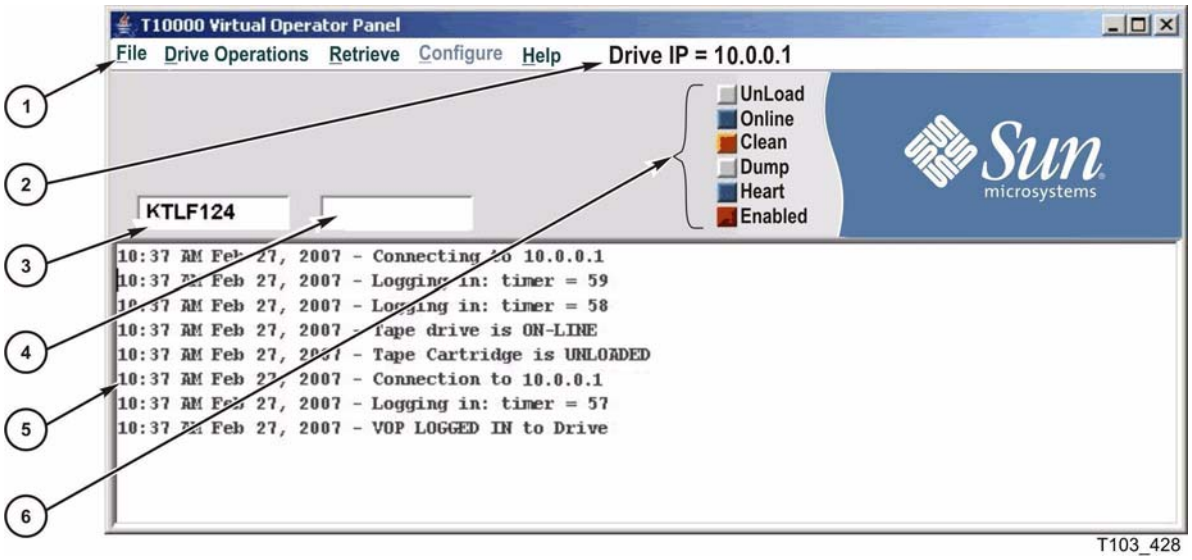
VOP Application Window (T-series)

The VOP application opens within its own window on a computer display screen. FIGURE 1-1 depicts the VOP (Windows OS) after connection to a drive.

- The menu bar contains the names of the online and offline menus. The File and Help menus are the only available menus before you connect to a drive. The Drive Operations, Retrieve, and Configure (drive must be offline) menus have expanded sub-menus and commands available only when VOP is connected to a drive.
- The drive name area displays the drive IP (10.0.0.1 in this example).
- The primary drive message window shows a recently loaded encryption key.
- The VOP text message pane displays the VOP transcript, from the connection initiation to the time the screen was captured.
- The drive status indicators show that a cartridge is not loaded; the drive is online; the drive is in need of a cleaning cartridge operation; the optional heartbeat is enabled; and that the drive is encryption-enabled (see TABLE 1-1 on page 26 for complete drive status indicator states).

Note – VOP on the Linux or UNIX OS is similar, but with a Linux/UNIX look and feel.

FIGURE 1-1 T-series VOP Application Window



1. Menu bar
2. Drive IP/name
3. Primary drive message window
4. Secondary drive message window
5. VOP transcript pane
6. Drive status indicators

Note – See Chapter 4, "VOP Operation - T-series" for details about VOP menus.

Drive Status Indicators

When you connect VOP to a drive, the drive status indicators (FIGURE 1-2) change color to indicate different drive conditions. You can click on certain indicators, such as Online, to toggle the drive to the alternative condition, and the label changes accordingly.

FIGURE 1-2 Drive Status Indicators

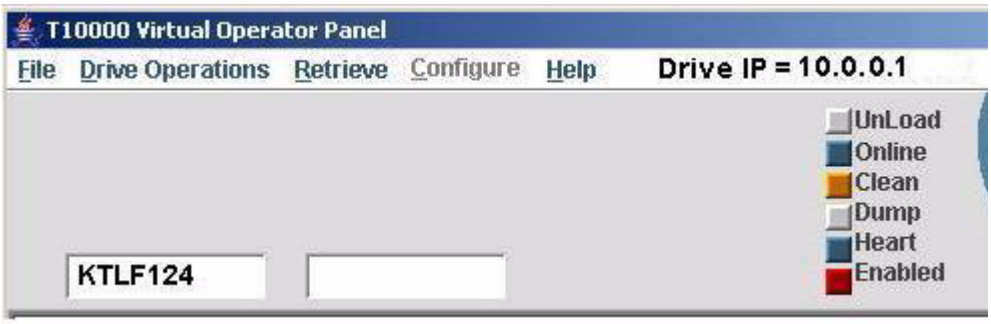


TABLE 1-1 describes the VOP status indicators, including the color meanings.

TABLE 1-1 Drive Status Indicators

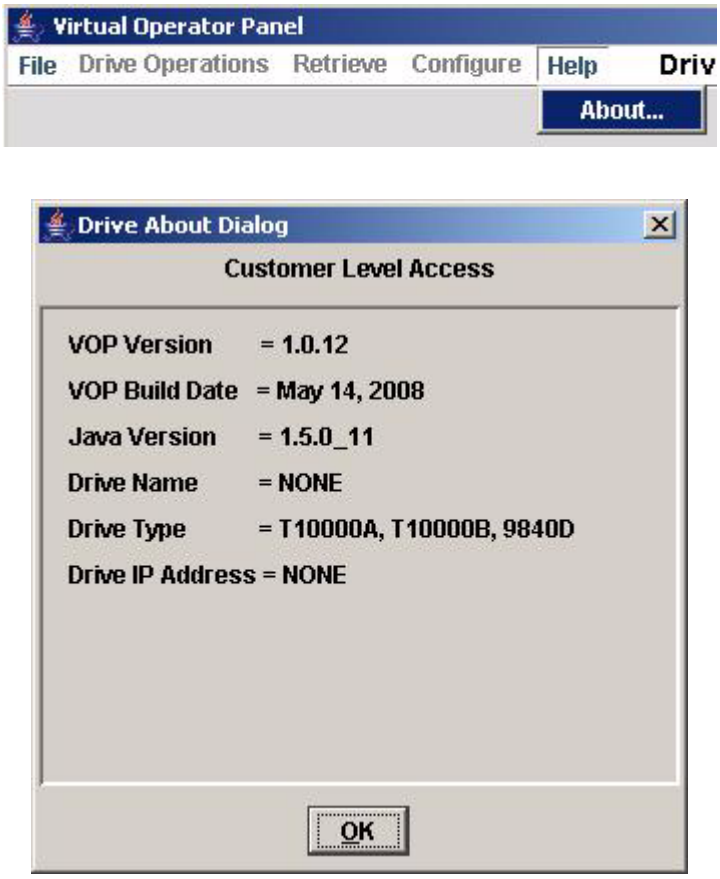
Indicator	Color	Meaning
All	Black	Indicates no connection to a tape drive
Loaded Unload Empty	Blue Grey Magenta Grey	Indicates that a cartridge is loaded in the drive Indicates that a cartridge is present in the loading slot, but NOT loaded in the drive Indicates cartridge loading/unloading is in transition Indicates that a cartridge is NOT present in the loading slot
Online Offline	Blue Grey Magenta	Indicates that the drive is online (label reads “Online”) Indicates that the drive is offline (label reads “Offline”) Indicates online/offline is in transition
Clean	Orange	Indicates that the drive needs to be cleaned
Dump	Orange	Indicates that there is an un-retrieved dump present
Heart [1]	Blue/grey	Alternates blue/grey (1 cps) while the VOP-to-drive connection is active. **Note:** The Heart indicator is available in VOP 1.0.9 or earlier only.
Encryption [2]	Red	Indicates that the drive is encryption-enabled and has all keys (label is Enabled).
	Orange	Indicates the drive is missing an encryption key (label indicates Media for KMS 2.0) or that the drive has not been enrolled (label indicates No Ecpt for KMS 2.0)

1. The heart indicator is present only when the “-b” (heartbeat feature) parameter is set in the VOP batch file. The heart beat indication is optional.
2. The encryption status indicator is present only with an encryption-capable drive that is encryption-enabled.

Help Menu

The Help menu (FIGURE 1-3) contains a single command.

FIGURE 1-3 VOP Help Menu



About

The Drive About Dialog box appears when you select About. It provides basic information about the VOP, such as VOP version and build date, and the Java Runtime Environment version. The actual Drive Name and Drive IP Address information is displayed only when the VOP is connected to a drive. The Drive Type shows the drive models on which you can use the VOP version.

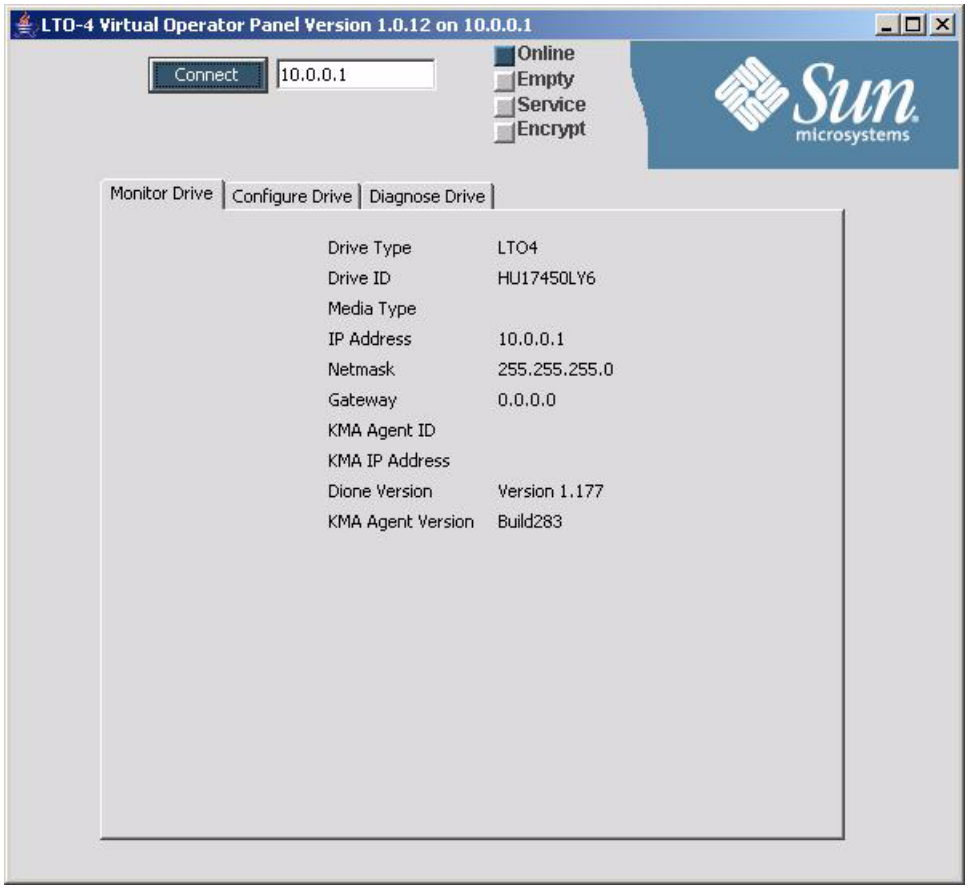
Note – The VOP title bar shows Virtual Operator Panel when there is no connection to the drive for those VOP versions that support multiple drive models. When a drive connection is completed, the title bar indicates the drive mode (such as T10000A Virtual Operator Panel).

LTO-4 VOP Application Window

The LTO-4 VOP application opens within its own window on a computer display screen. FIGURE 1-4 depicts the VOP (Windows OS) after connection to a drive.

- The title bar displays the drive IP (10.0.0.1).
- The Connect button is blue.
- There are four drive status indicators: Online, Empty, Service, and Encrypt.
- Three panels are available: Monitor Drive, Configure Drive, and Diagnose Drive.

FIGURE 1-4 LTO-4 VOP Application Window



Note – VOP on Linux or UNIX OS is very similar, but with a Linux/UNIX look and feel.

See Chapter 5, "VOP Operation - LTO"for additional information.

CHAPTER 2

Software Installation

This chapter provides instructions to install/update Java Runtime Environment (JRE) and the Virtual Operator Panel (VOP) Customer version application.

Install the Java Runtime Environment

To install/update Java Runtime Environment, go to http://www.sun.com.

Note – The Sun.com web pages are dynamic, and subject to frequent changes. Therefore, the actual pages you see might differ from the examples in this section (FIGURE 2-1 through FIGURE 2-4 on page 31). However, you should be able to make appropriate selections. Read the prompt text carefully before making selections.

FIGURE 2-1 Sun.com Home Page

1. **Choose Java 2 Standard Edition from the Downloads menu.**

   A page containing all available Java SE downloads opens (FIGURE 2-2 on page 30).

2. **Make sure the Latest Release section is active. If not, click it.**

Note – The list of the latest release of Java SE downloads is rather long; therefore, all but the Java Runtime Environment has been removed from the illustration.

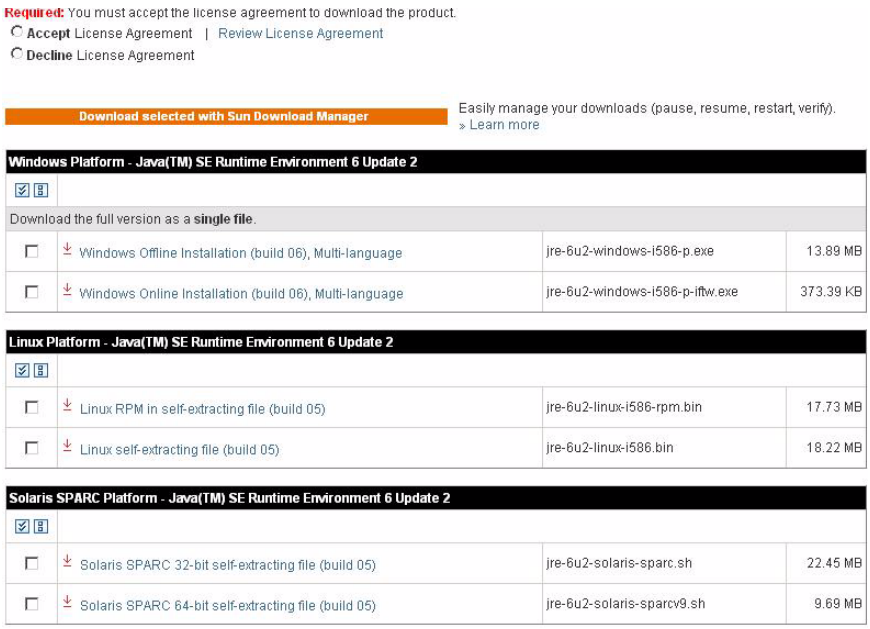
FIGURE 2-2 Java SE Downloads

3. **Click Download to start the JRE download.**

A list of available platform versions and the License Agreement appears (FIGURE 2-3).

Note – You must Accept the License Agreement to download any selection.

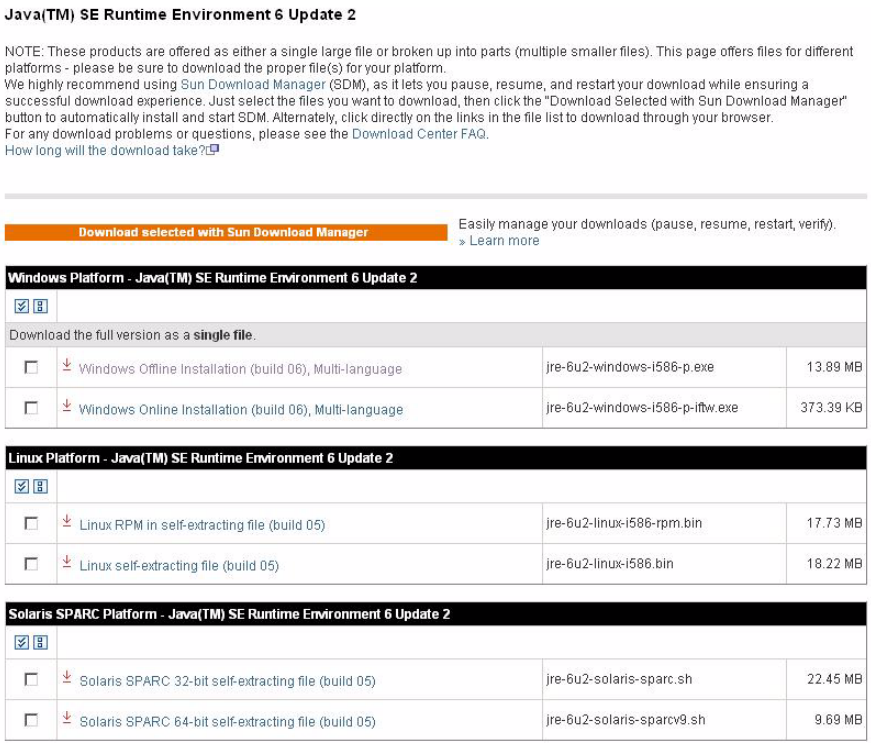
FIGURE 2-3 Java License Agreement



After you accept the License Agreement, select the platform version to match the operating system of your PC, and select offline/online installation (FIGURE 2-4). Offline installation saves a large executable file that you run after exiting Sun.com. Online installation saves a small executable file that you must run while still online.

Note – There are several additional platform selections available than are shown in FIGURE 2-4. Review the complete list before making your selection.

FIGURE 2-4 Platform Version Selection



4. **Select the appropriate check box, then click the adjacent link.**

   If you selected offline installation, you are prompted to specify the location for the large executable installation file. You can then exit Sun.com.

   If you selected online installation, a small installer executable file is saved to your desktop. You should remain online to Sun.com until the installation is finished.

5. **Double-click the executable file to start the installation process.**

   The installation process takes several minutes, and requires you to respond to a few prompts. Once the installation is complete, you are set to install/run the VOP.

   If you used the online installation version, you may now exit Sun.com.
   You can also delete either executable file used for the JRE installation/update.

Note – The JRE installation/update does not remove old JRE versions. However, their continued presence is ignored. Use discretion about removing older JRE versions.

VOP Application Software

The VOP application software installation/update process consists of four parts:

- Download the latest VOP version (zip file)
- Extract/unpack the zipped (compressed) contents
- VOP installation and test launch
  - Windows OS
  - Linux/UNIX
- Post-installation options

▼ Download VOP Zip

Begin the VOP installation process by downloading the latest VOP version release level zip file from the designated download resource.

1. **Create a local sub-folder for the VOP download.**

   We recommend creating the folder as a direct subordinate to the root (home folder in Linux/UNIX) and naming it “VOP_download”, or another name of your choice.

   Note – This folder is temporary. You will delete it after the installation.

2. **Download the latest version of the program from SunSolve.**

3. **Save the VOP zip file to the folder created in** Step 1**.**

   Once the VOP zip file is saved to your local disk, you can exit from SunSolve.

4. **Install VOP on your processing platform, see:**

   “VOP Installation, Windows OS Computers” on page 33.

   “VOP Installation, Linux/UNIX OS Computers” on page 50.

VOP Installation, Windows OS Computers

VOP software installation consists of the following parts:

- Extract/unpack the zipped (compressed) file contents
- Choose an installation method
  - Automatic (setup.exe)
  - Manual
- Verify version levels
- Test launch the LTO-4 VOP, if applicable (available in version 1.0.12)
- Post-installation options

▼ How to Extract VOP Files, Windows OS

There are several methods of extracting the VOP folders/files from the zip file. The following example is modeled on the Windows XP operating system, and the WinZip utility that is typically part of the Windows suite. The following procedure uses the most direct method to extract the VOP files within the download folder.

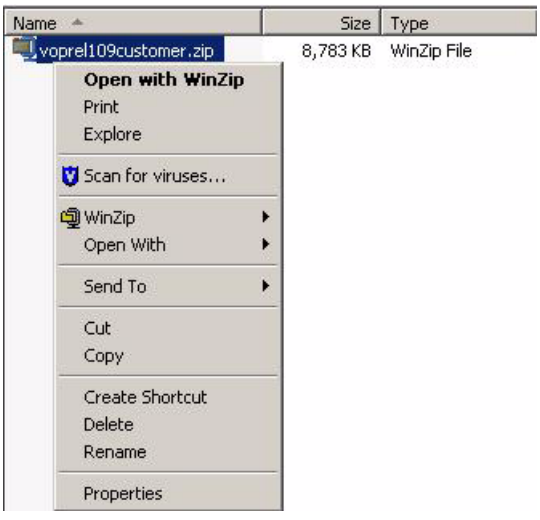
Note – If you do not have WinZip, go to:
http://www.winzip.com/ovwc17/winzip.htm.

---

1. **Open the sub-folder that you created in** Step 1 **of** "Download VOP Zip" on page 32**.**
2. **Click the right mouse button on the zip file.**

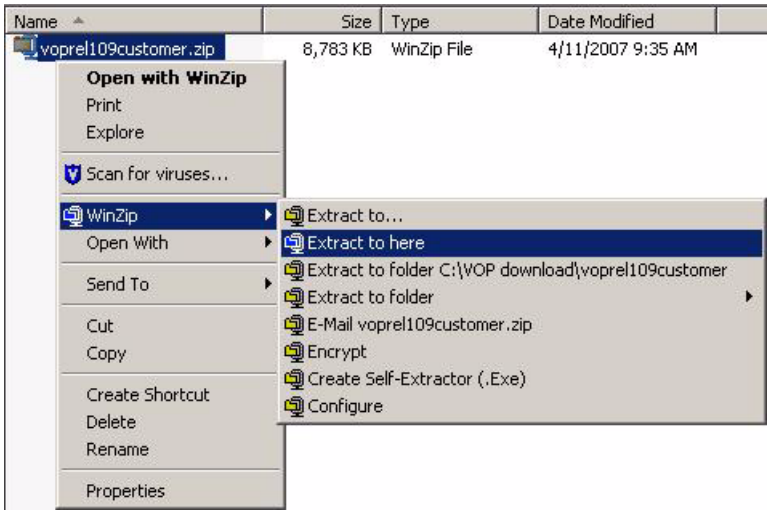
   A menu appears, similar to FIGURE 2-5.

FIGURE 2-5 WinZip Popup Menu



3. **Choose WinZip > Extract to here (see FIGURE 2-6).**

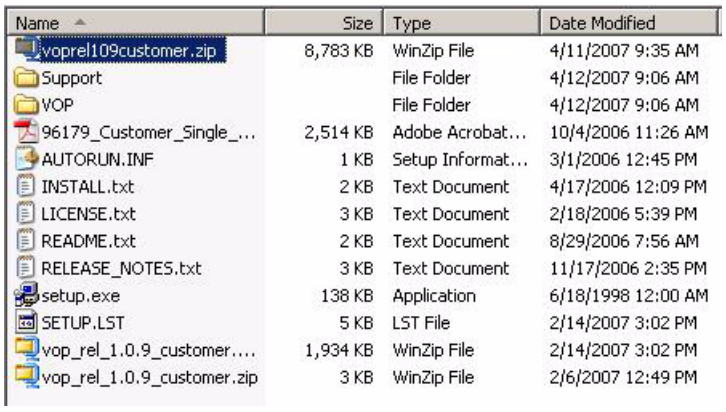
FIGURE 2-6 WinZip Extract to Here



The WinZip utility extracts the VOP files into the current folder (see FIGURE 2-7).

Note – The zip file contents will vary, relative to the specific VOP version.

FIGURE 2-7 Extracted VOP Files, Windows Explorer



4. **Open and read the LICENSE.txt file.**
5. **Go to** "Choose an Installation Method, Windows OS"**.**

Choose an Installation Method, Windows OS

On computers with Windows operating system, you have a choice between two setup procedures:

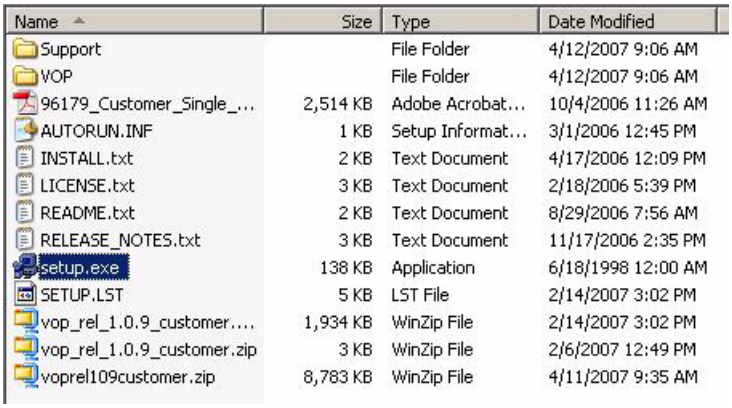
- "How to Use the Automatic Setup"
- "How to Use the Manual Setup" on page 38

▼ How to Use the Automatic Setup

The automatic setup process installs VOP program files within the Windows Program Files structure, and creates a Start Menu, Programs path for launching the program.

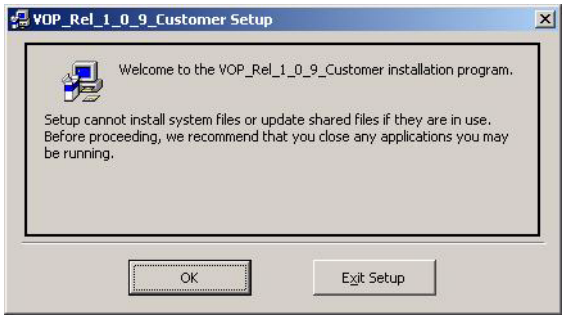
1. **Double-click the setup.exe file.**

FIGURE 2-8 Automatic VOP Installation



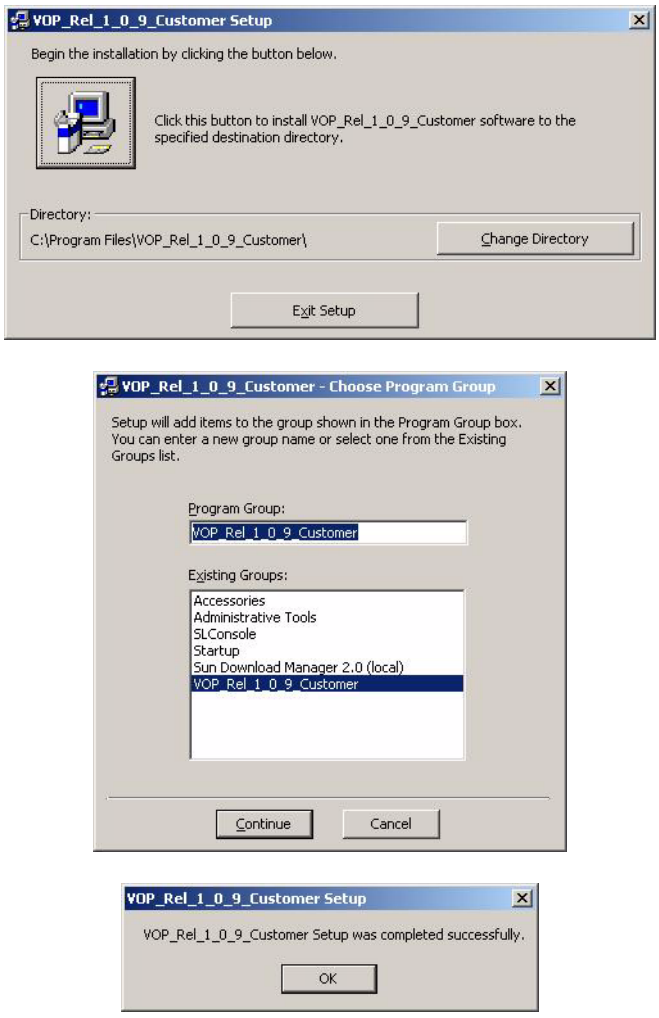
The automatic VOP installation process begins.

FIGURE 2-9 Automatic Installation Welcome



Note – During the installation process there are several points where you are asked to provide a response, see FIGURE 2-10 on page 36. Unless you have a compelling reason to the contrary, accept all defaults presented.

FIGURE 2-10 Automatic Installation Progress Points

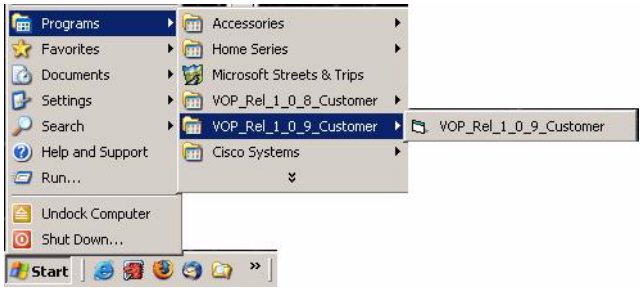


Note – Once the installation process is complete, you should verify the Start Menu path, and test launch the newly installed VOP version.

2. **Click Start, and select the Programs > VOP program folder.**

Note – The newly installed VOP version (**VOP_<*Rel level*>_Customer)** should be listed in the Programs group listing (see FIGURE 2-11 on page 37).

FIGURE 2-11 Start Menu VOP Path



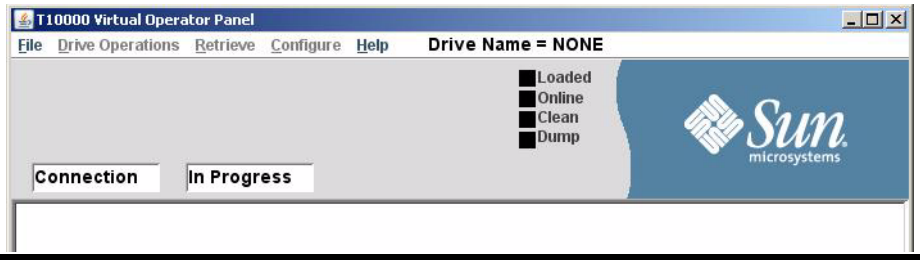
Note – If this installation updates a previously auto-installed VOP version, the earlier version program folder is also listed.

3. **Select the newest VOP version program folder, and click the executable file name.**

   The VOP application window (FIGURE 2-12) opens.

Note – There is a noticeable delay when you open the VOP application for the first time of every PC power-on session while the anti-virus scan is in progress. Subsequent VOP launches, in the same PC power-on session, are quicker. During the delay, the only visible indication of the VOP program launching is with the hard drive activity indicator

FIGURE 2-12 VOP Application Window



Note – Connection In Progress appears in the two drive message windows, but the application is open without a drive connection actually being initiated. Notice that the Drive Name is NONE and all status indicators are black.

Note – The title bar for VOP version 1.0.12 shows Virtual Operator Panel only. The model number will not appear until you initiate a drive connection.

4. **Go to** "To Display the Program Help Menu" on page 41.

▼ How to Use the Manual Setup

The manual setup process installs VOP program files outside the Windows Program Files structure

---

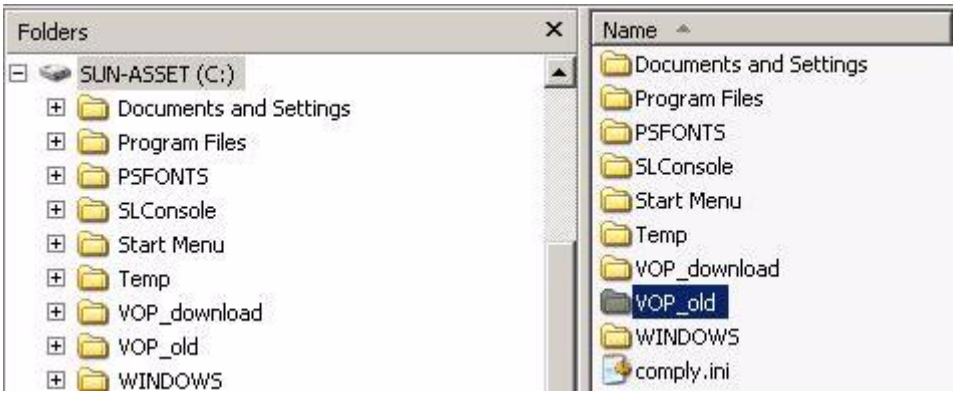
Note – If this installation is to update an existing manually-installed earlier VOP version, the existing VOP folder must be renamed. If there is not an existing VOP folder, skip to step 2.

---

1. **Rename an existing VOP folder as VOP_old.**

   See FIGURE 2-13.

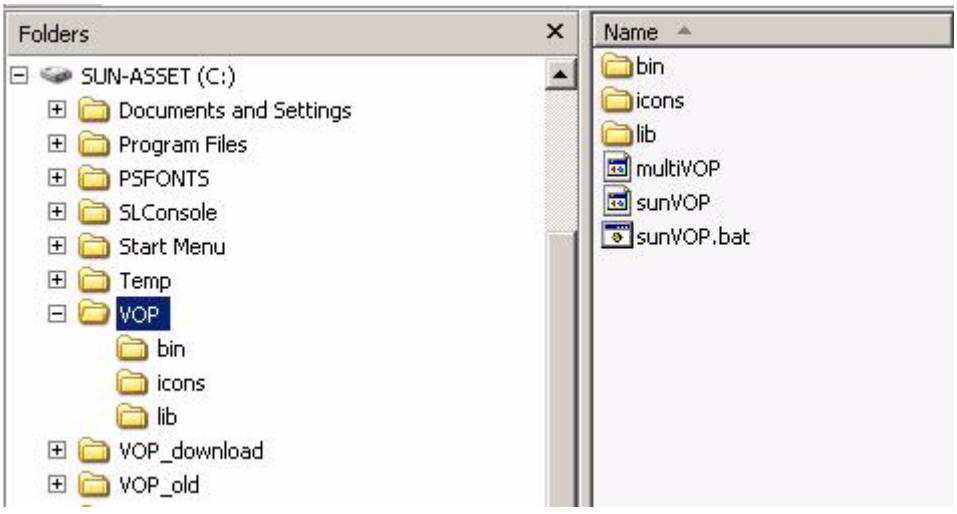
FIGURE 2-13 Rename VOP Folder



2. **Move or Copy the new VOP folder from VOP_download to the root folder.**

   FIGURE 2-14 shows the location and typical contents of the new VOP folder.

FIGURE 2-14 VOP Folder Location and Contents, Windows Explorer

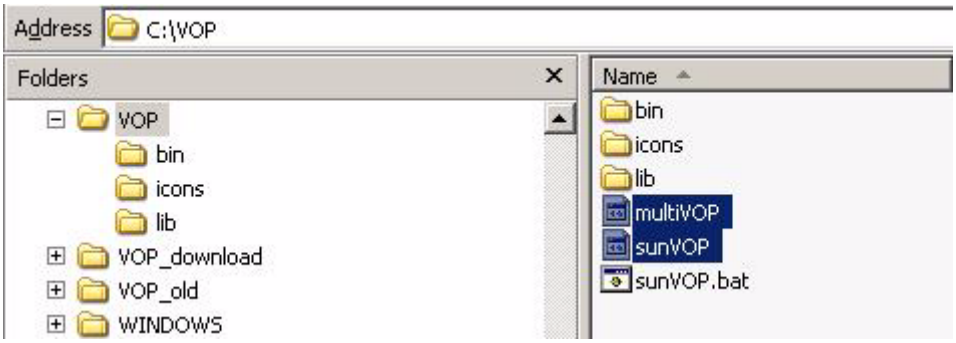


Note – Version 1.0.12 contains additional files for the ltoVOP application.

3. **Delete the file names without file extensions.**

   Examples: multiVOP, ltoVOP, or sunVOP. These files (FIGURE 2-15) are non-Windows files, and they are not needed.

FIGURE 2-15 VOP non-Windows Files



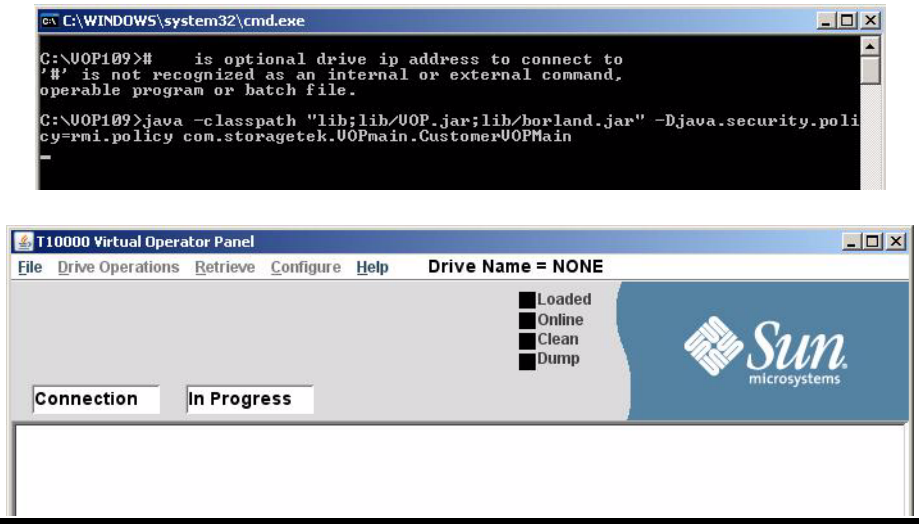
The new sunVOP.bat and ltoVOP.bat programs are now ready to launch, and you should perform a test launch to verify the setup.

4. **Double-click the sunVOP.bat batch file.**

   The sunVOP batch file window appears; then, the VOP window opens (see FIGURE 2-16 on page 40).

Note – There is a noticeable delay between the bath file window and the opening of the VOP application for the first time of every PC power-on session while the anti-virus scan is in progress. Subsequent VOP launches, in the same PC power-on session, are quicker. During the delay, the only visible indication of the VOP program launching is with the hard drive activity indicator.

FIGURE 2-16 VOP Batch File and Application Windows



Note – Connection In Progress appears in the two drive message windows, but the application is open without a drive connection actually being initiated. Notice that the Drive Name is NONE and all status indicators are black.

Note – The title bar for VOP version 1.0.12 shows Virtual Operator Panel only. The model number will not appear until you initiate a drive connection.

Until you establish a connection to the drive, you can use only the File and Help menus.

5. **Go to** "To Display the Program Help Menu" on page 41**).**

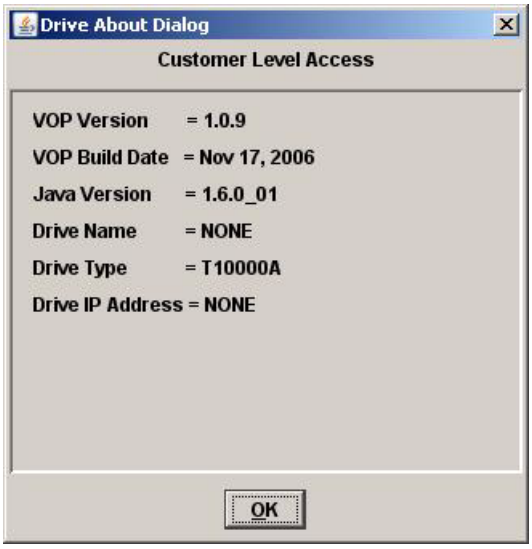
▼ To Display the Program Help Menu

Use the About command in the Help menu to verify the VOP version and Java version.

1. **Click Help, then choose About.**

   The Drive About Dialog box (FIGURE 2-17) opens.

FIGURE 2-17 VOP and Java Installation Verification, Solaris



Note – The Drive Type field in VOP version 1.0.12 lists T10000A, T10000B, and T9840D.

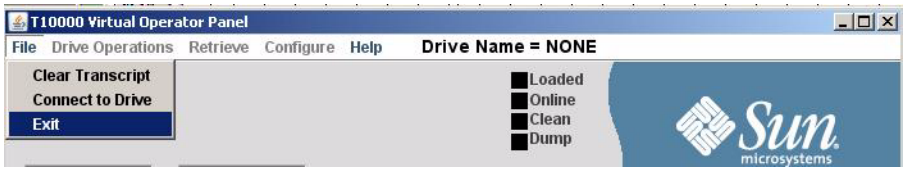
2. **Verify the release levels listed in the VOP Version and the Java Version fields.**

   If either of the release levels is not correct, replace it with the proper level.

Note – Java version 1.5, or higher, is required when you use VOP version 1.0.10 or higher. Earlier VOP releases were supported by Java 1.4.2_10, or higher.

3. **Close the About dialog box.**
4. **Exit the program (use the File menu or click the "X" in the upper right corner).**

FIGURE 2-18 Exit VOP, Windows

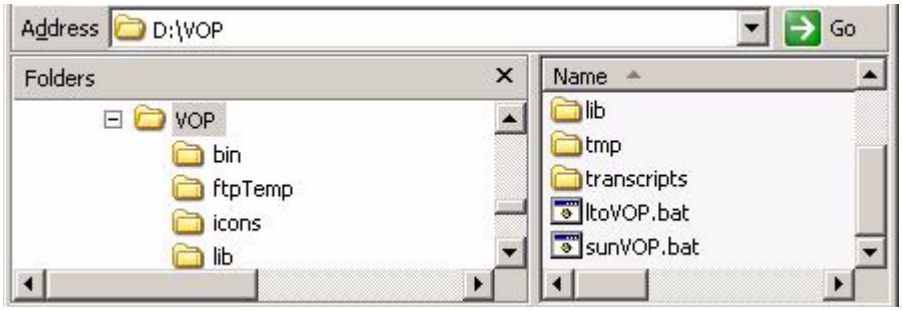


▼ To Test Launch the ltoVOP Program

The ltoVOP.bat file is available in VOP 1.0.12.

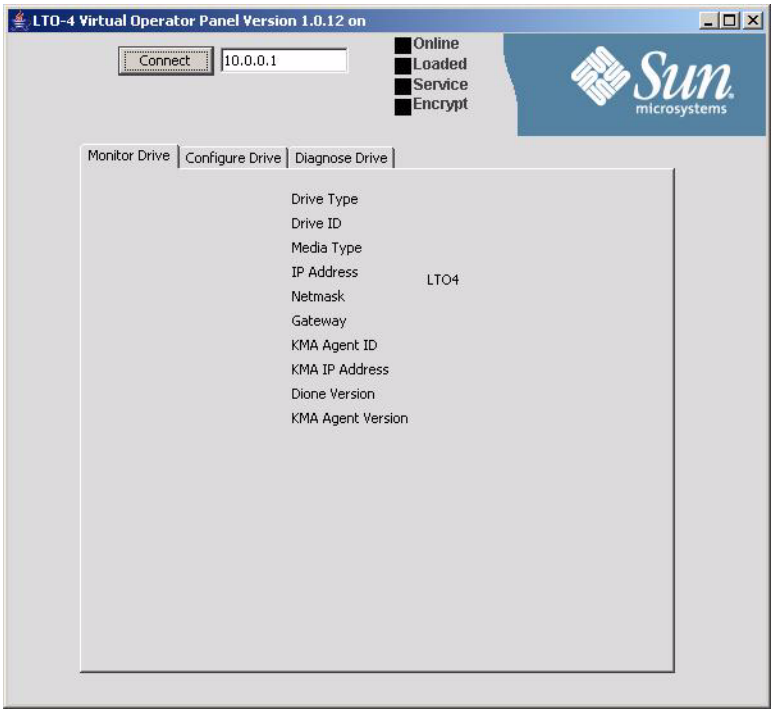
1. **Double-click the ltoVOP.bat batch file.**

FIGURE 2-19 Batch File - LTO



The LTO-4 Virtual Operator Panel window opens.

FIGURE 2-20 LTO-4 Virtual Operator Panel



2. **Exit from the ltoVOP program.**
3. **Go to** "VOP Post-Installation Options, Windows" on page 43**).**

VOP Post-Installation Options, Windows

When you have confirmed the VOP program opens and the release level is correct; you can optionally create shortcuts, modify the opening batch file, and delete down-level versions or VOP folders/files that are not needed. You should delete or empty the VOP download folder that was created to temporarily hold VOP update downloads.

▼ To Create Optional Shortcuts, Windows

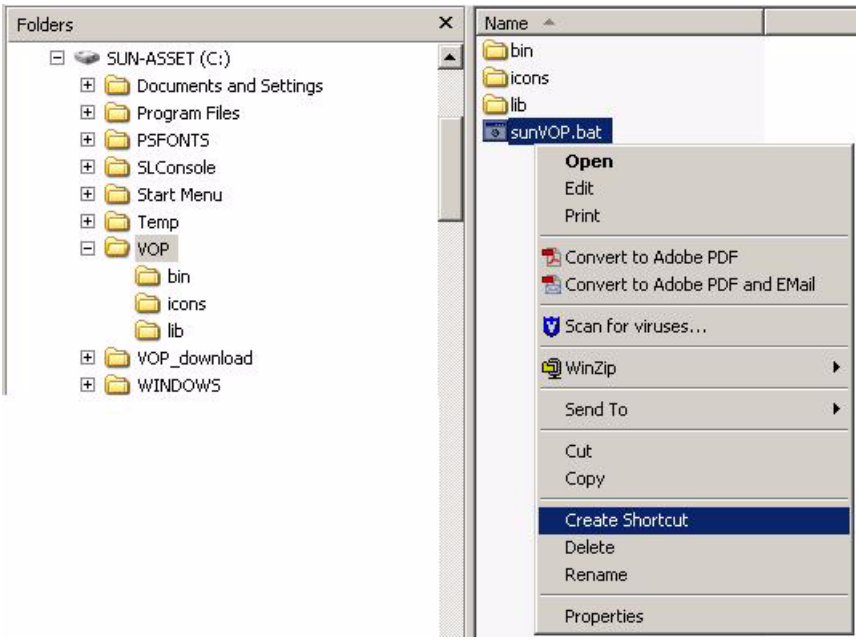
If you used automatic installation, you already have a Start Menu type of shortcut, and might well choose not to create additional shortcuts. However, if you used manual installation, you might consider creating a desktop shortcut.

Note – If this is an update to a previous manually installed VOP, any existing shortcut should work. Check the shortcut properties and edit them, as needed, to target the new sunVOP.bat file.

Use the following steps to quickly create a VOP shortcut on the desktop:

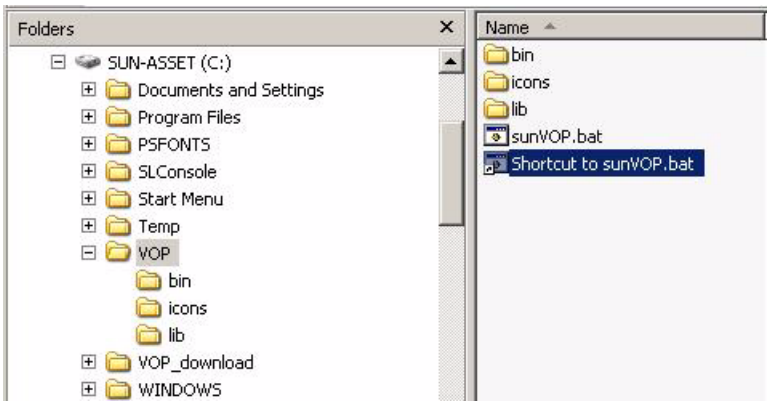
1. **Click (single-click) the sunVOP.bat file.**
2. **Click the right mouse button and choose Create Shortcut (**FIGURE 2-21**).**

FIGURE 2-21 Create Shortcut



The new shortcut (Shortcut to sunVOP.bat) appears in the sub-folder file list.

FIGURE 2-22 VOP Batch File



3. **Rename the shortcut.**
   Keep the name short, such as VOP.
4. **Drag and drop the renamed shortcut to the desktop.**
   The desktop VOP shortcut icon (FIGURE 2-23) should work.

FIGURE 2-23 Desktop VOP Shortcut Icon

5. **Double-click the new desktop VOP shortcut icon to test launch VOP.**
   See FIGURE 2-16 on page 40 to confirm VOP launch.

Note – You do not need to reconfirm VOP and Java version release levels.

6. **Click File, then either choose Exit or click the "X", in the application window upper right corner.**
   The VOP application window closes.

Note – Use normal Windows functions to create and locate additional shortcuts.

7. **Repeat this process to create a shortcut for the ltoVOP.bat file, if desired.**

▼ To Display the Optional Heartbeat Indication, Windows

In VOP release 1.0.9, and lower, you can optionally enable a heartbeat indicator that appears on the VOP application window indicator stack, and blinks while the VOP has a running connection with the drive.

Note – The heartbeat indicator is basically redundant because the VOP will detect an inadvertent lost connection with the drive, and display a “heartbeat failure” message in the VOP text message window.

If you want the visual heartbeat indicator on the VOP application window, use the following instructions to edit the sunVOP.bat file:

1. **Launch a simple text editor.**

   Notepad or Wordpad is OK.

Note – Avoid using a full word processing application.

---

2. **Locate, and open sunVOP.bat.**

Note – The location of the batch file depends on the type of VOP installation used:
Auto - C:\Program Files\VOP_Rel_<*release level*>_Customer\sunVOP.bat
Manual - C:\VOP<*release level*>\sunVOP.bat

The following, or similar lines of text should appear:

```
#   %1 is optional drive ip address to connect to java -classpath
"lib;lib/VOP.jar;lib/borland.jar" -Djava.security.policy=rmi.policy
com.storagetek.VOPmain.CustomerVOPMain %1

cd bin
```

3. **Insert -b, followed by a space, just before the %1 in the last text line.**

   For example: “VOPMain %1” edited to “VOPMain -b %1”.

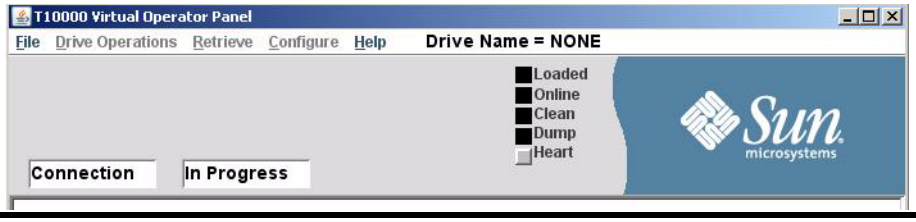
Note – The -b parameter enables the heartbeat indicator.
To disable an existing heartbeat indicator, delete the -b parameter.

---

4. **Save and close the batch file.**

   When the VOP application window is open, the heartbeat indicator is present, as seen in FIGURE 2-24. While the VOP is connected to a drive, the indicator blinks.

FIGURE 2-24 Heartbeat Indicator



▼ To Delete/Remove Folders/Files, Windows

Note – Although there is not any requirement to remove/delete no-longer-needed VOP folders, it is considered best practice to do so, once the newest version is fully functional. Even if the newest version becomes dysfunctional later, you can redownload, and reinstall the current version.

The following procedure removes/deletes no-longer-needed VOP program files:

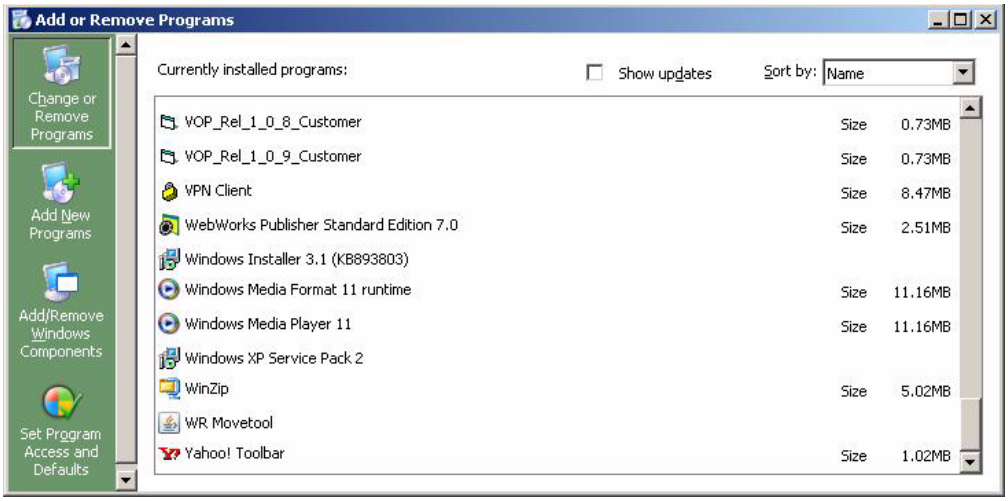
Note – Perform steps 1 & 3 following an automatic installation.
Perform steps 2 & 3 following a manual installation.

1. **Remove an auto-installed down-level VOP program folders/files:**

   a. **Open the Control Panel, Add or Remove Programs utility.**

   All auto-installed VOP versions are listed (FIGURE 2-25).

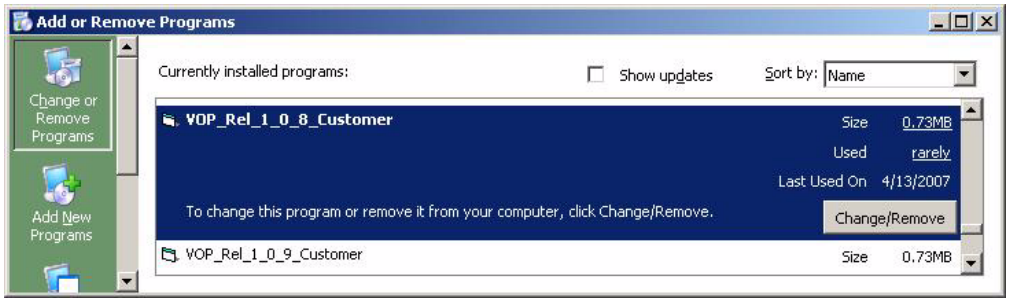
FIGURE 2-25 Add or Remove Programs, Windows



   b. **Select the down-level VOP program.**

   Once you make the selection (VOP_Rel_1_0_8_Customer in FIGURE 2-25), the Add or Remove Program window changes, as shown in FIGURE 2-26 on page 47.

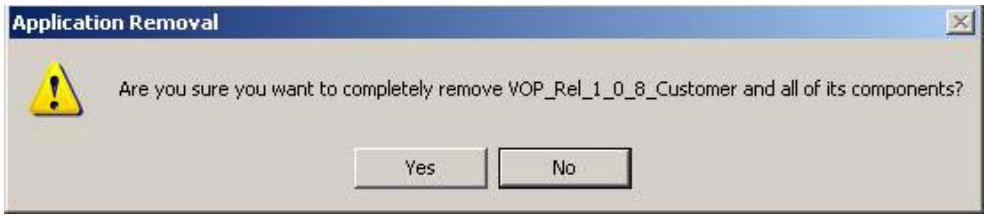
FIGURE 2-26 Remove Program Selection, Windows



c. Click Change/Remove to start the remove process.

You are asked to confirm the removal (FIGURE 2-27).

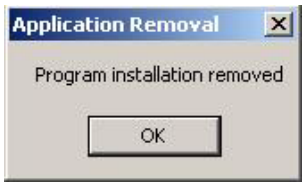
FIGURE 2-27 Remove Program Confirmation, Windows



d. Click Yes to confirm, or No to cancel, and reselect.

Once the old VOP is removed, you see a confirmation notice (FIGURE 2-28).

FIGURE 2-28 Remove Program Completion, Windows



e. Click OK, then close the Add or Remove Program window, and the Control Panel.

Note – The last post-installation step is to delete the no longer needed VOP download folder used to extract/unpacked folder.

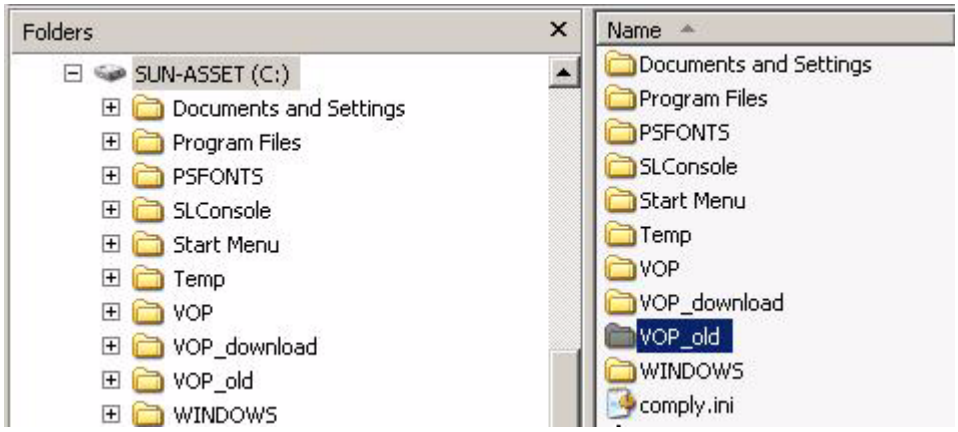
f. Skip to step 3.

2. **Delete the down-level VOP_old folders:**

   a. **Open the root folder.**

   All VOP folders are listed (see FIGURE 2-29).

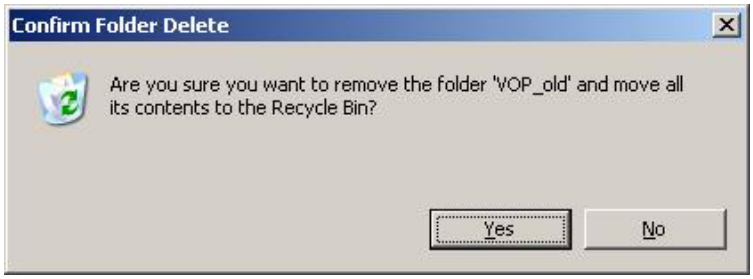
FIGURE 2-29 Delete VOP_old Folder, Windows



   b. **Right-click the down-level VOP_old folder, and choose Delete.**

   You are asked to confirm the folder deletion (FIGURE 2-30).

FIGURE 2-30 Delete VOP_old Folder Confirmation, Windows



   c. **Click Yes to confirm, or No to cancel, and reselect.**

   Once the VOP_old folder is deleted, it no longer appears in the folder tree.

Note – The last post-installation step is to delete the no-longer-needed VOP_download folder used to extract/unzip the updated VOP folders/files.

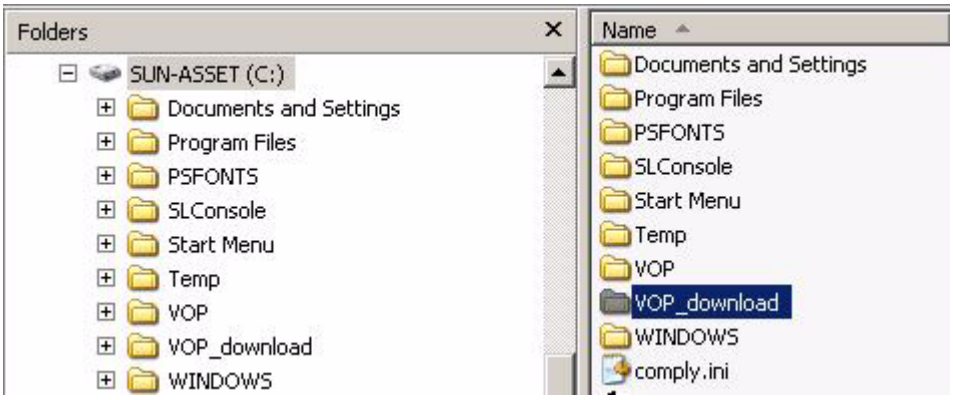
   d. **Continue with step 3.**

3. **Delete the VOP_download folder:**

   a. **Open the root folder.**

   The VOP_download folder you created to hold, and extract/unzip the VOP program folders and files is listed (see FIGURE 2-31).

FIGURE 2-31 Delete VOP_download Folder, Windows



   b. **Right-click the VOP_download folder, and choose Delete.**

   You are asked to confirm the deletion (FIGURE 2-32).

FIGURE 2-32 Delete VOP_download Folder Confirmation, Windows

   c. **Click Yes to confirm, or No to cancel, and reselect.**

   Once the VOP_download folder is deleted, it no longer appears in the folder tree.

VOP Installation, Linux/UNIX OS Computers

This section contains instructions to manually extract and install the VOP software on computers with Linux or UNIX operating systems. The installation consists of three parts: extract/unzip VOP files, install VOP, and post-installation options.

Note – There are multiple ways to accomplish the same task. The following procedures are modeled, using Solaris 10. You can use alternate means that you prefer, as long as the end results in a launchable VOP installation.

▼ To Extract VOP Folders/Files (Linux/UNIX)

Use the following procedure to extract the zipped VOP files:

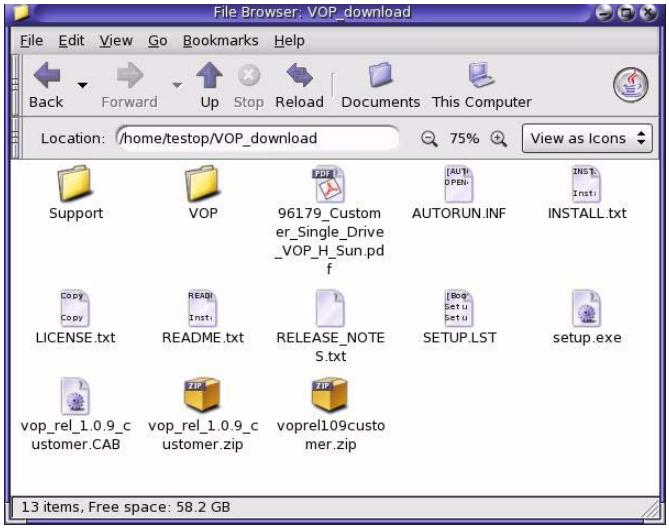
1. **Launch File Browser.**
2. **Navigate to the sub-folder that you created in** Step 1 **of** "Download VOP Zip" on page 32**.**
3. **Click and hold the right mouse button over the VOP zip file.**

   A list of commands appears.
4. **Select Extract Here.**

   The utility extracts the zipped contents behind the scene.
5. **Click Reload in the tool bar.**

   The screen refreshes and displays the extracted files (FIGURE 2-33).

FIGURE 2-33 Extracted VOP Files, Solaris File Browser



▼ To Set up the VOP, Linux/UNIX OS

The manual installation of the VOP program consists of the following parts:

- Install VOP
  - Verify the search path
  - Copy VOP folder to home
  - Delete Windows files
- Confirm that the file is executable
- Test launch a program
  - sunVOP
  - ltoVOP (version 1.0.12)

1. **Make sure the `Java JRE`, and the `VOP/bin` folders locations are in the search path on the computer.**

   If required, use Linux/UNIX utilities to specify their locations. This requires that you change the $PATH variable in the ".cshrc" file to include the java/bin directory. In the CLASSPATH file, add the path to the java directory.

Note – If this installation is to update an existing manually-installed earlier VOP version, the existing VOP folder must be renamed. If there is not an existing VOP folder, skip to step 3.

---

2. **Rename an existing VOP folder as VOP_old.**
3. **Move or Copy the new VOP folder from VOP_download to the home folder.**

FIGURE 2-34 Extracted VOP Files, Solaris File Browser

4. **Verify the new location and contents of the new VOP sub-folder.**

Note – You should see a few sub-folders (such as: bin, icons, and lib) and some files.

---

5. **Delete the Windows only files.**

   The multiVOP, lotVOP.bat, and sunVOP.bat files (FIGURE 2-35) are not needed with the Linux/UNIX setup.

   The sunVOP file (no extension) and the ltoVOP (version 1.0.12) are the Linux/UNIX executable files.

FIGURE 2-35 Unneeded VOP Files, Solaris File Browser

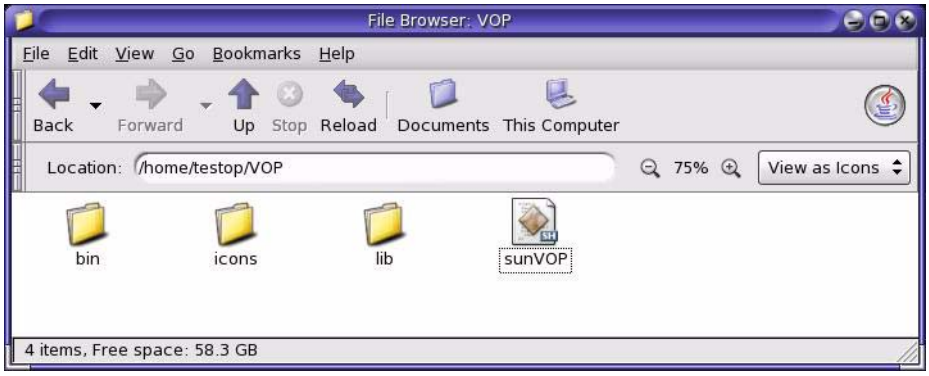
You should perform a test launch to verify the setup.

6. **Verify that the files are executable.**

   If the files are not executable, change the permission to be executable.

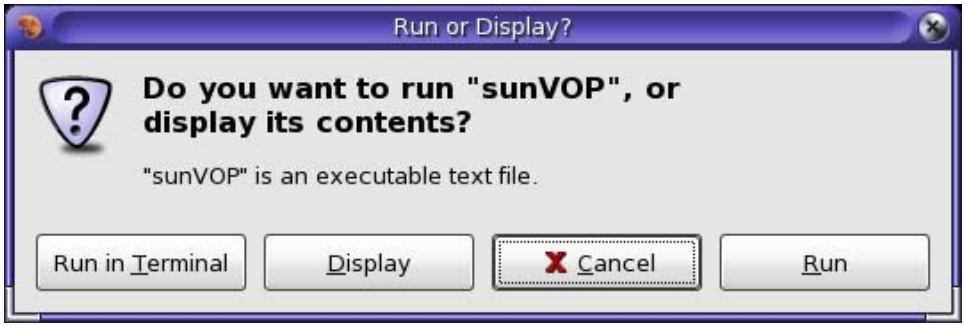
7. **Double-click the *sunVOP* file.**

FIGURE 2-36 Test Launch VOP, Solaris File Browser



8. **The Run or Display? dialog box (FIGURE 2-37) appears.**

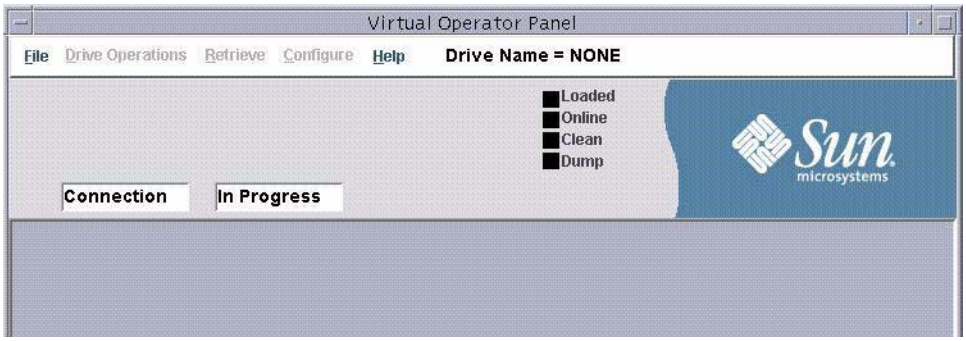
FIGURE 2-37 Solaris Run or Display? Dialog Box



9. **Click Run**

The VOP application launches, and the VOP application window opens (see FIGURE 2-38).

FIGURE 2-38 VOP Application Window, Solaris



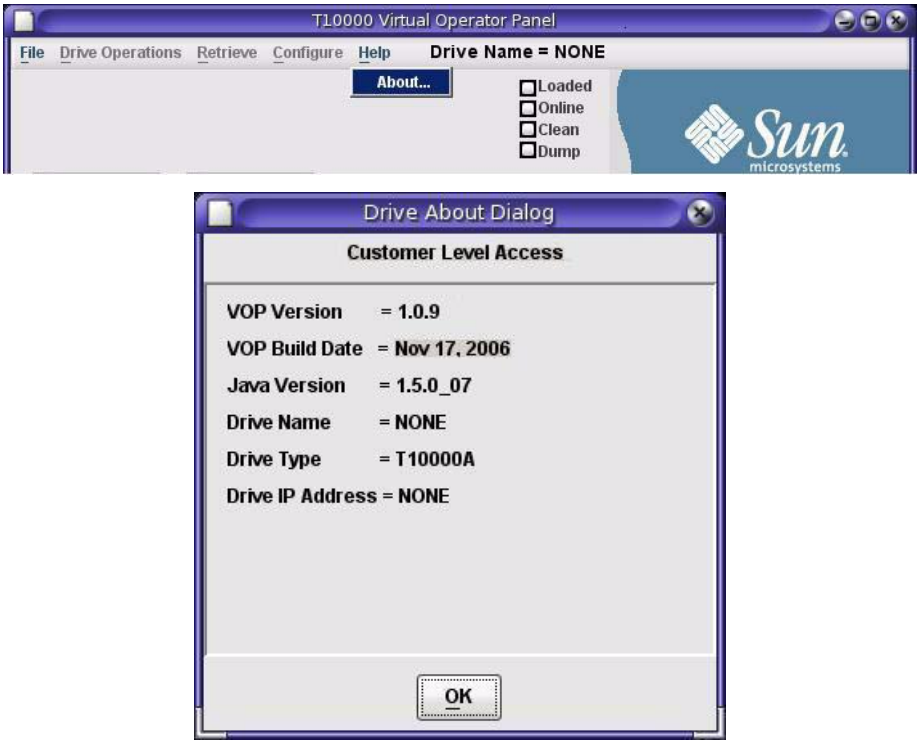
Note – Connection In Progress appears in the two drive message windows, but the application is open without a drive connection actually being initiated. Notice that the Drive Name is NONE.

Note – The title bar for VOP version 1.0.12 shows Virtual Operator Panel only. The model number will not appear until you initiate a drive connection.

10. **Click Help, then choose About.**

    The Drive About Dialog box (FIGURE 2-39) opens.

FIGURE 2-39 VOP and Java Installation Verification, Solaris



Note – The Drive Type field in VOP version 1.0.12 lists T10000A, T10000B, and T9840D.

11. **Verify the release levels listed in the VOP Version and the Java Version fields.**

    If the VOP release level is not correct, replace it with the proper level. If the Java version is not correct, contact your system administrator.

Note – Java version 1.5, or higher, is required when you use VOP version 1.0.10 or higher. Earlier VOP releases were supported by Java 1.4.2_10, or higher.

12. **Close the Drive About Dialog box.**

13. **Click File, then choose Exit, or click the "X", in the application window upper right corner (see** FIGURE 2-40**).**

FIGURE 2-40 Exit VOP, Solaris

The VOP application window closes.

14. **Test launch the *ltoVOP* file.**

The ltoVOP file is available in VOP 1.0.12.

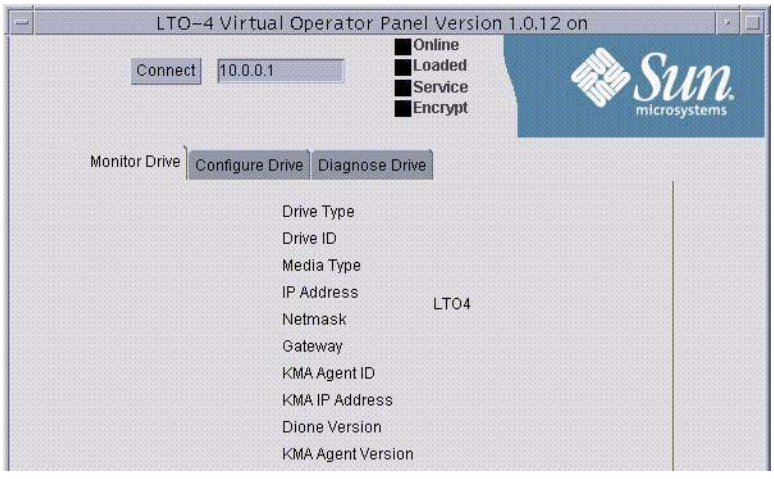
a. Double-click the *ltoVOP* file.

b. The Run or Display? dialog box appears.

c. Click Run.

The VOP application launches, and the VOP application window opens (see FIGURE 2-38).

FIGURE 2-41 ltoVOP Application Window, Solaris



d. Close the application window.

VOP Post-Installation, Linux/UNIX OS

When you are satisfied that the newly installed VOP program is functioning properly, you can optionally create shortcuts to the program file, delete down level VOP folders/files, and modify the sunVOP batch file.

▼ To Create Optional Shortcut Links

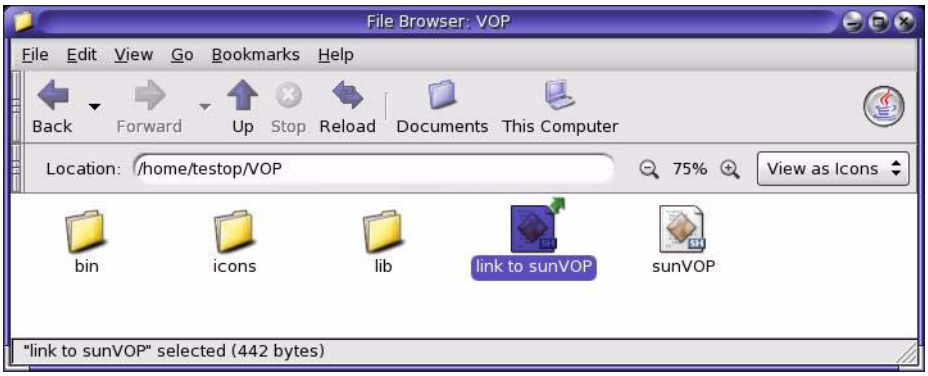
Note – If this is an update to a previous manually installed VOP, any existing shortcut should work. Check the shortcut properties and edit them, as needed, to target the new sunVOP file.

Use the following steps to quickly create a VOP shortcut link on the Solaris desktop:

1. **Click (single-click) the sunVOP file.**
2. **Click the right mouse button and choose Make Link (**FIGURE 2-42**).**

   The new shortcut (link to sunVOP) appears in the sub-folder file list.

FIGURE 2-42 Link to sunVOP



3. **Rename the shortcut link.**

   Keep the name short, such as VOP.

4. **Drag and drop the renamed shortcut link to the desktop.**

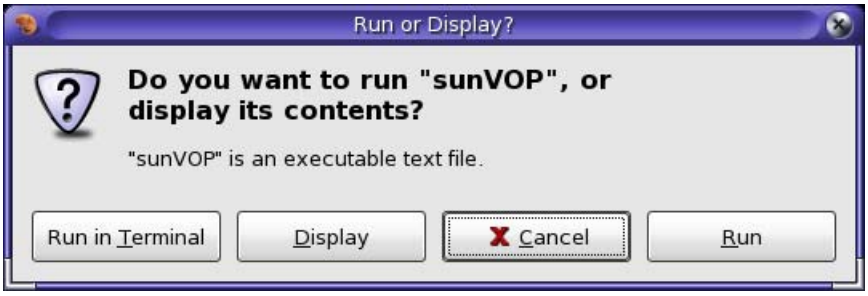
   The desktop VOP shortcut link icon (FIGURE 2-43) should now be functional.

FIGURE 2-43 Solaris Desktop VOP Link Icon

5. **Double-click the new desktop VOP shortcut icon to test launch VOP.**

   The Run or Display? dialog box (FIGURE 2-44) appears.

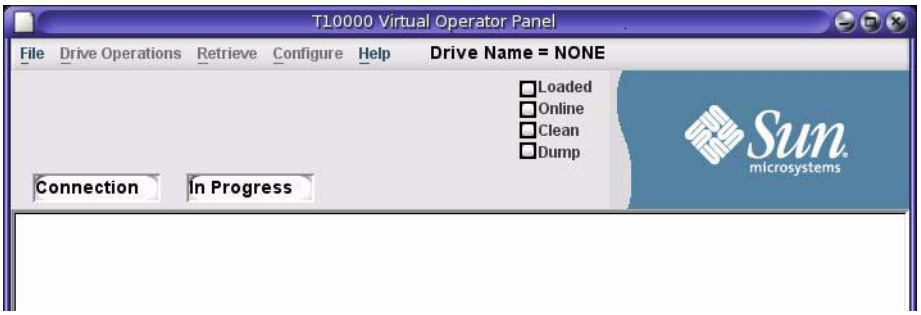
FIGURE 2-44 Solaris Run or Display? Dialog Box



6. **Click Run.**

   The VOP application launches, and the VOP application window opens. See FIGURE 2-45 to confirm that VOP launches.

FIGURE 2-45 VOP Application Window, Solaris



Note – T10000 Virtual Operator Panel appears in the title bar of VOP versions prior to 1.0.12. Version 1.0.12 displays Virtual Operator Panel only until you establish a valid drive connection.

7. **Click File, then choose Exit, or click the "X", in the application window upper right corner.**

   The VOP application window closes.

Note – Use normal Solaris functions to create and locate additional shortcuts.

8. **Repeat the process to create a shortcut to the *ltoVOP* file, if desired.**

▼ To Create the Optional Heartbeat Indication, Linux/UNIX

In VOP release 1.0.9, and lower, you can optionally enable a heartbeat indicator which appears on the VOP application window indicator stack, and it blinks while the VOP has a running connection with the drive.

Note – The heartbeat indicator is basically redundant because the VOP will detect an inadvertent lost connection with the drive, and display a “heartbeat failure” message in the VOP text message window.

If you want the visual heartbeat indicator on the VOP application window, use the following instructions to edit the sunVOP file:

1. **Launch the Vi text editor.**

   a. Locate, and open sunVOP.

Note – The sunVOP file should be located in the version-specific folder created during the VOP installation: C:\VOP<*release level*>\sunVOP

The following, or similar lines of text should appear:

```
#!/bin/ksh
#cd $HOME/VOP<release level>
#   $1 is optional drive ip address to connect to
VOPdir=`echo $0 |sed 's!/VOP/.*!/VOP!'`
vopdir2=`echo $VOPdir |grep "\.\/" |wc -c`
if [ $vopdir2 -ne "0" ]
then VOPdir="./" fi
chkVOPdir=`echo $VOPdir |wc -c`
if [ $chkVOPdir -lt "3" ]
then VOPdir=`which $0| sed 's!$0!!'` fi
cd $VOPdir
java -classpath "lib:lib/VOP.jar:lib/borland.jar" -Djava.security.policy=rmi.policy
com.storagetek.VOPmain.CustomerVOPMain $1 &
```

   b. Insert -b, followed by a space, just before the $1 in the last text line.

For example: “VOPMain $1 &” edited to “VOPMain -b $1 &”.

Note – The -b parameter enables the heartbeat indicator.
To disable an existing heartbeat indicator, delete the -b parameter.

---

   c. Save and close the sunVOP file.

   d. Enter the command: *rehash*.

▼ To Delete/Remove Folders/Files, Linux/UNIX

Note – Although there is not any requirement to remove/delete no-longer-needed VOP folders, it is considered best practice to do so, once the newest version is fully functional. Even if the newest version becomes dysfunctional later, you can redownload, and reinstall the current version.

Use normal Linux/UNIX commands to delete no-longer-needed VOP program files:

1. **Delete the down-level VOP_old directory/folder.**

   This folder was replaced by the update for VOP.

2. **Delete the VOP_download directory/folder**

   This folder was temporary to hold and extract the updated VOP folders/files, and is no longer need.

CHAPTER 3

Starting VOP Programs

This chapter assumes operation of the Virtual Operator Panel (VOP) with a single tape drive interface. See Appendix B for additional guidelines when operating VOP within a multiple-drive private network.

For basic hardware requirements and connection description, see "Ethernet Connection to the Drive" on page 24.

The purpose of the VOP application has evolved from an operator panel for the T10000A tape drive (versions through 1.0.10), to provide a method to license and enroll the T9840D tape drive for encryption (version 1.0.11), and to provide an operator panel for other T-series tape drives (T10000B and T9840D) and enable enrollment of the LTO Generation 4 tape drive (1.0.12).

Overview

This chapter contains instructions for starting the VOP applications. Because the operating systems provide multiple means to start/launch applications, you can choose any one of the several listed here; and, a different one at any future VOP session:

- "Windows" on page 62
- "Linux/UNIX" on page 68

Windows

There are two separate VOP applications:

- T-series VOP
- "The ltoVOP Application (Windows)" on page 66

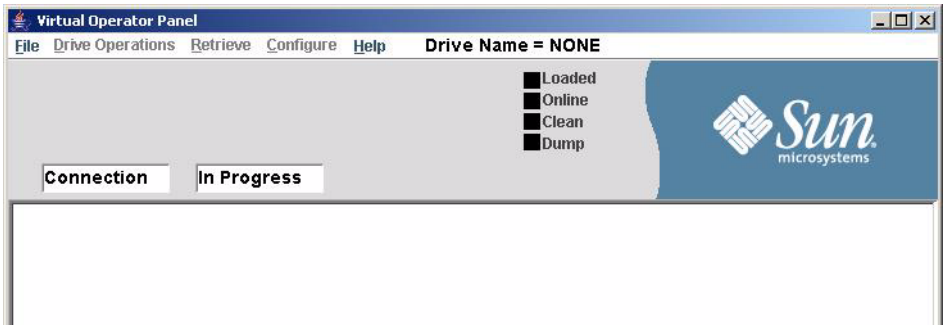
T-series VOP (Windows)

You can start the VOP application in the following ways:

- "Start Menu, Programs List (Windows)"
- "Start Menu, Run Dialog Box (Windows)" on page 64
- "Optional Desktop Shortcut (Windows)" on page 65
- "Windows Explorer (Windows)" on page 65.

The application displays in a separate window as shown in the following figure:

FIGURE 3-1 VOP, Not Connected



See Chapter 4, "VOP Operation - T-series" for detailed information on the sunVOP application.

▼ Start Menu, Programs List (Windows)

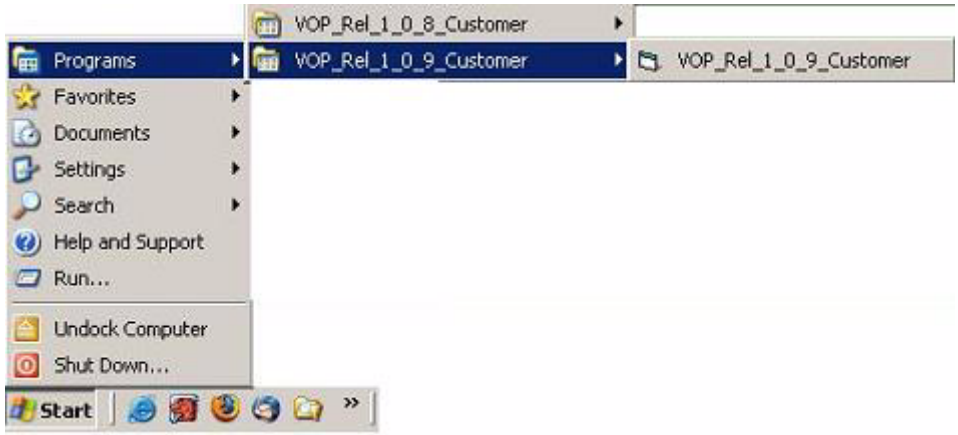
When the VOP was installed, the windows automatic setup utility created a pointer in the start menu program list that points to the VOP executable file.

1. **Click Start and select the Programs > VOP program folder.**

Note – All installed VOP versions (**vop_<*Rel level*>_service)** are listed in the Programs group (see FIGURE 3-2).

Note – If there are multiple VOP programs listed, make sure you have selected the intended folder before clicking the pointer.

FIGURE 3-2 Start Menu, Programs List VOP Path



2. **Click the pointer name.**

The VOP window opens (FIGURE 3-1). You can resize and move the window around the desktop. See FIGURE 1-1 on page 25 for detailed descriptions of the window sections.

Note – There is a noticeable delay opening the VOP application window for the first time of every PC power-on session while your anti-virus scans.
During the delay, the only visible indication is with the hard drive activity indicator. Subsequent VOP launches, in the same powered session, are quicker.

Note – At this point, the application is open, but a drive connection has not been initiated.

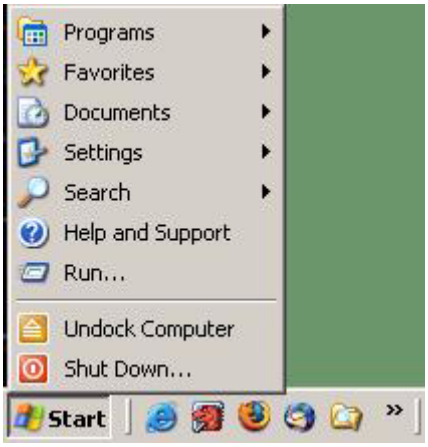
▼ Start Menu, Run Dialog Box (Windows)

Use the following guidelines to launch VOP from the Run dialog box:

1. **Click Start.**

   The Start menu (FIGURE 3-3) opens.

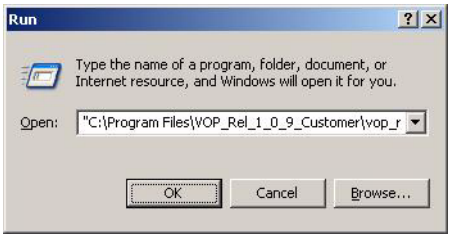
FIGURE 3-3 Start Menu,



2. **Select** `Run`**.**

   The Run dialog box (FIGURE 3-4) opens.

FIGURE 3-4 Run Dialog Box



3. **Do one of the following:**
   - Enter the path to the desired VOP executable file.
   - Click the down arrow to select a previous entry.
   - Click the Browse command button to locate the desired VOP executable file.

Note – The path must point through the specific folder.

4. **Click OK.**

   The VOP opens (FIGURE 3-1 on page 62).

▼ Optional Desktop Shortcut (Windows)

If you created an optional desktop shortcut (FIGURE 3-5):

FIGURE 3-5 Desktop VOP Shortcut Icon

1. **Double-click the shortcut icon.**

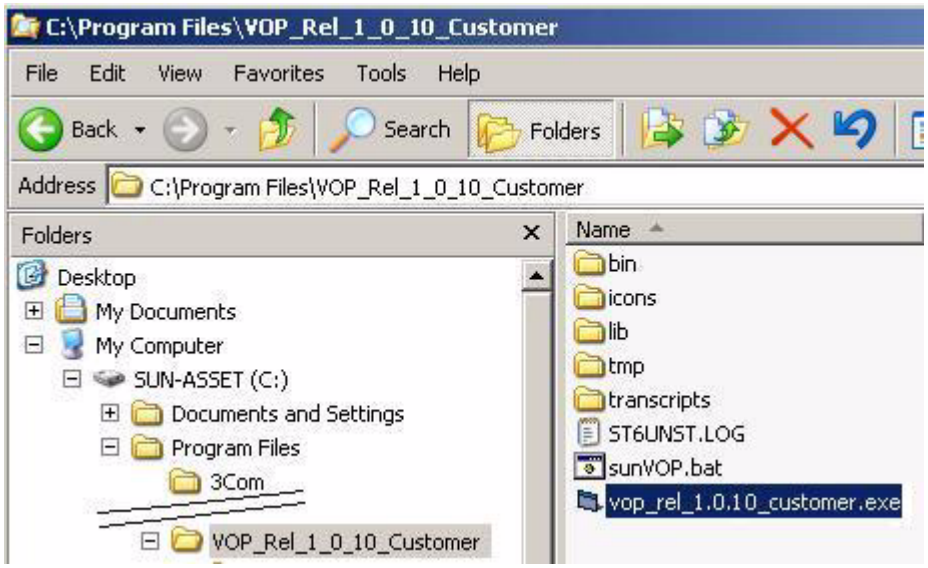
   The VOP opens (FIGURE 3-1 on page 62).

   See "Using VOP Menus and Controls" on page 74 for VOP operational guidelines, including Connect to Drive.

▼ Windows Explorer (Windows)

You can optionally start VOP from Windows Explorer (FIGURE 3-6):

FIGURE 3-6 VOP Executable File



1. **Navigate to the VOP folder, then double-click the VOP executable file.**

   The VOP opens (FIGURE 3-1 on page 62).

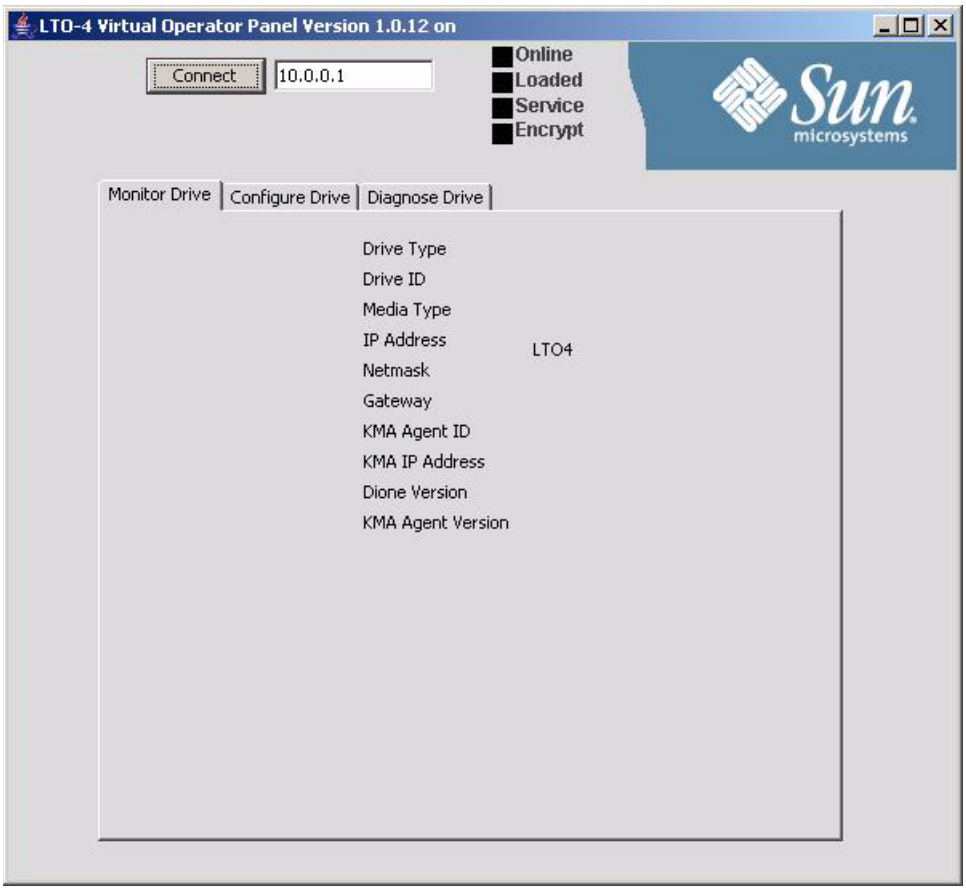
The ltoVOP Application (Windows)

You can start the VOP application in the following ways:

- "Start Menu, Run Dialog Box (Windows)"
- "Desktop Shortcut Icon (Windows)" on page 67

The application displays in a separate window as shown in the following figure:

FIGURE 3-7 LTO-4 Virtual Operator Panel

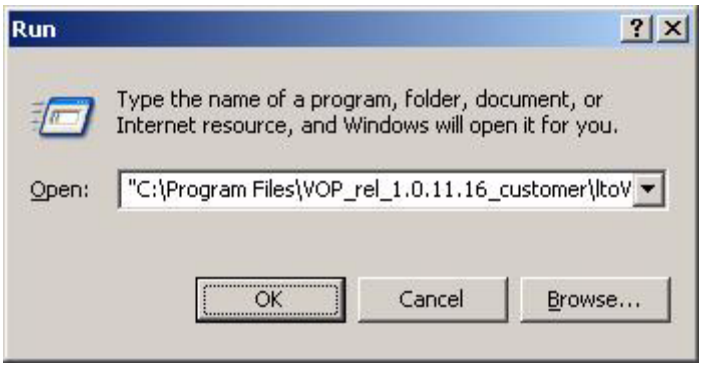


See Chapter 5, "VOP Operation - LTO" for detailed information on the ltoVOP application.

▼ Start Menu, Run Dialog Box (Windows)

1. **Click Start.**
2. **Select** `Run`**.**
   The Run dialog box (FIGURE 3-8) opens.

FIGURE 3-8 Run Dialog Box ltoVOP



3. **Do one of the following:**
   - Enter the path to the desired VOP executable file.
   - Click the down arrow to select a previous entry.
   - Click the Browse command button to locate the desired VOP executable file.

Note – The path must point through the specific folder.

4. **Click OK.**
   The ltoVOP window opens (FIGURE 3-7 on page 66).

▼ Desktop Shortcut Icon (Windows)

Use this method if you have created a desktop shortcut.

1. **Double-click the shortcut icon.**

   The ltoVOP window opens (FIGURE 3-7 on page 66).

Linux/UNIX

There are two separate VOP applications:

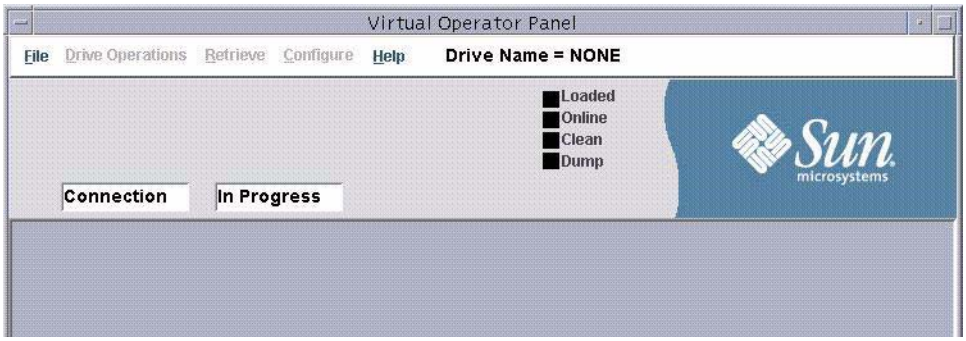
- T-series VOP
- "The ltoVOP Application (Linux/UNIX)" on page 70

T-series VOP

You can start the VOP application in the following ways:

- "Launch from a Terminal Window (Linux/UNIX)"
- "Launch from the File Browser (Linux/UNIX)" on page 69
- "Launch from a Shortcut (Linux/UNIX)" on page 69

FIGURE 3-9 VOP, Not Connected, Solaris



See Chapter 4, "VOP Operation - T-series" for detailed information on the sunVOP application.

▼ Launch from a Terminal Window (Linux/UNIX)

1. **Click Launch, then select Applications > Utilities > Terminal**

   A Terminal window opens.

Note – Make sure you are in the home directory/folder, or specify the complete path with the command.

2. **Enter the command *sunVOP*.**

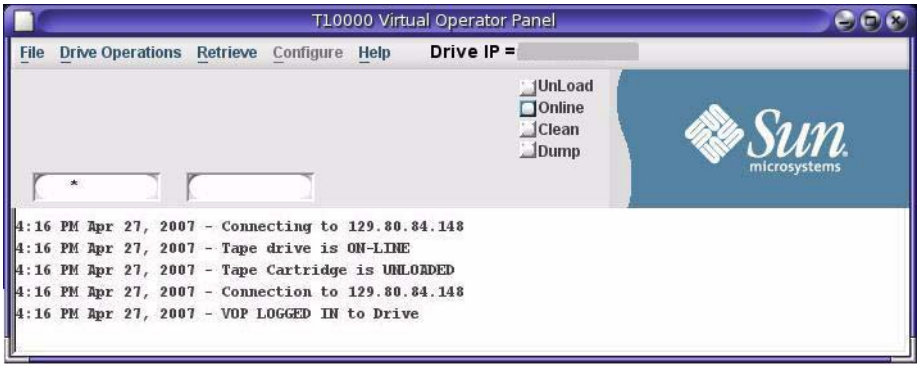
   The VOP application launches, not connected (FIGURE 3-9).

Note – At this point, only the application window is open. A drive connection has not been initiated.

See FIGURE 1-1 on page 25 for detailed descriptions of the application window sections.

Note – If you include the drive's IP or alias, VOP will open and auto-connect to the designated drive.

FIGURE 3-10 VOP, Connected, Solaris



▼ Launch from the File Browser (Linux/UNIX)

1. **Start the File Browser.**
2. **Open the VOP folder.**
3. **Double-click the *sunVOP* file.**
4. **Click Run in the Run or Display? dialog box.**

   The VOP application launches and the VOP application window opens (see FIGURE 3-9).

▼ Launch from a Shortcut (Linux/UNIX)

1. **Double-click the desktop VOP shortcut icon.**
2. **Click Run in the Run or Display? dialog box.**

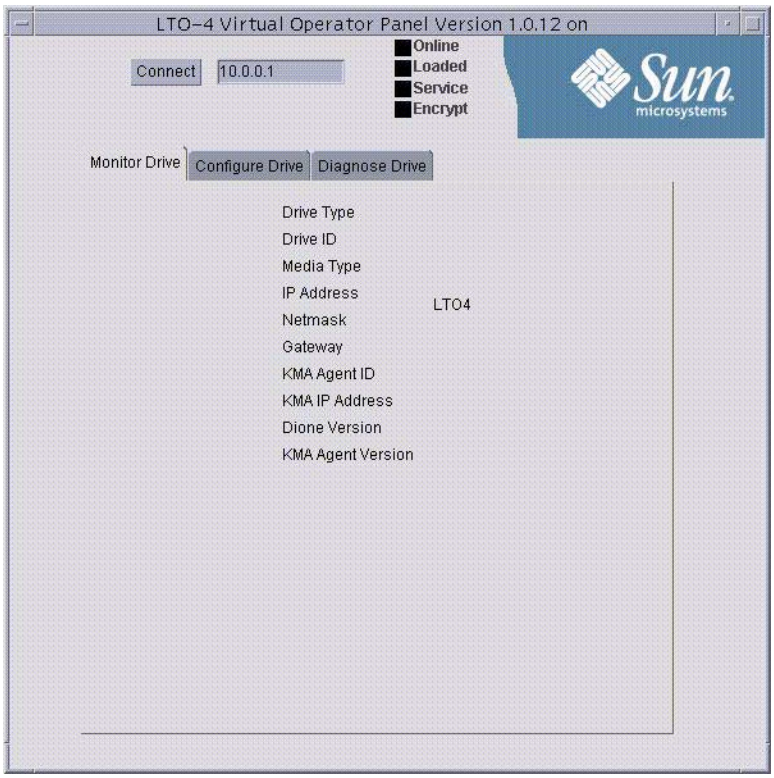
   The VOP application launches and the VOP application window opens (see FIGURE 3-9).

The ltoVOP Application (Linux/UNIX)

You can start the ltoVOP application in the following ways:

- "Launch from a Terminal Window (Linux/UNIX)"
- "Launch from the File Browser (Linux/UNIX)" on page 71

FIGURE 3-11 LTO-4 Virtual Operator Panel



See Chapter 5, "VOP Operation - LTO" for detailed information on the ltoVOP application.

▼ Launch from a Terminal Window (Linux/UNIX)

1. **Click Launch, then select Applications > Utilities > Terminal**

   A Terminal window opens.

   Note – Make sure you are in the home directory/folder, or specify the complete path with the command.

2. **Enter the command *ltoVOP*.**

   The ltoVOP application launches, not connected (see FIGURE 3-11).

Note – If you include the drive's IP or alias, VOP will open and auto-connect to the designated drive.

▼ Launch from the File Browser (Linux/UNIX)

1. **Start the File Browser.**
2. **Open the VOP folder.**
3. **Double-click the *ltoVOP* file.**
4. **Click Run in the Run or Display? dialog box.**

   The VOP application launches and the VOP application window opens (see FIGURE 3-11).

CHAPTER 4

VOP Operation - T-series

This chapter provides guidelines for Virtual Operator Panel (VOP) operation with a single drive interface to a T10000 or T9840D tape drive. See Appendix B for additional guidelines when operating VOP within a multiple-drive private network. The VOP does not provide any interconnection with the host data input/output interface.

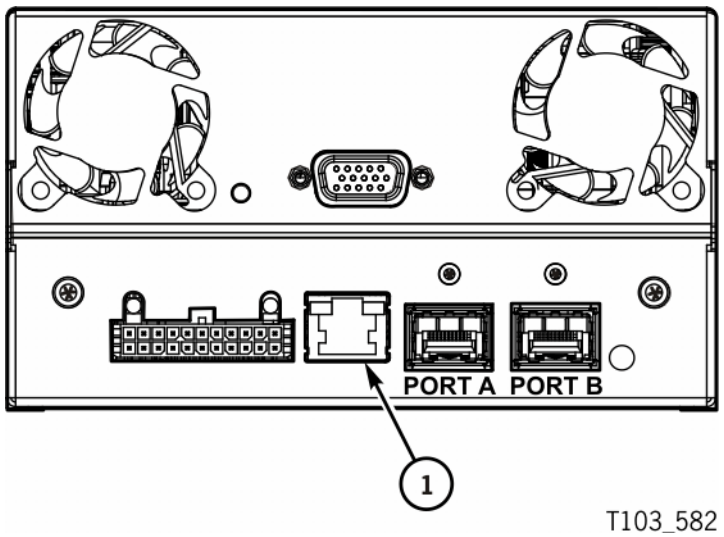
The VOP has three basic operational functions:

- Drive status monitoring
- Drive configuration settings
- Drive operation utilities

Because the T10000 Tape Drive does not have a built-in, physical operator panel, the primary means of operational interface is by the drive Ethernet port (see FIGURE 4-1).

Note – The only exception would be when the drive is mounted in a rack mount chassis, which has a physical operator panel for each drive. However, you can still use the VOP interface with a rack mount configured drive.

FIGURE 4-1 T10000 Tape Drive Rear Panel



1. Ethernet Port

Note – When a Service Delivery Platform (SDP) site server unit is installed on site and monitoring installed drives via an Ethernet private network, the drive Ethernet port is 100% dedicated to the service network. Therefore, the drive Ethernet port is NOT available for connection to the customer VOP.

Using VOP Menus and Controls

This section provides guidelines for using the VOP menus, sub-menus, and other controls, such as dialog boxes and status indicators.

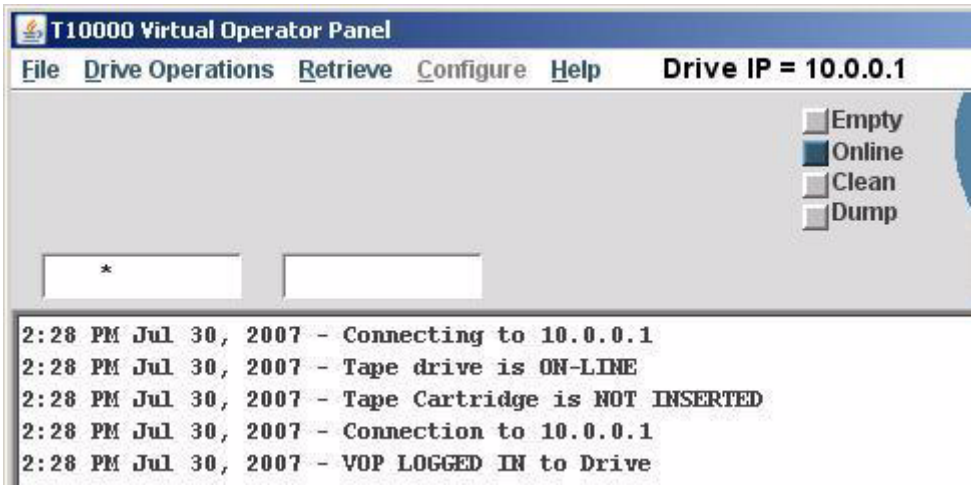
Note – The VOP application window illustrations in this section were captured on a Windows XP platform. The Linux/UNIX platform VOP application window has a slightly different look (see FIGURE 3-9 on page 68); but, the guidelines apply equally.

The VOP application window provides several drop-down menus. When the drive is online, unavailable menus are dimmed (see the Configure menu label in FIGURE 4-2). Some menu commands have additional sub-menus or dialog boxes.

Some status indicators are also an active link that allow you to toggle the state of the monitored drive item. Note that the mouse cursor does not change when you mouse-over such an indicator.

During the course of selected operations, the VOP text message pane displays a transcript of the VOP actions, and will prompt you for additional input.

FIGURE 4-2 VOP Window Menus and Indicator/Controls



Note – The following sections provide more detailed guidelines.

▼ Menu Bar Selections

In general, the following two steps are basic for all menus:

1. **Click on an available menu label.**

   A drop-down list of available commands appears.

2. **Select a command or sub-menu.**

   The drive message text windows, drive status indicators, and the VOP text message pane provide informational feedback.

File Menu

Three commands are available in the File menu.

- Clear Transcript
- Connect to Drive, on page 76
- Exit, on page 78

Note – File commands are available whether connected to a drive or not, and if connected, online and offline.

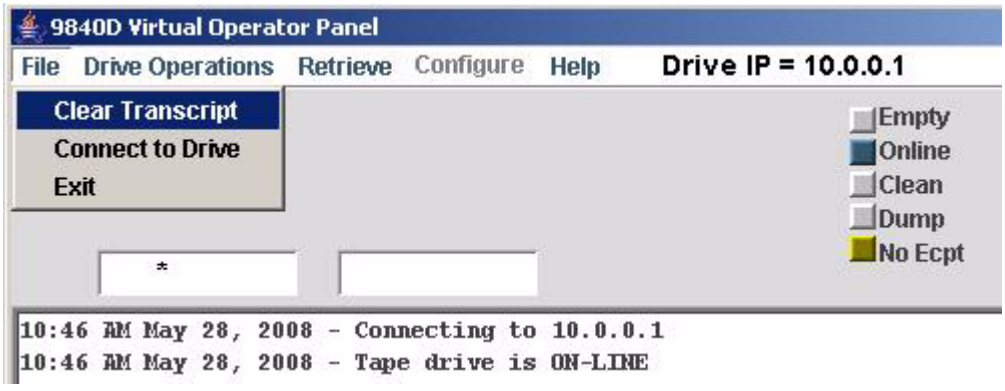
▼ To Use the Clear Transcript Command

Use the following guidelines to clear the VOP transcript:

1. **Click File to open the menu.**
2. **Choose Clear Transcript (**FIGURE 4-3**) to clear text in the VOP transcript pane.**

   The entire VOP transcript pane clears and the file menu closes.

FIGURE 4-3 Clear Transcript



▼ To Use the Connect to Drive Command

Use the following guidelines to connect VOP to a designated drive:

Note – After a drive is connected, use this command to disconnect or to connect to a different drive.

---

1. **Click File to open the menu.**
2. **Choose Connect to Drive (**FIGURE 4-4**).**

FIGURE 4-4 Connect to Drive

The Connect to Drive dialog box (FIGURE 4-5) opens.

FIGURE 4-5 Connect to Drive Dialog Box, Windows

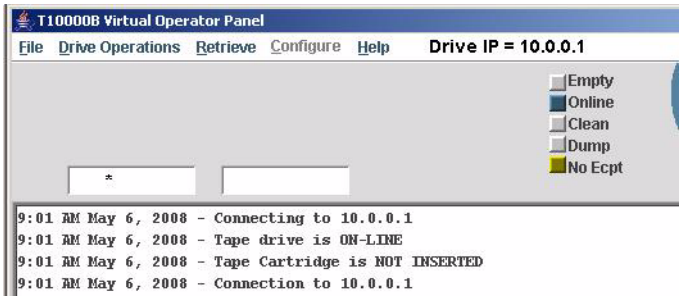
3. **Enter the drive's IP address or alias, then click OK.**

   Factory preset (*10.0.0.1*), a preassigned static IP, or a preassigned alias.

   After the VOP establishes connection with the designated drive, the VOP window changes to the connected stage (see FIGURE 4-6). In the connected stage, additional menus are available, the status indicators are a color other than black, and the text pane/transcript indicates the VOP is logged into the drive.

Note – VOP versions higher than 1.0.10 indicate the drive model at the beginning of the title bar (T10000A, T10000B, or T9840D).

FIGURE 4-6 VOP, Connected, Windows



Note – When operating VOP with a single drive, disconnect the crossover cable, and reconnect it to a different drive. If the newly connected drive has the same IP (factory preset 10.0.0.1), the VOP will auto-reconnect to the new drive.
Otherwise, perform Step 3 on page 77 to designate a different drive IP.

When operating in a private network, leave the PC Ethernet cable connected to the Ethernet switch, and perform Step 3 on page 77 to designate a different drive IP.

▼ To Use the Exit Command

Use the following guidelines to exit the VOP session:

1. **Click File to open the menu.**
2. **Choose Exit (**FIGURE 4-7**).** The VOP application window closes.

FIGURE 4-7 Exit

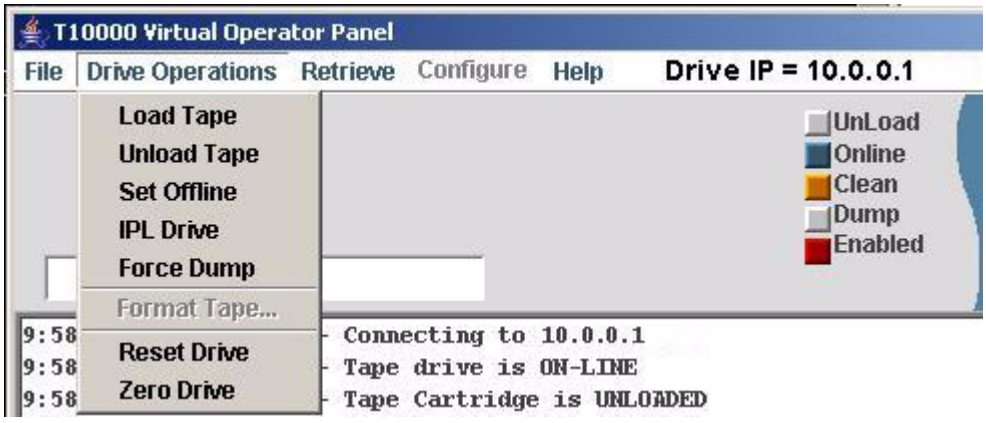
Note – If the VOP was connected to a drive, the Ethernet connection terminates.

Drive Operations Menu

FIGURE 4-8 shows the online commands of the Drive Operations menu.

Note – Notice that the Format Tape label is dimmed, which indicates that it is not available online. Format Tape commands are only available when the drive is offline.

FIGURE 4-8 Drive Operations Menu



Load Tape Command

This command causes a cartridge that is present in the loading slot to load.

Note – The only time a cartridge would be present in the loading slot, but not loaded occurs when it had been previously loaded, then unloaded, but not physically removed.

Unload Tape Command

This command causes a loaded cartridge to rewind and unload.

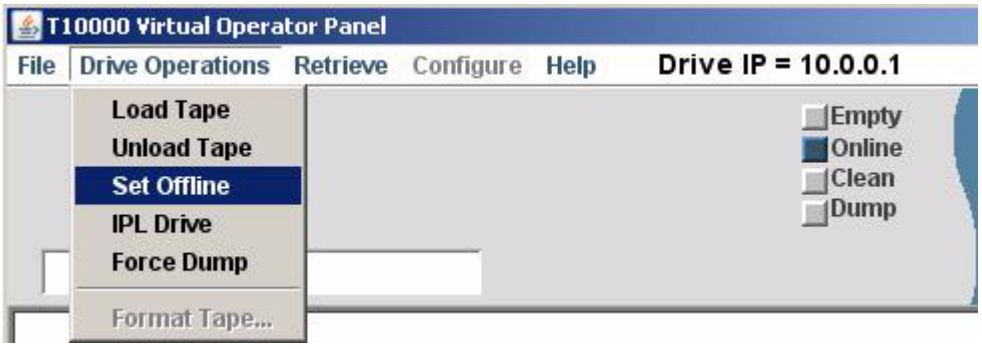
Note – An unloaded cartridge must be physically removed from the drive by library robotics or manually from the rack mount configuration. Otherwise, it remains in the loading slot, but NOT loaded into the drive.

Set Offline/Online Command

- When the tape drive is online, this command reads **Set Offline**. Click **Set Offline** to set the drive offline.
- When the tape drive is offline, this command reads **Set Online**. Click **Set Online** to set the drive online.

You can click the Online status indicator (see FIGURE 4-9).

FIGURE 4-9 Set Drive Offline



Note – When the drive goes offline, the status indicator turns gray and the label changes to Offline; and, the Configure menu label turns blue.

IPL Drive Command

This command causes the tape drive to perform an initial program load (IPL).

Note – VOP looses communications with the drive during the IPL. Once the drive IPL is successfully completed, VOP automatically reconnects with the drive.

Force Dump Command

This function forces a diagnostic dump of current contents of various drive registers. This dump is stored in the tape drive's internal memory and the dump status indicator changes to orange.

Note – The forced dump operation also causes a drive IPL; and, once the drive successfully completes the IPL, fffc appears in the drive message window.

Format Tape Command

This command is only available when the drive is offline.
(see "Format Tape Cartridge Dialog Box (Offline)" on page 81 for details.)

Note – The following drive operation commands only appear on the menu for encryption-capable drives that are also encryption-enabled. Refer to the encryption documentation for more information.

Reset Drive Command

This command erases all current media keys from the drive volatile memory. The drive is inoperable until media keys are loaded into the drive memory.

Note – When the Reset Drive command is selected, the encryption status indicator changes to orange, and the label identifies missing keys.

Zero Drive Command

Caution – DRIVE DAMAGE. Once the drive is zeroed, it is totally disabled and must be returned to the factory. **DO NOT SELECT ZERO DRIVE WITHOUT CONSULTATION WITH SUN STORAGETEK SUPPORT.**

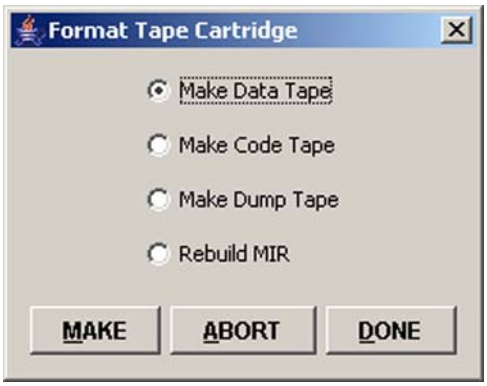
This command deletes all encryption keys including the internal enabling key.

Note – Should you select this command, a confirmation dialog box appears, which will allow you to confirm or cancel.

Format Tape Cartridge Dialog Box (*Offline*)

The offline format tape cartridge dialog box (FIGURE 4-10) provides four utilities.

FIGURE 4-10 Format Tape Submenu



Three command buttons are on the bottom of the format tape dialog box:

- Make - Initiates the selected utility.
- Abort - Terminates an in-progress utility.
- Done - Closes the dialog box.

▼ To Format a Tape Cartridge (*Offline*)

Use the following general guidelines to perform any of the utilities:

1. **Make sure the drive is offline.**

   If not offline, select Drive Operations > Set Offline, or click the Online status indicator (see FIGURE 4-8 and "Set Offline/Online Command" on page 79).

2. **Select the appropriate utility radio button.**

Note – See the individual utility paragraphs for additional information and/or detail:
"Make Data Tape" on page 83
"Make Code Tape" on page 83
"Make Dump Tape" on page 84
"Rebuild MIR" on page 84

3. **Click MAKE to start the selected utility.**

   A prompt to insert a cartridge appears.

Note – If there is a cartridge in the drive, it unloads. You must physically remove the unloaded cartridge.

4. **Insert a write-enabled cartridge.**

   When the screen display prompts you to insert a cartridge, make sure the write-protect switch (FIGURE 4-11) is in the write-enabled (unlocked) position.

   The drive performs the selected utility, displays relative information in the VOP transcript pane, then unloads the cartridge.

Note – You can cancel a selected utility by clicking ABORT before inserting the cartridge. Once the cartridge has been inserted, the utility runs to completion.

5. **Remove the unloaded cartridge.**

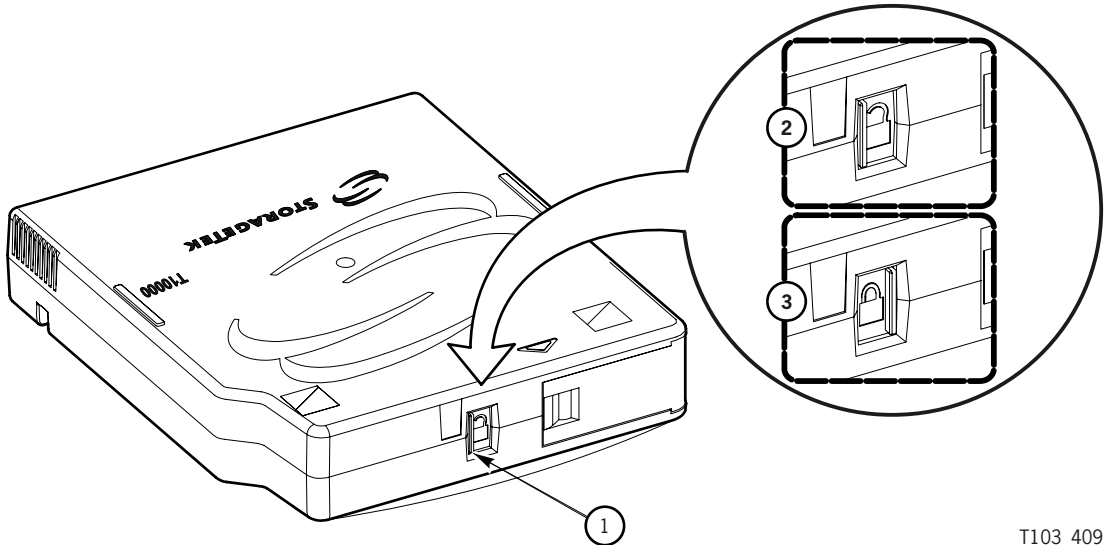
   You now have the following options:

   - Repeat the current selected format tape command (go to Step 3 on page 81).
   - Select a different format tape command (go to Step 2 on page 81).
   - Exit the format tape submenu (continue with Step 6).

6. **Click DONE to exit the format tape submenu.**

   The Format Tape Cartridge dialog box closes.

FIGURE 4-11 Tape Cartridge Write-Protect Switch



1. Write-protect switch
2. Unlocked position
3. Locked position

Make Data Tape

The Make Data Tape utility reformats a tape cartridge for reuse as a data tape cartridge. Existing headers are removed and the Media Information Region (MIR) is rewritten to identify the cartridge as empty and therefore ready for write operations.

Note – The Make Data Tape utility does not erase existing data. Old data can still be recovered by special data recovery applications. Therefore, if data security is a concern, you must configure the drive for full Data Security Erase (DSE) - Yes, and initiate an erase command from the host software before you select the Make Data Tape utility.

Use the general guidelines, beginning on page 81, to perform this utility.
When the screen display prompts you to insert a cartridge, make sure the write-protect switch (FIGURE 4-11) is in the write-enabled (unlocked) position.

Make Code Tape

The Make Code Tape utility reformats a tape cartridge with a special format, and downloads the drive firmware code from the drive memory to the tape cartridge. The MIR is then written to identify the cartridge as a “code” tape. You can use the code tape to upload drive firmware to other tape drives.
Use the general guidelines, beginning on page 81, to perform this utility.
When the screen display prompts you to insert a cartridge, make sure the write-protect switch (FIGURE 4-11 on page 82) is in the write-enabled (unlocked) position

---

Note – The VOP heartbeat feature is not compatible with the Make Code Tape utility in VOP version 1.0.9, and lower. If the heartbeat feature is active when the Make Code Tape utility is initiated, the VOP loses connection to the drive shortly after the drive begins the utility.

However, after the utility starts, the drive continues until completion.
The VOP quickly reconnects to the drive, but does not regain monitoring the utility’s progress, nor does it display a successful code tape completion message. However, the VOP detects and displays the cartridge unloading at the end of the utility.

To prevent losing the VOP-to-drive connection during the Make Code Tape utility with VOP version 1.0.9 and lower, you must make sure the heartbeat feature is not enabled. To disable the heartbeat feature, remove the “-b” parameter from the “sunVOP.bat” file. See “To Display the Optional Heartbeat Indication, Windows” on page 45 for guidelines to modify the batch file. The batch file revision must be done prior to starting the VOP session in which you intend to use the Make Code Tape utility.

Make Dump Tape

The Make Dump Tape utility reformats a tape cartridge with a special format. The MIR is written to identify the cartridge as a "dump" tape. You can use a formatted dump tape to download diagnostic "dump" data from drive memory. Service representatives use formatted dump tapes with the diagnostic routines that are available offline.

Use the general guidelines, beginning on page 81, to perform this utility.
When the screen display prompts you to insert a cartridge, make sure the write-protect switch (FIGURE 4-11 on page 82) is in the write-enabled (unlocked) position.

Rebuild MIR

You can use the Rebuild MIR utility to repair a data tape cartridge that has an invalid or corrupted MIR. The utility reads the file headers all the way to the End of Data mark. Then, the MIR is rewritten to correctly reflect the tape contents. This utility could take well over one hour to rebuild the MIR on a full or nearly full data tape cartridge.

Use the general guidelines, beginning on page 81, to perform this utility.
When the screen display prompts you to insert a cartridge, make sure the write-protect switch (FIGURE 4-11 on page 82) is in the write-enabled (unlocked) position.

Note – See "Media Information Region" in the *T10000 Tape Drive Operator's Guide*, PN 96174 for additional MIR information.

Retrieve Menu

FIGURE 4-12 shows the Retrieve menu commands available online and offline.

FIGURE 4-12 Retrieve Menu

See the following sections for more detail and guidelines:

- "View Drive Data Command" on page 86
- "View Date & Time Command" on page 96
- "Dumps to File" on page 97
- "Perms to File" on page 98
- "Logs to File" on page 99

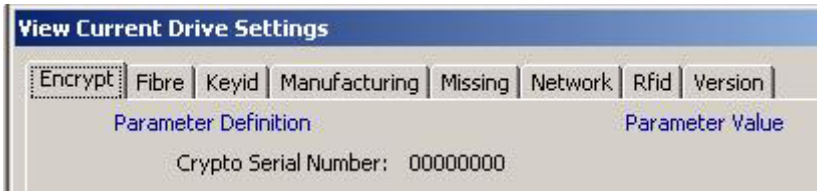
Note – In VOP version 1.0.9 and lower, there is also a Get and Display command in the Retrieve menu. However, it is not a functional command with the customer version of VOP. Should you select the command, you will only see an error message.

If you are operating VOP 1.0.9 or lower, consider an upgrade to the newest version.

View Drive Data Command

The View Drive Data command (see FIGURE 4-12 on page 85) displays current drive configuration settings and other drive data on selectable property sheets (tabs).

FIGURE 4-13 View Current Drive Settings Property Sheets



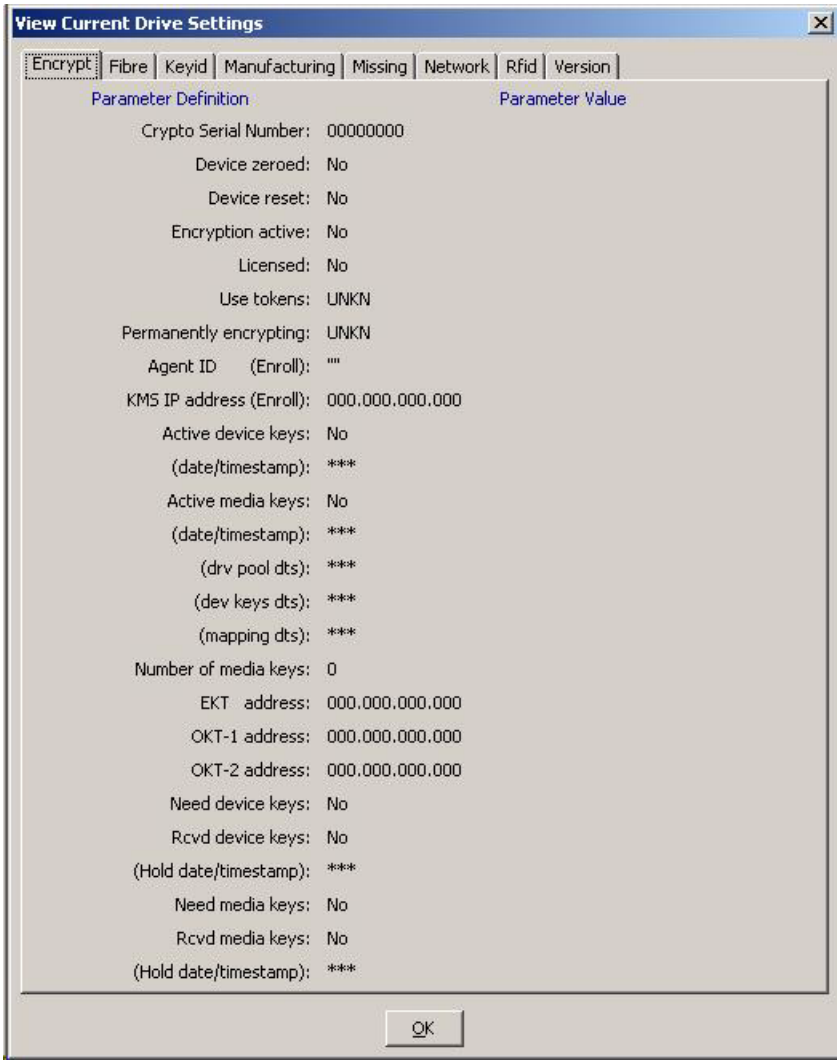
Encryption-capable drives open to the Encrypt tab (FIGURE 4-14) while other drives open to the Fibre tab (FIGURE 4-15). The Keyid and Missing tabs provide information that relates to encryption-capable drives.

Note – The View Current Drive Settings property sheets are view (display) only. See "Configure Menu" on page 100 for detailed descriptions and guidelines for changing configuration settings.

Encrypt Property Sheet

The Encrypt tab (FIGURE 4-14) displays encryption-related data.

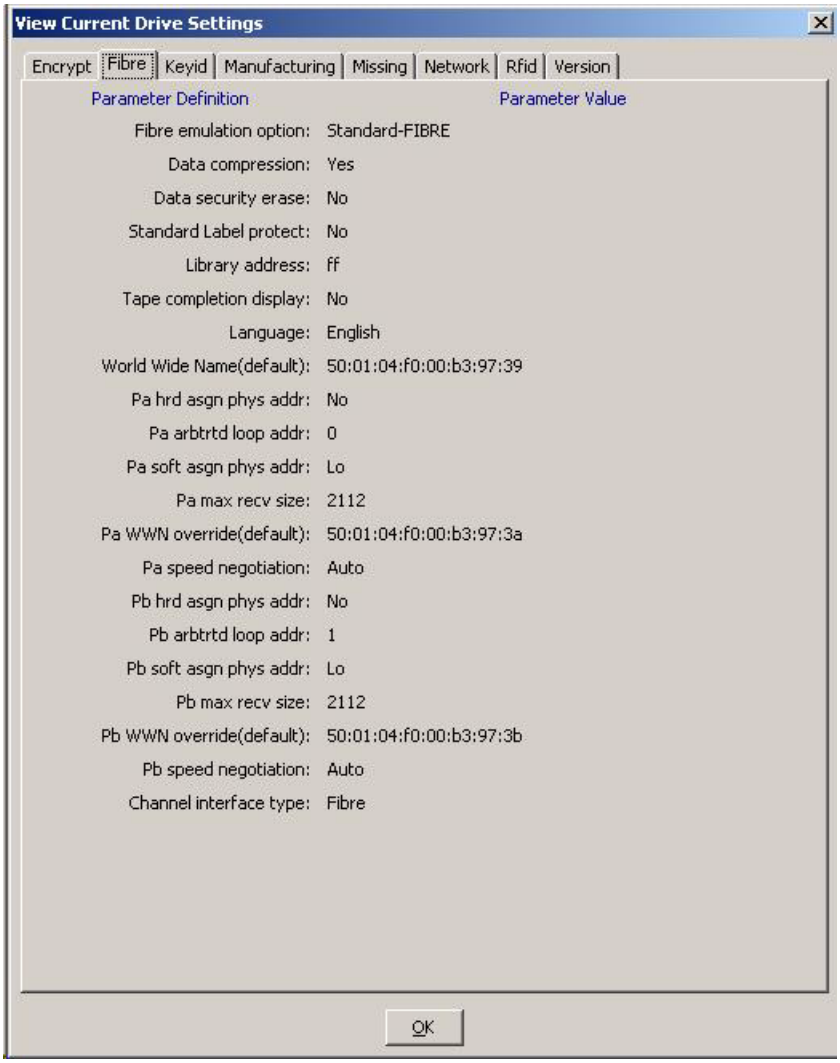
FIGURE 4-14 View Current Drive Settings, Encrypt Tab



Fibre Property Sheet

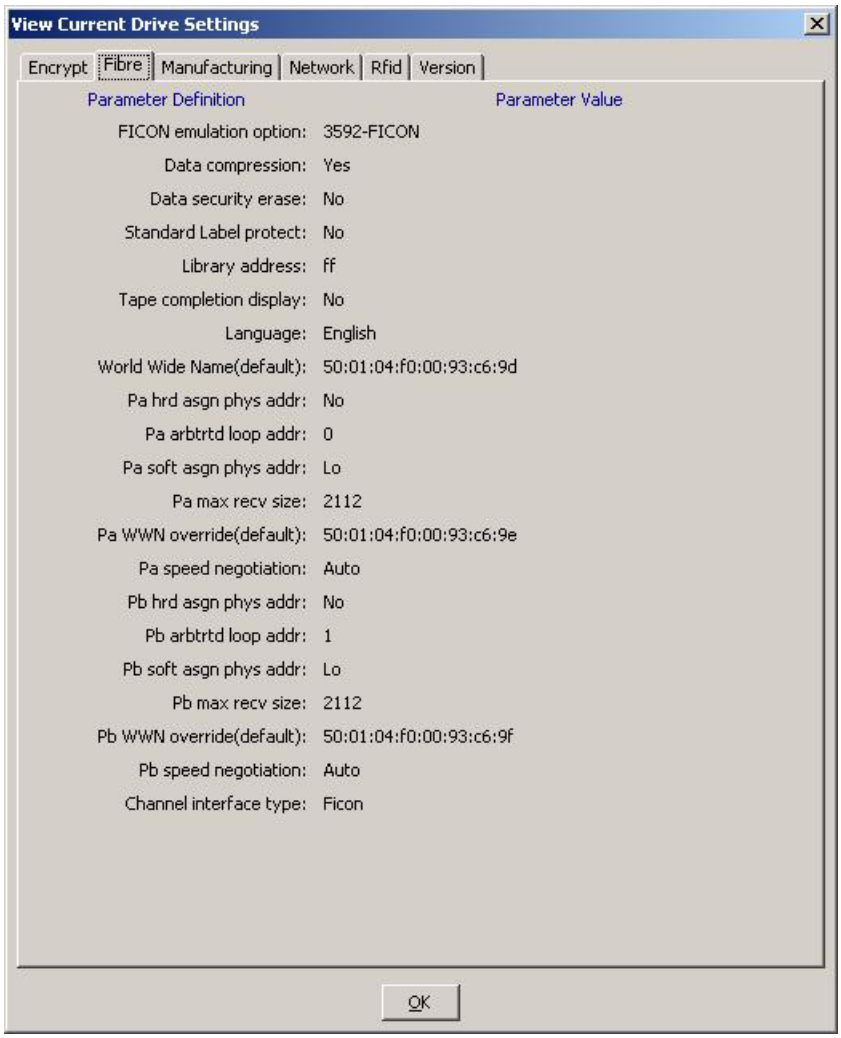
The data displayed on the Fibre tab is specific to the type of drive interface. The Fibre Channel Protocol (FCP), shown in FIGURE 4-15, has FCP specific data. The Fibre Interface Connection (FICON), shown in FIGURE 4-16 on page 89 has FICON specific data. There is a similar list of parameters for a T9840D drive.

FIGURE 4-15 View Current Drive Settings, Fibre Tab (FCP Interface)



The Fibre tab for the FICON interface (FIGURE 4-16) is very similar to the FCP interface (FIGURE 4-15 on page 88), with the exception of the FICON specific emulation setting.

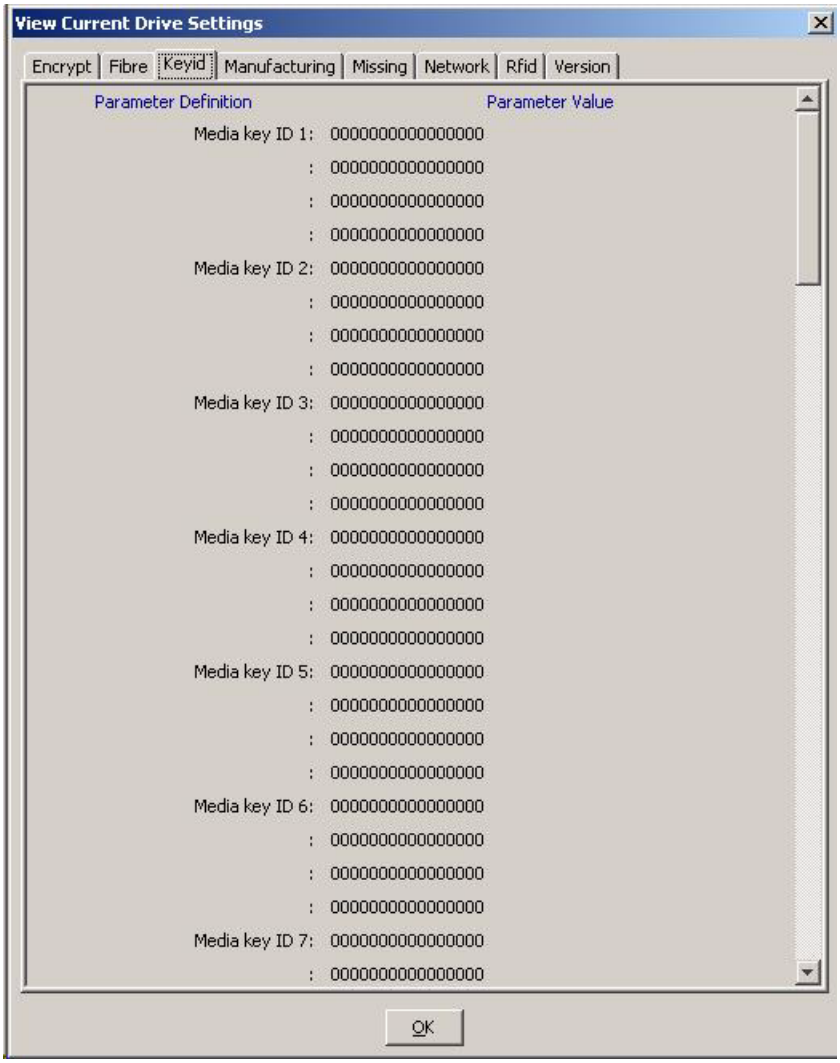
FIGURE 4-16 View Current Drive Settings, Fibre Tab (FICON Interface)



Keyid Property Sheet

The Keyid tab (FIGURE 4-17) displays a list of key identifiers.

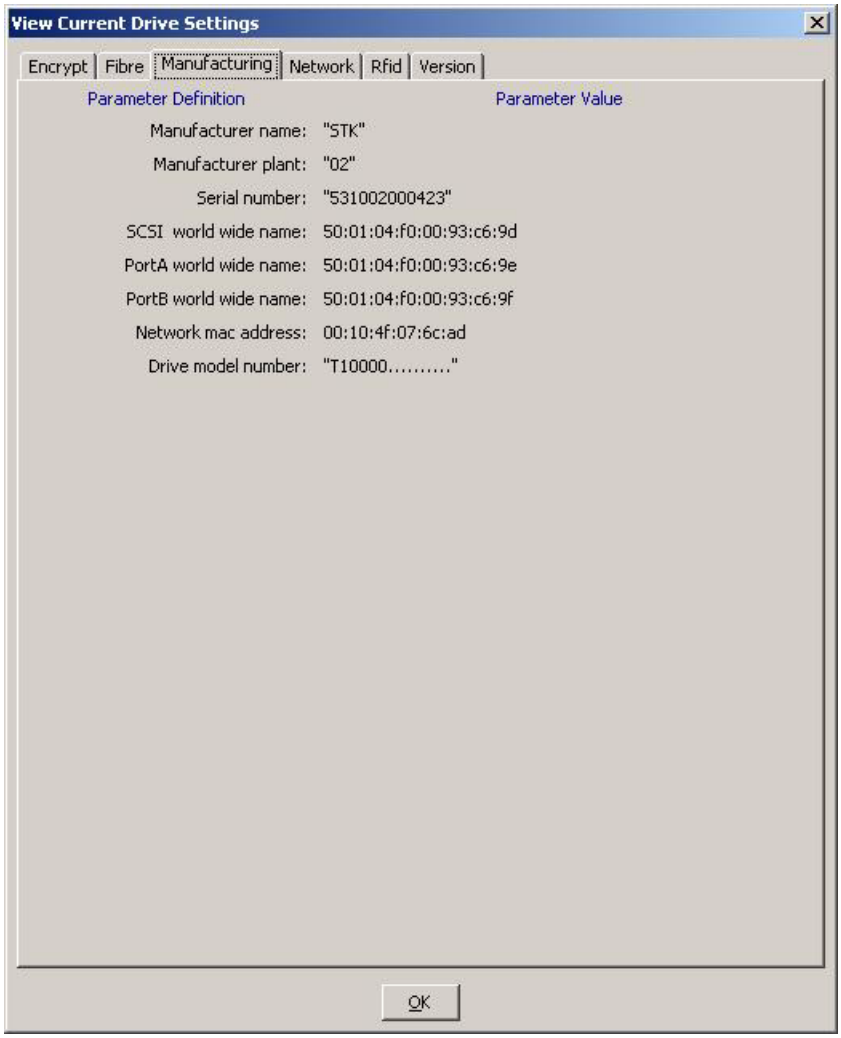
FIGURE 4-17 View Current Drive Settings, Keyid



Manufacturing Property Sheet

The Manufacturing tab (FIGURE 4-18) displays factory preset settings, such as drive serial number, and default world wide names.

FIGURE 4-18 View Current Drive Settings, Manufacturing Tab

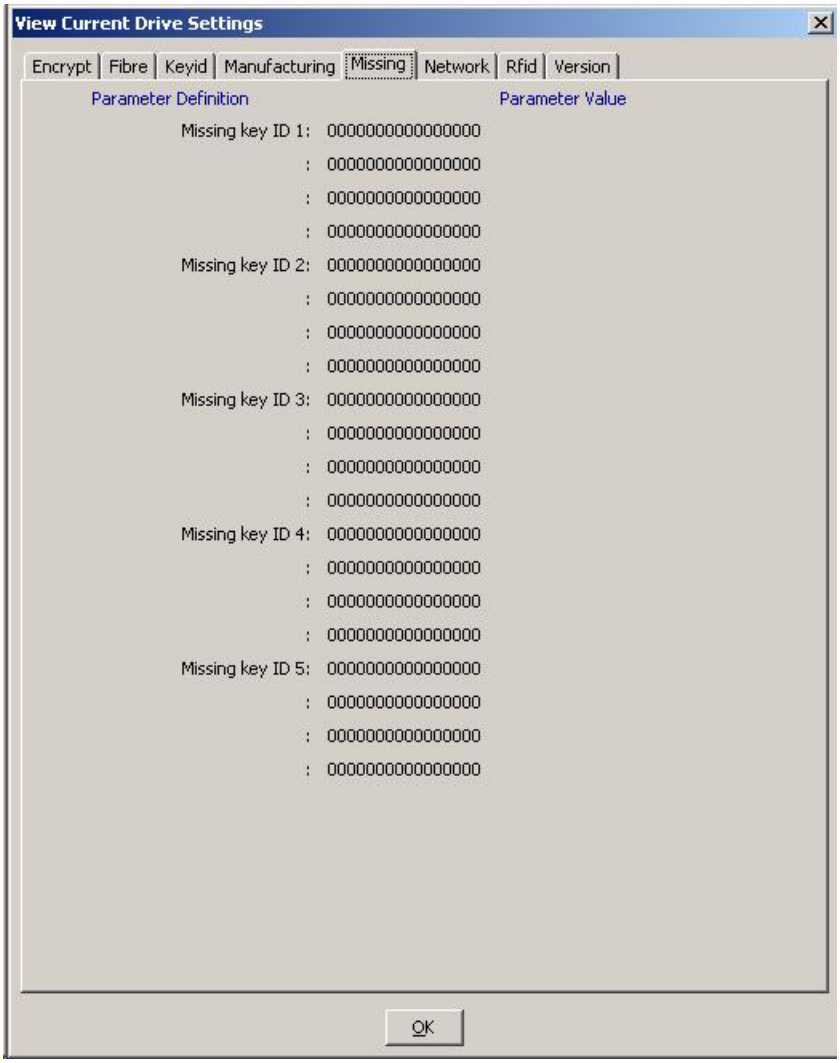


Note – The serial number of a T10000A drive begins with 531 while the serial number of a T10000B drive begins with 572.
The drive model number of a T10000A drive displays as T10000 (see the figure above) while the model number of a T10000B drive displays as T10000B.

Missing Property Sheet

The Missing tab (FIGURE 4-19) displays a list of missing key identifiers.

FIGURE 4-19 View Current Drive Settings, Missing

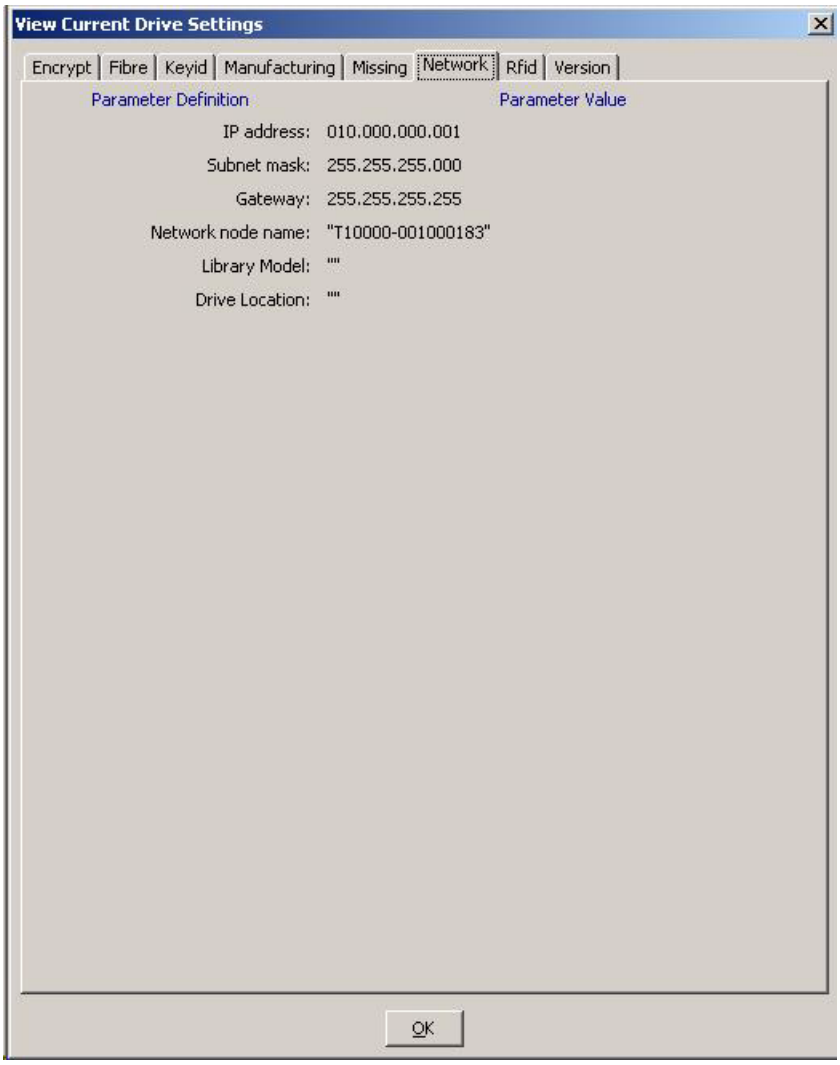


Network Property Sheet

The Network tab (FIGURE 4-20) displays the Network node name. The factory preset default is comprised of the drive model number (t10000) and the last nine digits of the drive serial number.

This tab also displays the current static IP settings. FIGURE 4-20 shows factory preset static IP parameters, which can be changed through the Configure menu (see "Network Property Sheet" on page 117).

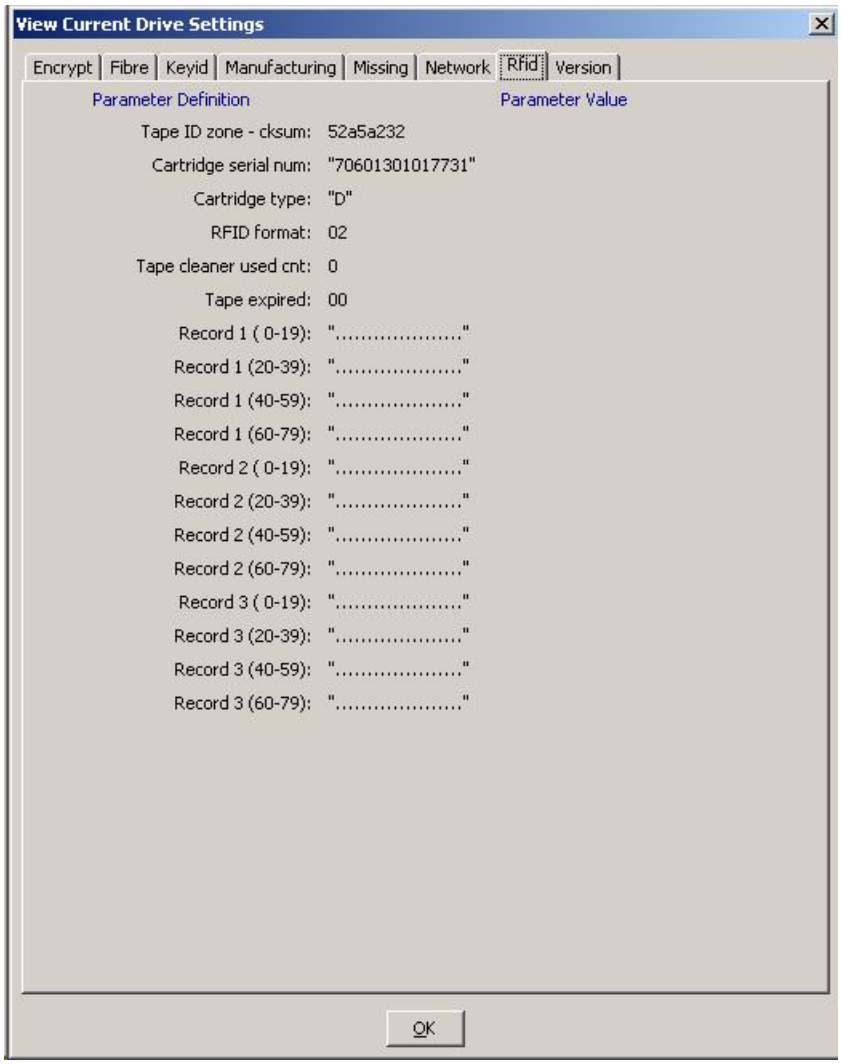
FIGURE 4-20 View Current Drive Settings, Network Tab



Rfid Property Sheet

The Rfid tab (FIGURE 4-21) displays data stored in the radio-frequency identification (Rfid) memory chip in the T10000 tape cartridge. The Rfid chip stores data related to cartridge contents and statistics. The data is similar to data stored in the media information region (MIR) on the tape, and is updated with each cartridge mount/dismount. An Rfid module in the drive reads the Rfid chip while the cartridge is loaded, and is viewable (read-only) by the VOP application.

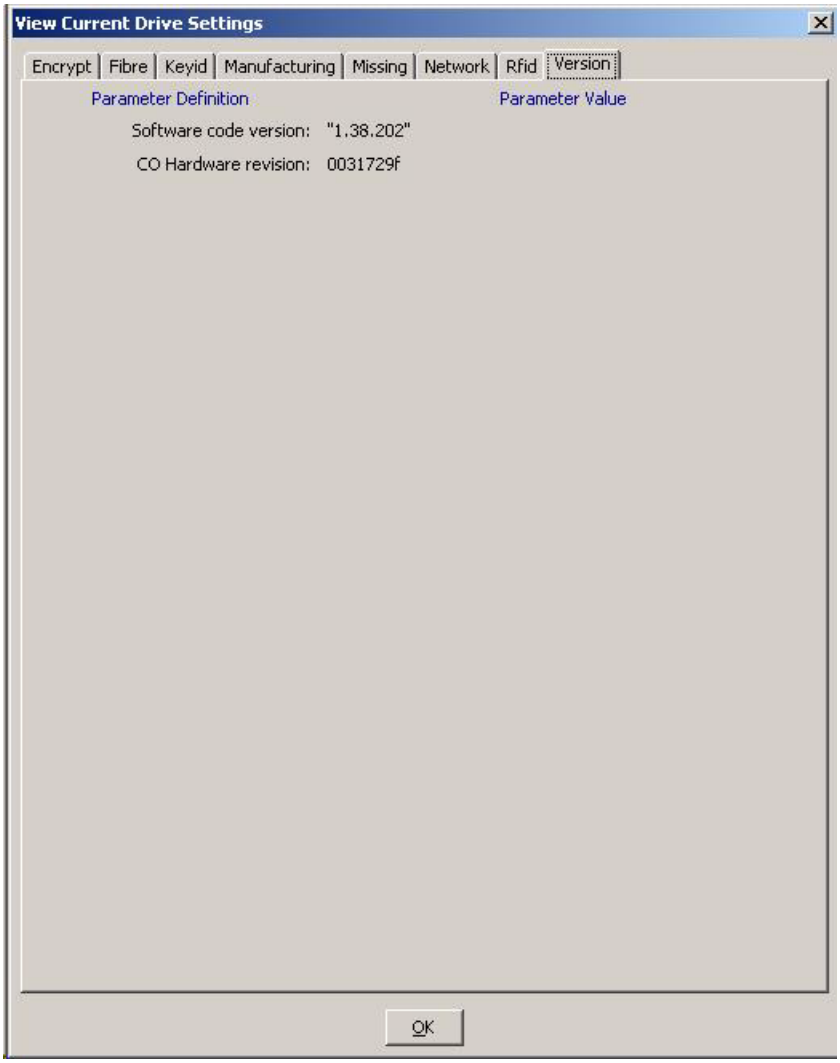
FIGURE 4-21 View Current Drive Settings, Rfid Tab



Version Property Sheet

The Version tab (FIGURE 4-22) displays the current drive firmware level.

FIGURE 4-22 View Current Drive Settings, Version Tab



View Date & Time Command

This command displays the date and time of the drive internal clock module. When you select View Date & Time (FIGURE 4-23), the drive date and time appears in the VOP transcript pane, as shown in FIGURE 4-24.

FIGURE 4-23 View Date & Time

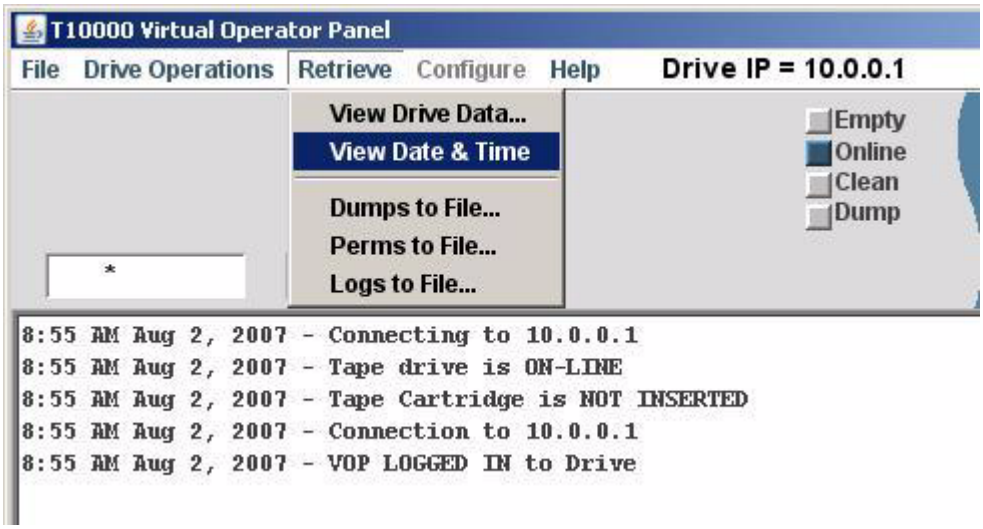
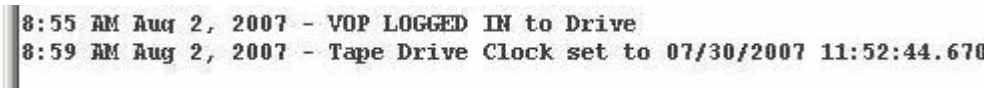


FIGURE 4-24 Date & Time Display



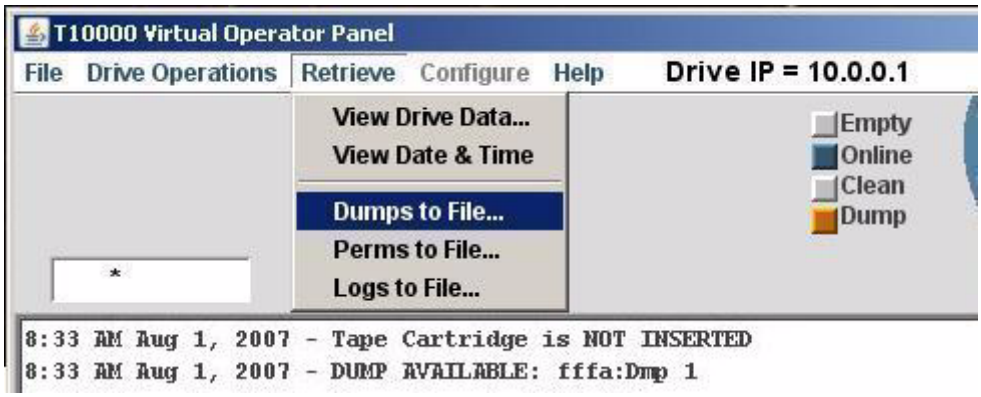
Notice in FIGURE 4-24 that the drive clock setting is lagging behind the VOP time at the left end of the same text line. The drive clock only operates while the drive is powered; therefore, the drive clock time can fall behind real clock time during times that the drive is not powered. Most library configurations set the drive clock in-sync with the library clock. However, you can manually set the drive clock when the drive is offline.

Note – See "Set Clock Command" on page 121 to reset the drive clock.

Dumps to File Command

The Dumps to File command (FIGURE 4-25) allows you to retrieve and save diagnostic dumps that are currently stored in the drive memory.

FIGURE 4-25 Dumps to File



▼ Dumps to File

1. **Choose Dumps to File to open an operating system save dialog box**

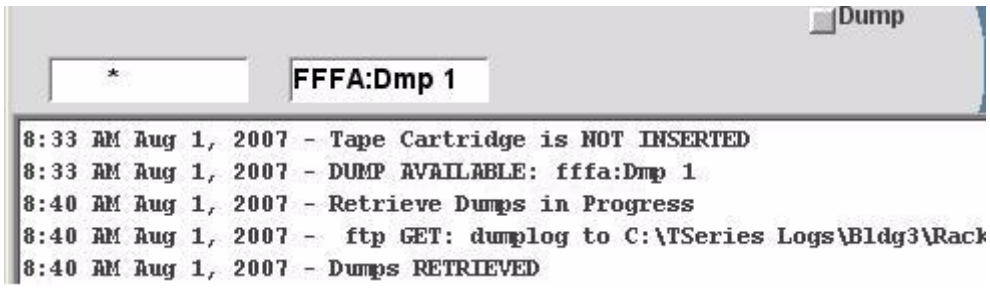
   The save dialog box allows you to name the file, and where to save the file.

2. **Name the file, specify the target folder, and click Save.**

   The operating system saves the dump file in the specified location.

   The VOP transcript (FIGURE 4-26) documents the action, including the path to the file.

FIGURE 4-26 Dumps to File Transcript

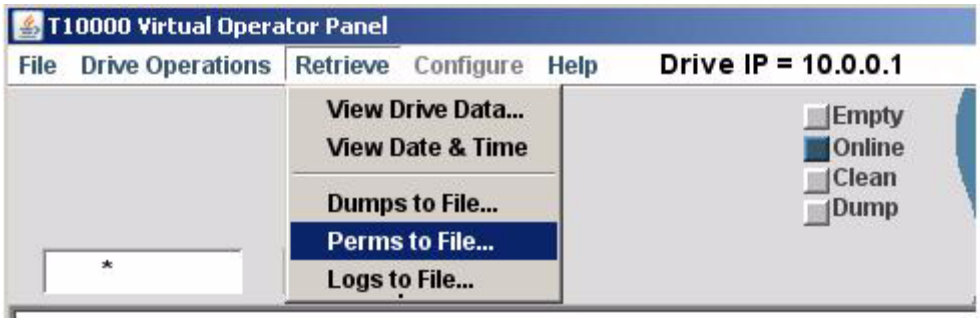


Note – Notice that the drive status dump indicator dimmed after the dump file was retrieved. However, the dump is still present in drive memory until intentionally deleted by a service representative, or until the drive firmware is updated.

Perms to File Command

The Perms to File command (FIGURE 4-27) allows you to retrieve and save all the permanent errors that are currently stored in the drive memory.

FIGURE 4-27 Perms to File



▼ Perms to File

1. **Choose Perms to File to open an operating system save dialog box.**

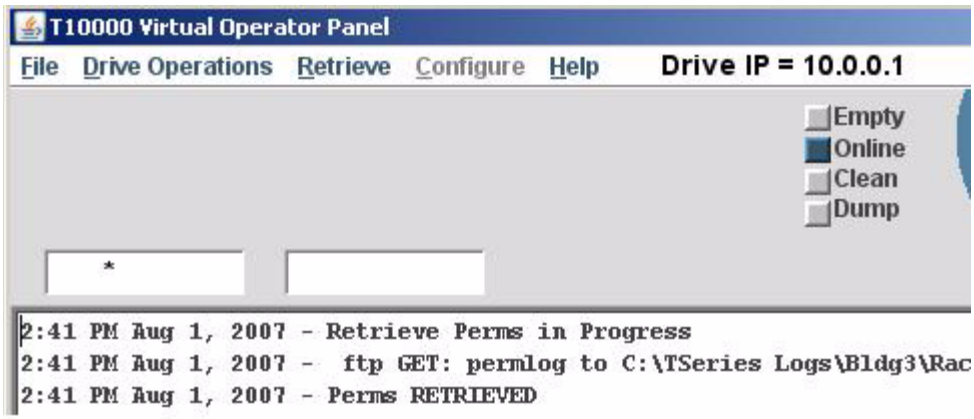
   The save dialog box allows you to name the file, and where to save the file.

2. **Name the file, specify the target folder, and click Save.**

   The operating system saves the perm file in the specified folder.

   The VOP transcript (FIGURE 4-28) documents the action, including the path to the file.

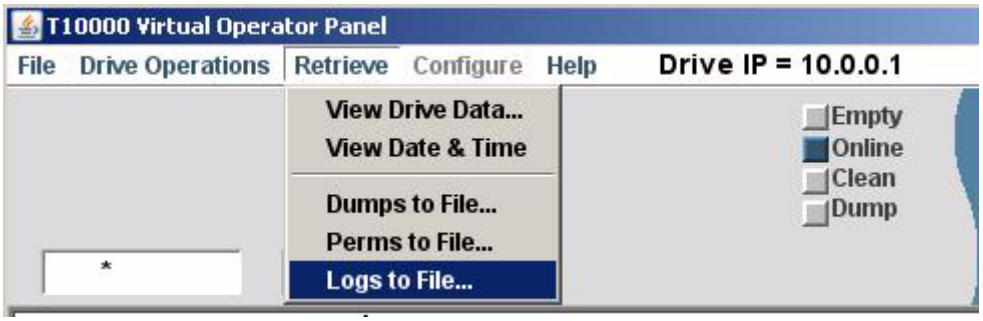
FIGURE 4-28 Perms to File Transcript



Logs to File Command

The Logs to File command (FIGURE 4-29) allows you to retrieve and save event logs that are currently stored in the drive memory.

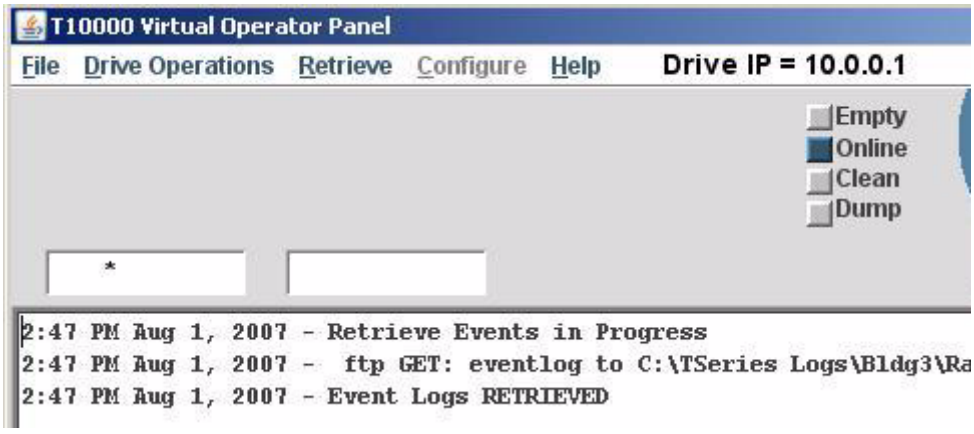
FIGURE 4-29 Logs to File



▼ Logs to File

1. **Choose Logs to File to open an operating system save dialog box.**
   The save dialog box allows you to name the file and where to save the file.
2. **Name the file, specify the target folder, and click Save.**
   The operating system saves the log file in the specified folder.
   The VOP transcript (FIGURE 4-30) documents the action, including the path to the file.

FIGURE 4-30 Logs to File Transcript



Configure Menu

The Configure menu commands (FIGURE 4-31) and submenus are available when the drive is offline.Use them to:

- Change drive configuration settings
- Save the drive configuration values in a file
- Set the date and time in the drive (clock)
- Load drive microcode from a tape

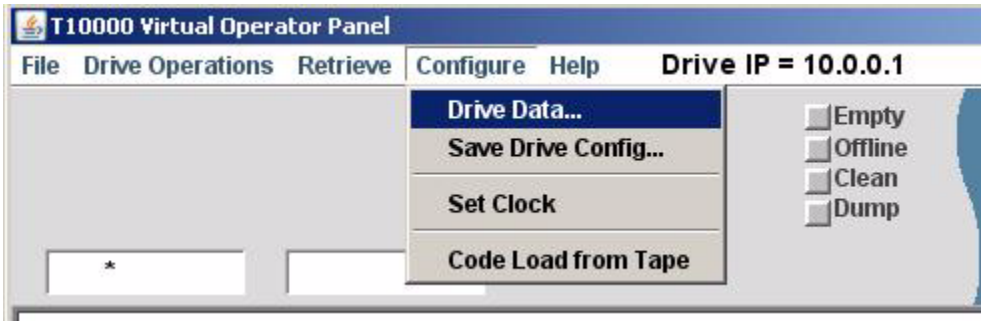
FIGURE 4-31 Configure Menu

Note – The drive must be offline, and should not be available to the host when exercising the Configure menu commands. Some changes require the drive to perform an Initial Program Load (IPL) to affect configuration changes.

Drive Data Command

The Drive Data command (FIGURE 4-32) allows you to change configuration settings.

FIGURE 4-32 Configure > Drive Data



The multi-tab Configure Drive Parameters property sheet opens.

FIGURE 4-33 Property Sheets

Notice that there are several selection methods on the property sheets:

- Drop-down list boxes
- Radio buttons
- Text fields

Before discussing the available configuration settings, you should be familiar with the three command buttons across the bottom of every tab.

When you select a property sheet (tab), the current drive parameter values appear. If you change a setting, the adjacent Update checkbox indicates a pending change. Clearing the checkbox cancels the pending change for only that parameter.

Configure Command Buttons

The three command buttons across the bottom of the Configure Drive Parameters dialog box (see FIGURE 4-34) directly affect drive configuration settings.

FIGURE 4-34 Configure Command Buttons

Load Drive Config

Clicking Load Drive Config allows you to retrieve a previously saved file of preselected drive configuration parameters/settings.
See "To Save Drive Config" on page 120 for guidelines on saving a drive configuration.

Note – You will need to use normal file browsing to locate the saved file.

Once the retrieved file is opened, it populates all tabs with the saved configuration parameter values/settings.

Note – Marked Update checkboxes identify changed parameter values/settings. The imported saved configuration file includes drive specific parameters of the originating drive. Make sure you clear or reset drive specific parameters to accurately reflect the drive importing the saved configuration file.

You have the choice to retrieve a different file, clear check boxes of individual marked parameters, edit any specific parameter; or cancel or commit all pending (check-marked) configuration changes.

Commit

Clicking Commit initiates a drive IPL to activate pending changes.

Note – VOP loses connection to the drive when IPL begins. However, VOP automatically reconnects to the drive after a successful IPL.

After the drive completes IPL, and VOP has reconnected to the drive, you should review Retrieve > Drive Data tabs to verify the new parameter values/settings (see "View Drive Data Command" on page 86). If required, place the drive offline, and repeat the configuration process see "Drive Data Command" on page 100).

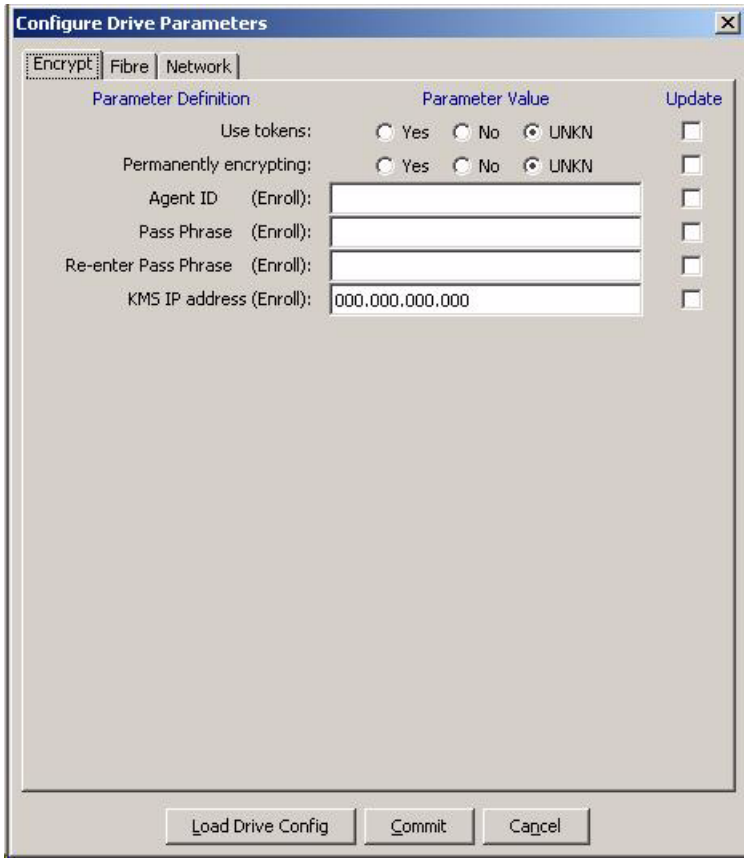
Cancel

Clicking Cancel clears any/all pending change selections for all four tabs.

Encrypt Property Sheet

The Encrypt tab (FIGURE 4-35) contains information about the encryption characteristics of the drive (use of tokens and permanently encrypting) and enrollment information. See the encryption documentation for guidelines on how to use this property sheet.

FIGURE 4-35 Configure Drive Parameters, Encrypt Tab



FCP Fibre Property Sheet

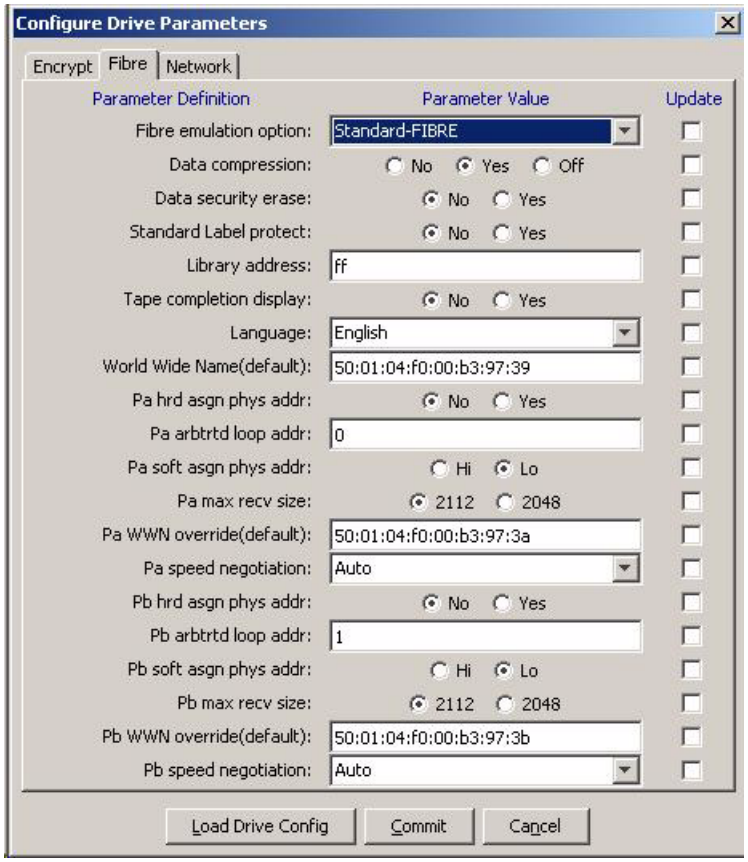
The FCP Fibre tab (FIGURE 4-36) contains drive FCP configuration settings that you can change for the T10000A tape drive. The parameters are similar for the T10000B or T9840D tape drive.

Notice that there are three different selection methods on the Fibre tab:

- Drop-down list boxes - Emulation, language, Pa/b max recv size, and Pa/b speed negotiation.
- Radio buttons - Data compression, Data security erase, Standard Label protect, Tape completion display, Pa/b hrd asgn phys addr, and Pa/b soft asgn phys addr.
- Text fields - Library address, and World Wide Name (drive, ports A & B).

Note – See FIGURE 4-37 on page 105 for the FICON Fibre tab.

FIGURE 4-36 Configure Drive Parameters, Fibre Tab (FCP)



FICON Fibre Property Sheet

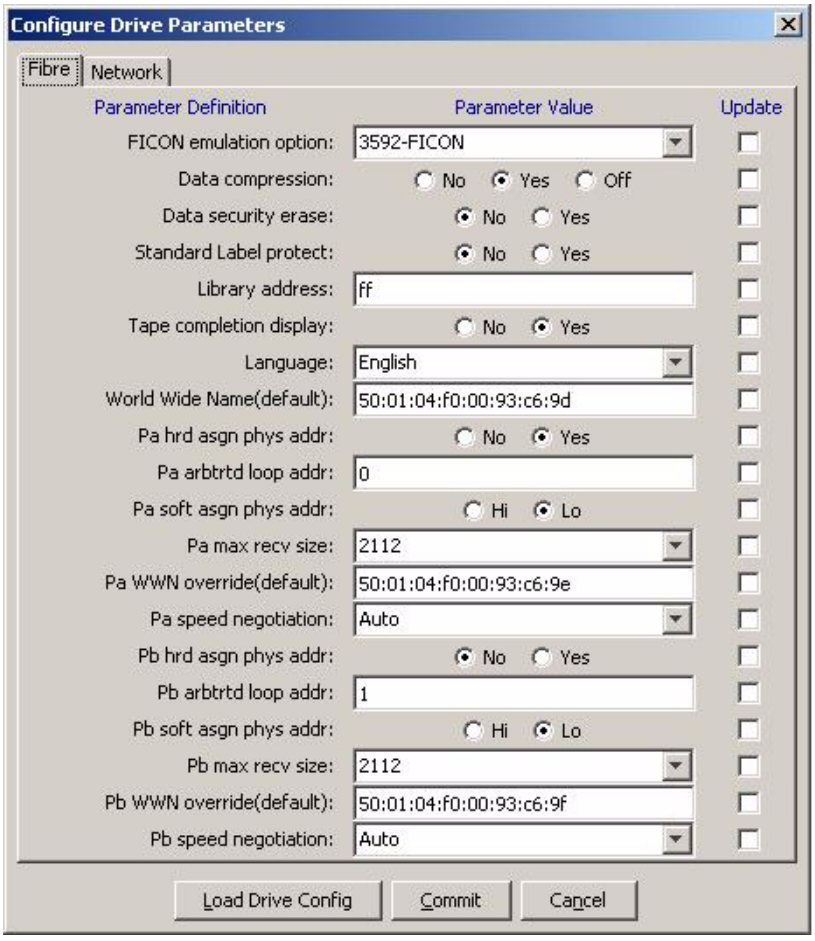
The FICON Fibre tab FIGURE 4-37) contains drive FICON configuration settings that you can change,

Notice that there are three different selection methods on the Fibre tab:

- Drop-down list boxes - Emulation, Language, Pa/b max recv size, and Pa/b speed negotiation.
- Radio buttons - Data compression, Data security erase, Standard Label protect, Tape completion display, Pa/b hrd asgn phys addr, and Pa/b soft asgn phys addr.
- Text fields - Library address, and World Wide Name (drive, ports A & B).

Note – See FIGURE 4-36 on page 104 for the FCP Fibre tab.

FIGURE 4-37 Configure Drive Parameters, Fibre Tab (FICON)



The following guidelines provide additional detail for changing drive settings.

Note – The current drive parameter settings were selected by the installation team to match pre-determined site requirements. Changing the drive parameter setting could materially affect drive performance. Therefore, you should change drive parameter settings only as instructed by your IT manager, or Sun StorageTek Support.

▼ To Set an Emulation

1. **Click the down arrow to see an item list of emulation options.**

   The available emulation option list appears with the current option highlighted.

2. **Select an alternative option in the item list to change the setting.**

   The selected option is highlighted, and a check mark appears in the Update checkbox.

Note – The available emulation options are specific to the active interface and the tape drive model. FIGURE 4-38 shows the T10000A FCP options. FIGURE 4-39 show the T10000A FICON options. T9840D emulation options are different.

FIGURE 4-38 T10000A Emulation Options - FCP

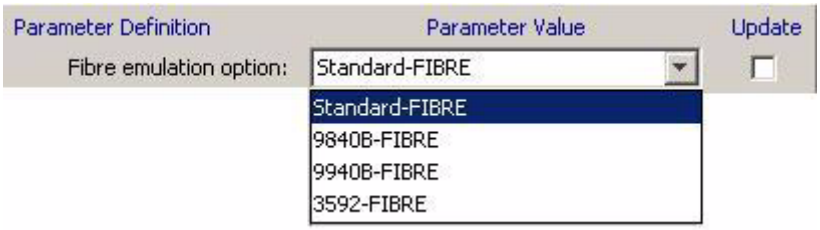
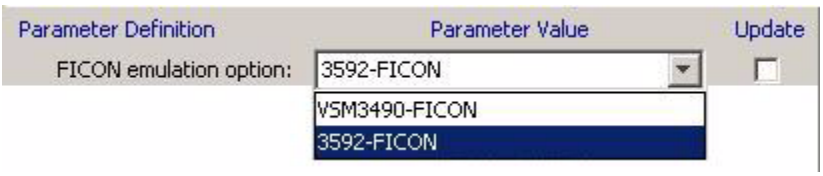


FIGURE 4-39 T10000A Emulation Options - FICON



3. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

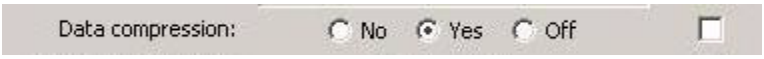
▼ To Set Data Compression

See FIGURE 4-40 for available data compression options.

1. **Click the appropriate radio button.**

   The selected button is highlighted, and a check mark appears in the Update checkbox.

FIGURE 4-40 Data Compression Options



Note – Data compression radio buttons are mutually exclusive. The option defaults to the last saved selection. Yes is preset at the factory. See TABLE 4-1 for descriptions.

TABLE 4-1 Data Compression Option Descriptions

Option	Use/Meaning
No	Data is not compressed, by default, but can be overridden by the host for a job.
Yes	Data is compressed, by default, but can be overridden by the host for a job.
Off	Data compression is disabled by default, and cannot be overridden by the host.

2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set Data Security Erase

See FIGURE 4-41 for available data security erase (DSE) options.

1. **Click the appropriate radio button.**

   The selected button is highlighted, and a check mark appears in the Update checkbox.

FIGURE 4-41 DSE Options

Note – The DSE radio buttons are mutually exclusive. The option defaults to the last saved selection. See TABLE 4-2 for descriptions.

Note – In June 2008, the factory setting for the T9840D will be Yes. Drives manufactured before this date were set to No.

TABLE 4-2 DSE Option Descriptions

Option	Use/Meaning
Yes	Enables a full DSE. A random binary pattern is written on the media, over-writing existing data, from the point of an "Erase" command to the End of Tape mark.
No	Writes an end of data mark on the media that indicates valid data does not exist beyond the point of an "Erase" command. Data is actually still present beyond the end of data mark, and it can be retrieved by special tape utilities.

2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set Standard Label Protect

See FIGURE 4-42 for available standard label protect (SL Prot) options.

1. **Click the appropriate radio button.**

   The selected button is highlighted, and a check mark appears in the Update checkbox.

FIGURE 4-42 Standard Label Protect Options

Note – The SL Prot radio buttons are mutually exclusive. The option defaults to the last saved selection. No is preset at the factory. See TABLE 4-3 for descriptions.

TABLE 4-3 Standard Label Protect Options

Option	Use/Meaning
No	Disables standard label protection.
Yes	Enables standard label protection.

Notes:
Consider the following:
1. Select Yes if label overwrite code is loaded, or if running standard labels and wish the drive to display a fatal error (CHK 33EX) when writing a non-80-byte record for VOLSER or HDR1.
2. Select No if you are using NL or NSL tape processing.
3. POST WRCART cannot be run with Yes selected

2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set Library Address

FIGURE 4-42 shows the Library address text field.

Note – The library address is a two-character hexidecimal notation, preset at the factory to *ff*. It should remain at *ff* for all libraries except the 9310 PowderHorn, where it is manually keyed to the drive cabinet position, as viewed from the cabinet rear.

1. **Select the current entry.**

   The setting value is highlighted.

2. **Type in the appropriate two-character hexidecimal Library address.**

   The changed value appears and a check mark appears in the Update checkbox.

FIGURE 4-43 Library Address

Note – Valid entry for L-Series libraries and the SL8500 is the factory default *ff*. Valid entries for the 9310 PowderHorn Library 9741/9741E drive cabinet is *00* through *09* (top, down), left column; and *0A* through *13* (top, down) right column.

3. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Enable Tape Completion Display

See FIGURE 4-44 for available Tape completion display options.

1. **Click the appropriate option radio button.**

   The selected button is highlighted, and a check mark appears in the Update checkbox.

FIGURE 4-44 Tape Completion Display Options

Note – The radio buttons are mutually exclusive. The option defaults to the last saved selection. No is preset at the factory.

When No is selected, the tape completion display is disabled.

When Yes is selected, the tape completion display appears in the secondary drive message window when there is a cartridge loaded in the drive.

The display (FIGURE 4-45) provides an indication of tape completion (percentage of tape media with written data).

FIGURE 4-45 Tape Completion Display

Note – The view-only tape completion display is superseded by higher priority messages that require use of the secondary window.

---

2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set the Language

This option sets the language in which certain operational drive messages, such as loading, unloading, etc. (see TABLE 4-4) are displayed in the drive message windows.

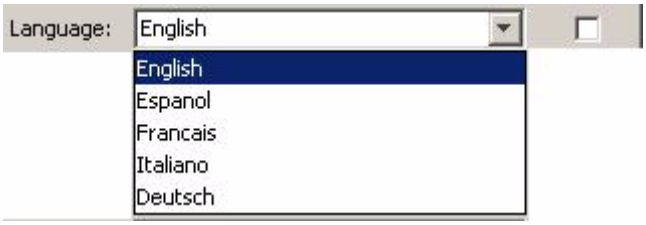
1. **Click the down arrow to see an item list of available languages.**

   The available language list appears with the current selection highlighted.

2. **Select another option in the item list to change the setting.**

   The selected option is highlighted, and a check mark appears in the Update checkbox.

FIGURE 4-46 Drive Message Language Options



Note – English is preset at the factory.

TABLE 4-4 Translated Drive Messages

English	Espanol	Francias	Italiano	Deutsch
Cleaning	*Limpia*	Nettoyage	*Pulir*	Reinigen
Erasing	*Borrando*	Effacement	*Cancella*	*Loeschng*
Loading	Cargando	Chargement	Carico	Laden
Locating	Situando	Recherche	Ricerca	Suchen
NT Ready F	Noprep P	Npret PTG	No PRT P	N Bereit N
NT Ready U	Noprep N	Npret U	No PRT N	N Bereit G
Ready A				
Ready F	Prepda P	Pret F	Pronto P	Bereit G
Ready U	Prepda N	Pret U	Pronto N	Bereit N
Rewinding	Rebobinar	Rebobinage	Riavvolg	Spult-R
Unloading	Descarga	Dechargemt	Scaricam	Entladung

3. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set the World Wide Name

The World Wide Name (WWN) identifies the drive node. This string of 16 hexidecimal characters (FIGURE 4-47) represents a 64-bit unique identifier that distinguishes the individual drive from all other devices, worldwide. Characters 2 through 6 identify the specific manufacturer. Sun StorageTek branded devices have the company ID “00104F”. Other characters reveal additional information, including an identifier unique only to the specific device.

Sun Microsystems assigns a block of three WWNs (from a pool of company-specific WWNs) to each tape drive during the manufacturing process. One for the drive and one each for the two fiber-optics interface ports. The drive node is assigned the first WWN of the block, and the next two WWNs, in sequence, are assigned to the ports. Notice the last two characters in FIGURE 4-47 is “9d”. If you refer back to the entire fibre tab (FIGURE 4-36 on page 104, FCP or FIGURE 4-37 on page 105, FICON) the port A WWN ends with “9e”, and the port B WWN ends with “9f”.

The ‘(default)’ indicates that this WWN was preset at the factory. Certain libraries override the default WWN with a library-assigned dynamic WWN (dWWN). Typically, only the last four characters differ from the default WWN. When dWWNs are active, ‘(library)’ appears in the label. Also, the WWN can be manually overridden with a custom WWN. In some circumstances, a service representative might customize a replacement drive’s WWN to be the same as the replaced, defective drive’s WWN. This precludes a requirement for a full system reset to acknowledge a new WWN.

Note – Indiscriminately changing the WWN could result in the drive being unavailable to the host.

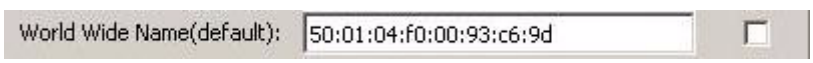
---

1. **Overwrite the appropriate hexidecimal characters with the specified new characters.**

   The changed value appears, and a check mark appears in the Update checkbox.

Note – When a customized WWN is active, ‘(custom)’ appears in the label.

FIGURE 4-47 World Wide Name Text Field



Note – If a custom WWN is applied to the drive node, custom WWNs must also be applied to the interface ports.

---

2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

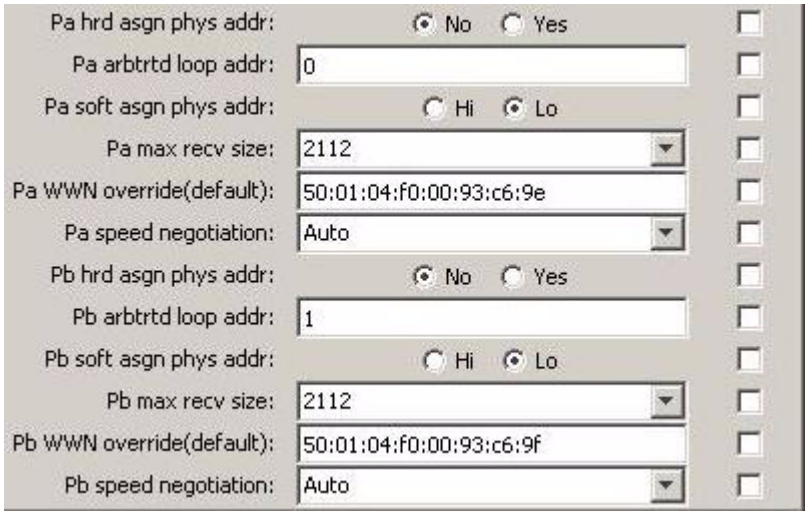
The original, factory-preset default WWN can be retrieved from the Retrieve > View Drive Data > Manufacturing tab (FIGURE 4-18 on page 91).

Attributes of Interface Ports

There are two identical interface ports attribute groups (FIGURE 4-48):

Note – Pa = Port A, Pb = Port B

FIGURE 4-48 Interface Port Attributes



▼ To Set Port Physical Address Attributes

Hard-assigned Physical Address (No/Yes)

When Yes is selected, the drive uses a specified hard physical address (PA). When No (factory-preset default) is selected, the drive seeks a soft PA.

Arbitrated Loop Address (loop ID)

This entry (*0 - 125*) specifies the loop ID when the Hard PA selection is Yes. Factory-preset defaults are: *0* for Port A, *1* for Port B.

Soft-assigned Physical Address (Hi/Lo)

Soft PA is effective only when the Hard PA selection is No.
When Soft PA is Hi, the drive seeks an available loop ID in a descending order.
When Soft PA is Lo (factory-preset default), the drive seeks an available loop ID in a descending order.

Note – Port physical address attributes are only used when the drive is in an arbitrated-loop. The settings are not applicable when the drive is in an interface fabric.

---

1. **Reset the port physical address attributes as directed by your IT manager.**
2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set the Maximum Receive Size

The maximum receive (max recv) size determines the maximum data frame size for data processing (see FIGURE 4-49).

Caution – POTENTIAL DRIVE DAMAGE. Older versions of VOP display several size options. The smaller size options are not valid with the T10000 drive. Furthermore, an attempt to switch to any setting other than 2112 or 2048, could cause the drive to fail to complete the IPL **DO NOT SELECT ANY SIZE OPTION OTHER THAN 2112 or 2048**.

---

1. **Click on the down arrow to see an item list of available data frame sizes.**

   The available frame size list appears with the current selection highlighted.

FIGURE 4-49 Max Data Frame Size Options

Note – 2112 is the factory preset default. Do not change unless directed by your IT manager or Sun StorageTek Support.

Note – You might see radio buttons instead of the list of frame sizes.

---

2. **Select the alternative option to change the setting.**

   The selected option is highlighted, and a check mark appears in the Update checkbox.
3. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Enable the Port World Wide Name Override

Each port has a unique WWN (see FIGURE 4-50) that can be overridden.

Note – See "To Set the World Wide Name" on page 112 for additional information/detail.

1. **Overwrite the appropriate hexidecimal characters with the specified new characters.**

   The changed value is displayed, and a check mark appears in the Update checkbox.

Note – If a custom WWN is applied to the drive node, custom WWNs must also be applied to the interface ports.

FIGURE 4-50 Port World Wide Name Text Fields

Note – When a customized WWN is active, '(custom)' appears in the label.

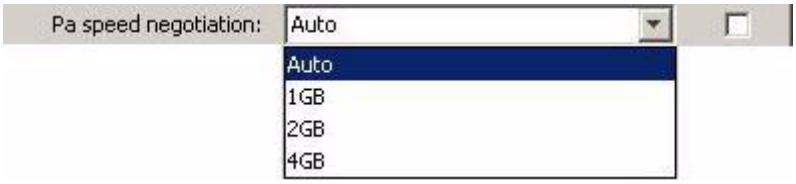
2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set Speed Negotiation

When Auto (see FIGURE 4-51) is selected, the drive operates at the interface negotiated speed, which is typically determined by the slowest attached device. When a fixed rate is selected, the drive will operate only at the specified speed.

FIGURE 4-51 Port Speed Negotiation Options



1. **Click on the down arrow to see an item list of available port speeds.**

   The available port speed list appears with the current selection highlighted

2. **Select another option in the item list to change the setting.**

   The selected option is highlighted, and a check mark appears in the Update checkbox.

Note – Auto is preset at the factory. Do not change unless directed by your IT manager or Sun StorageTek Support.

A fixed rate might cause the drive to be unavailable, unless all other interface devices are set to the same speed.

---

3. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

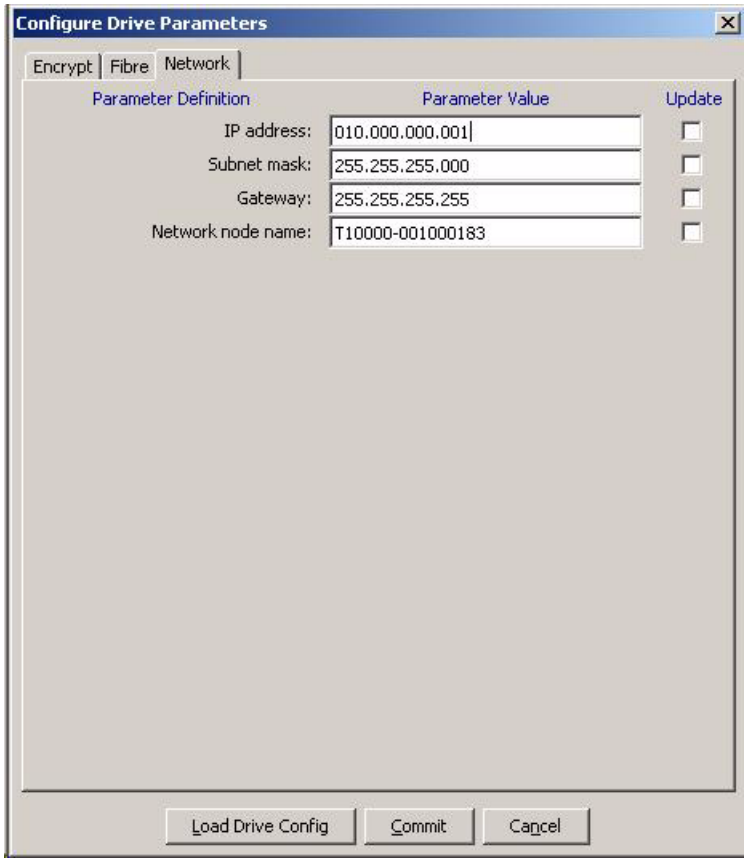
Network Property Sheet

The Network tab (FIGURE 4-52) provides network related options. When you select the Network tab, the current settings are displayed. The information in the following figure is from a T10000 tape drive.

If you are connected to a T9840D tape drive, the display contains five fields:

- IP address
- Subnet mask
- Gateway
- MIM host IP address
- MIM file path

FIGURE 4-52 Configure Drive Parameters, Network Tab

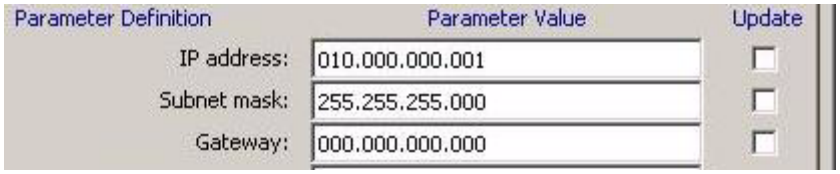


Note – The entries shown in FIGURE 4-52 are preset at the factory, and should only be changed by the direction of your IT manager.

▼ To Set a Static IP Address

Three parameters (FIGURE 4-53) determine the static IP addressing for the drive.

FIGURE 4-53 Static IP Address



Each parameter has four 3-digit groups, factory preset to the following values:

Parameter	Factory Preset	Valid Entries
IP address	010.000.000.001	000 - 255 (each 3-digit group)
Subnet mask	255.255.255.000	000 - 255 (each 3-digit group)
Gateway	000.000.000.000	000 - 255 (each 3-digit group)

Note – If your site is monitored by a Service Delivery Platform (SDP), all monitored drives are set to a dynamic IP address, controlled by the dynamic host control protocol (DHCP) server, in the SDP unit, which makes the drive static IP address not affective.

Therefore, you cannot even connect the customer VOP to drives monitored by an SDP.

For drives not monitored by an SDP, use the following procedure to edit the static IP address fields:

1. **Overwrite the IP address digits with the specified new digits.**

   A check mark appears in the Update checkbox.

2. **Repeat Step 1 for the Subnet mask**
3. **Repeat Step 1 for the Gateway**
4. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

▼ To Set the Network Node Name

This text field (FIGURE 4-54) determines the network node name for the T10000 tape drive.

FIGURE 4-54 Node Name

Note – The factory preset default is: t10000 - <last nine digits of drive serial number>.

To set a different network node name:

1. **Overwrite the appropriate characters with the specified new characters.**

   A check mark appears in the Update checkbox.

   Note – The factory preset network node name should only be changed by specific instructions from your IT manager, or Sun StorageTek Support.

   If you use a saved configuration file (from a different drive) to change settings, clear the update check box. Otherwise, the network node name will change, which could negatively impact network operations.

2. **Click Commit, at the bottom of the dialog box, if you do not have other changes. Otherwise, go to another section to select additional changes.**

   Note – Commit initiates a drive IPL to affect changed configuration settings. You should click Commit only after completing all drive parameter settings for change.

Save Drive Config Command

The Save Drive Config command (FIGURE 4-55) allows you to save the current drive configuration settings to a file. The saved file can then be retrieved to restore drive configuration settings.

FIGURE 4-55 Save Drive Configuration

▼ To Save Drive Config

1. **Make sure the drive is offline.**

   If the drive is not offline, set it offline.

   Note – The Configure label must be blue to allow menu selections.

2. **Click Configure, then choose Save Drive Config.**

   An typical operating system SaveAs dialog box opens.

3. **Select a folder location for the file.**

   Designate a folder location of your choice.

   Note – If a suitable folder does not currently exist, you must cancel the operation; then create a new folder, using normal operating system tools.

   If you create a new folder, go back to Step 2 to resume this utility.

4. **Name the new file.**

   Use a file name that differentiates it from similar files or overwrite an existing file.

5. **Save the file.**

   The new file is now saved and ready for retrieval with the "Load Drive Config" command button, on page 101.

Set Clock Command

The Set Clock command (FIGURE 4-56) allows you to set the drive's internal clock to the current time in your computer.

FIGURE 4-56 Set Clock

Note – The drive clock only operates while the drive is powered on; therefore, the drive clock time can fall behind real clock time during times that the drive is not powered on.

▼ To Set Clock

1. **Make sure the drive is offline.**

   If the drive is not offline, set it offline.

   Note – The Configure label must be blue to allow menu selections.

2. **Click Configure, then choose Set Cock.**

   The drive internal clock is set to your computer's clock.

FIGURE 4-57 Set Clock Verification

```
8:59 AM Aug 2, 2007 - Tape Drive Clock set to 07/30/2007 11:52:44.670
9:00 AM Aug 2, 2007 - Set OFF-LINE Operation Started
9:00 AM Aug 2, 2007 - Tape drive is OFF-LINE
9:01 AM Aug 2, 2007 - Clock Set To 08/02/2007 09:01:27
```

Note – With VOP release 1.0.9 or lower, there is not any indication of the set clock action. Therefore, verify the update by selecting Retrieve>View Date & Time.

With VOP release 1.0.10, and higher, a confirmation text line appears in the transcript (see FIGURE 4-57).

Code Load from Tape Command

The Code Load from Tape command (FIGURE 4-58) allows you to update the drive's firmware to the release level contained on a prerecorded Code Load Tape/Cartridge.

FIGURE 4-58 Code Load from Tape

Note – You can make a Code Load Tape/Cartridge from a drive that already has the updated drive firmware release level active (see "Make Code Tape" on page 83).

▼ To Use Code Load from Tape

1. **Make sure the drive is offline.**

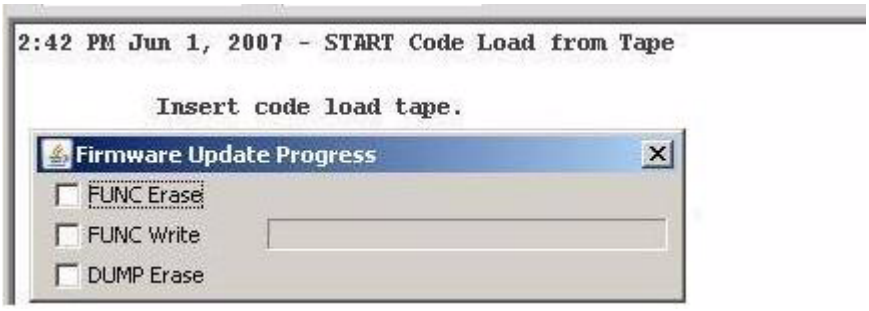
   If the drive is not offline, set it offline.

   Note – The Configure label must be blue to allow menu selections.

2. **Click Configure, then choose Code Load from Tape.**

   A text prompt to insert a code load tape appears in the VOP text message pane, and a Firmware Update Progress box appears (see FIGURE 4-59).

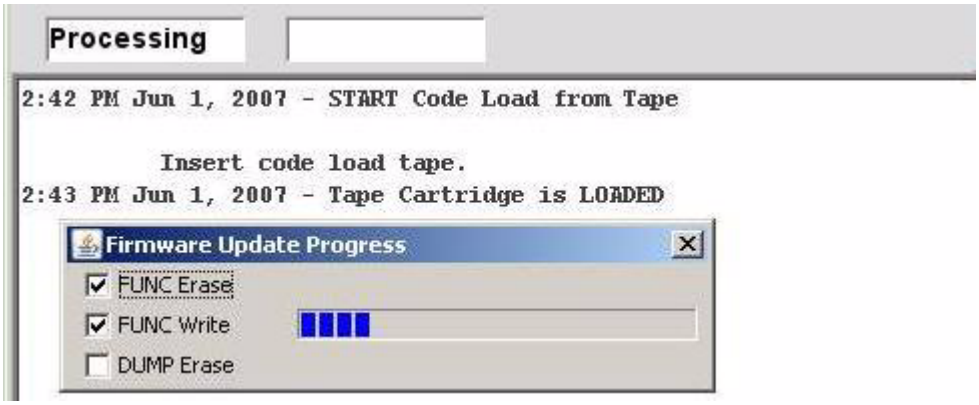
FIGURE 4-59 Code Load from Tape Start



3. **Insert the code load tape/cartridge containing the proper firmware release level.**

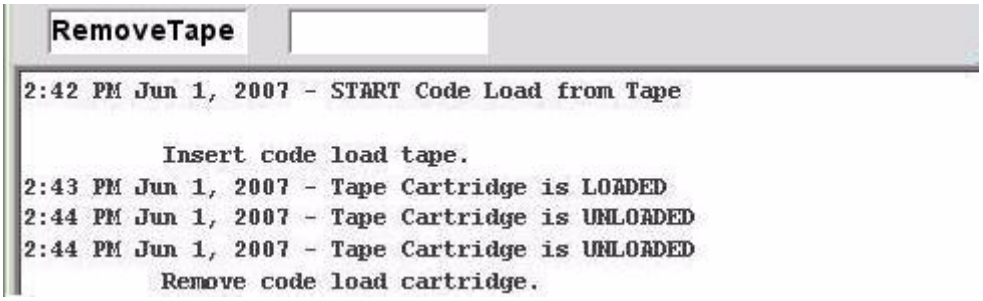
   The Firmware Update Progress box (FIGURE 4-60 on page 123) tracks the update.

FIGURE 4-60 Firmware Update Progress



When the firmware update is completely loaded into the drive memory, the progress box disappears, the code load tape/cartridge unloads, and a prompt to remove the code load cartridge appears in the VOP text message pane (see FIGURE 4-61).

FIGURE 4-61 Code Load from Tape End



4. **Remove the code load cartridge from the drive load slot.**

   When the cartridge clears the drive load slot, a drive IPL starts, which will load/activate the updated firmware level into the drive RAM.

Note – VOP loses connection to drive during IPL, but automatically reconnects once IPL is successfully completed.

5. **Select Retrieve>Drive Data>Version tab to verify the updated firmware level.**

   See FIGURE 4-22 “View Current Drive Settings, Version Tab” on page 95

Help Menu

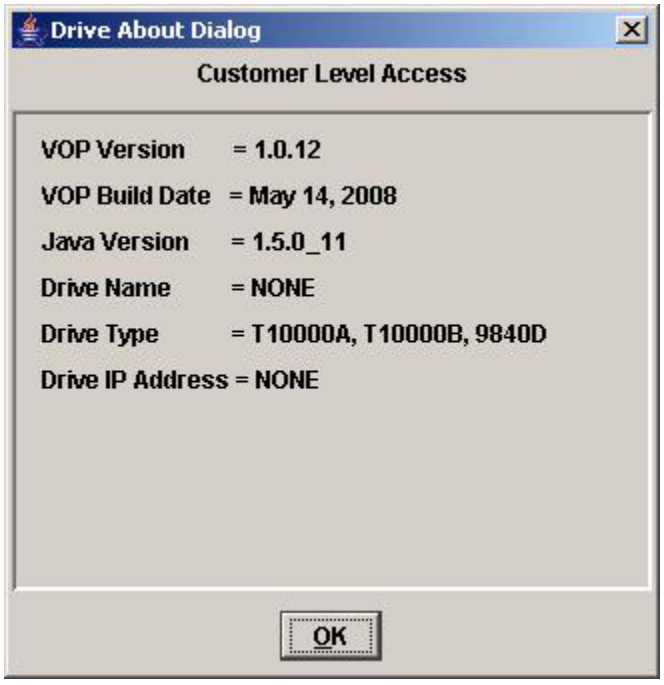
The Help menu (FIGURE 4-62) has one command that displays information about the virtual operator panel, the Java version, and the drive connection.

FIGURE 4-62 Help Menu

1. **Click Help, then choose About.**

   The Drive About Dialog box (FIGURE 4-63) displays information about the VOP application; and, if connected to a drive, it lists the drive name and IP address.

FIGURE 4-63 About Dialogue Box



2. **Click OK to close the dialog box.**

   You can also click the X in the upper-right corner of the dialog box.

CHAPTER 5

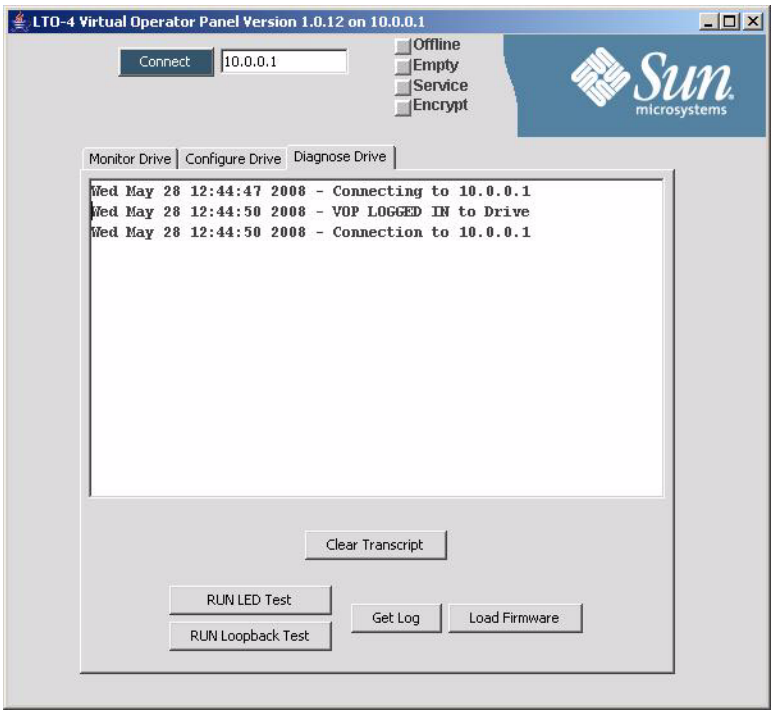
VOP Operation - LTO

This chapter provides guidelines for operation of the LTO Virtual Operator Panel (VOP) with a single tape drive. See Appendix B for additional guidelines when operating VOP within a multiple-drive private network. The VOP does not provide any interconnection with the host data input/output interface.

The VOP application window has three basic operational functions that you access from a tab:

- Drive status monitoring
- Drive configuration settings
- Drive diagnosis

FIGURE 5-1 LTO-4 Virtual Operator Panel Transcript

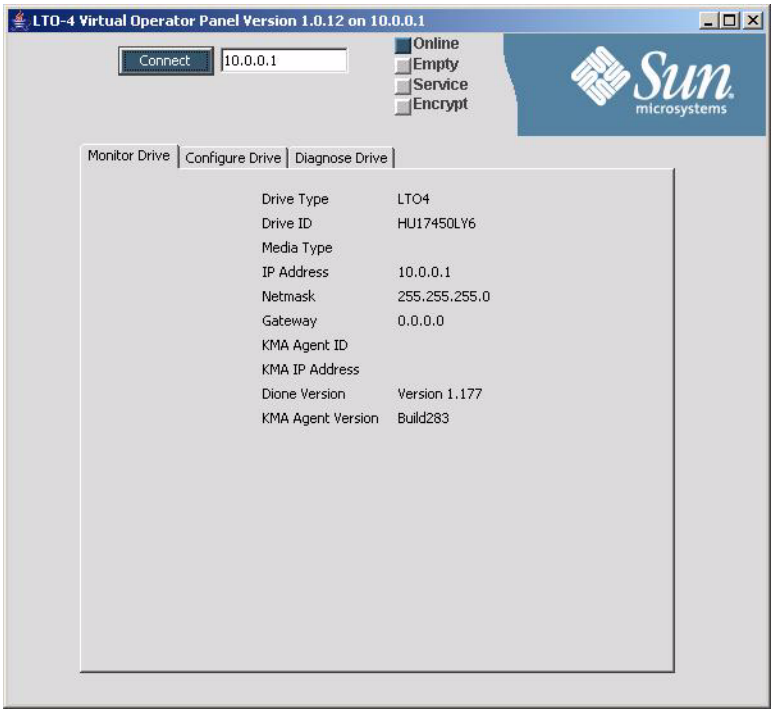


The diagnose drive panel also contains a transcript pane where text messages appear that relate to both VOP and drive actions.

Monitor Drive

The Monitor Drive panel (see the figure below) contains a list of drive, cartridge, and Key Management Station agent attributes and values for those attributes.

FIGURE 5-2 Monitor Drive Panel

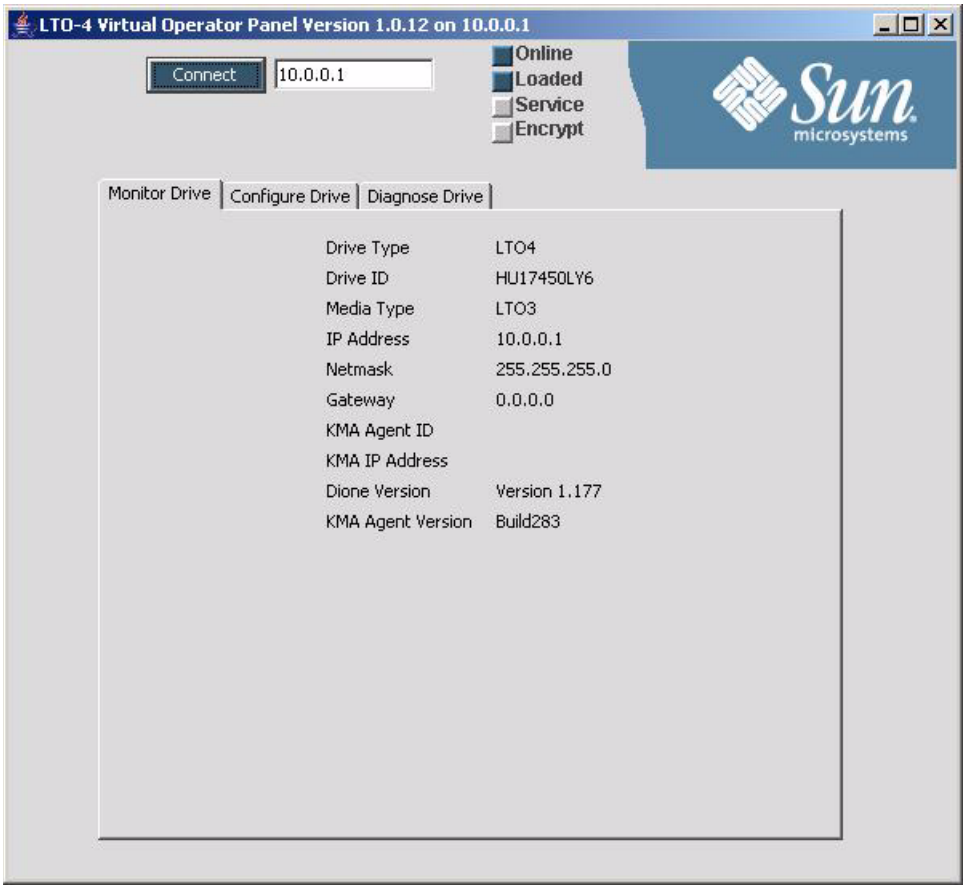


In addition, the status indicators display the present drive state:

- Online state indicator is dark blue - the drive is online
- Empty state indicator is grey - no cartridge is loaded in the drive
- Service state indicator is grey - shows that the Ethernet card (Dione) is communicating with the tape drive
- Encryption state indicator is grey - the drive is not enrolled

When a cartridge is loaded in the drive, the cartridge state indicator color changes to dark blue, the indicator label changes to Loaded, and the Media Type value appears in the Monitor Drive panel (the example below indicates an LTO3-formatted cartridge).

FIGURE 5-3 Cartridge Loaded

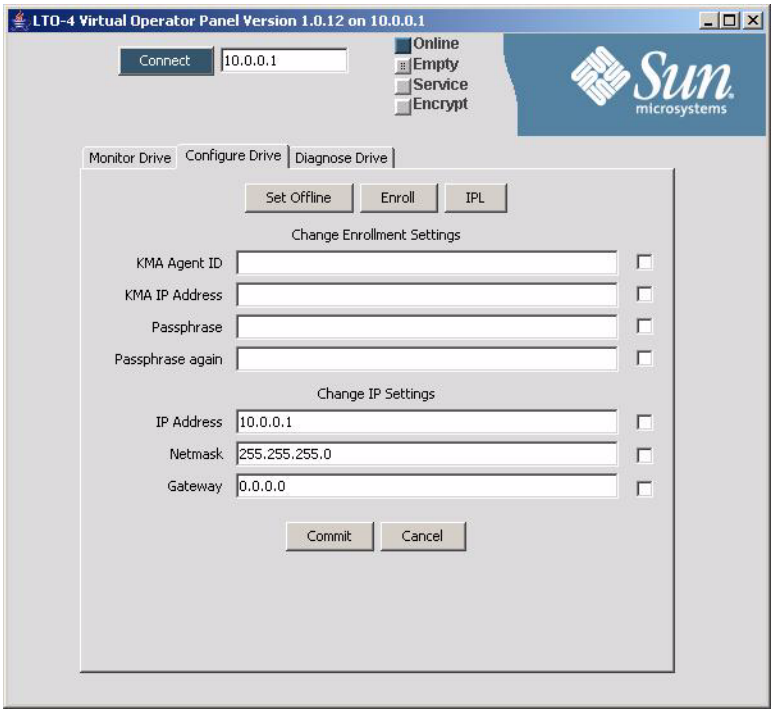


Configure Drive

The Configure Drive panel contains five buttons, a Change Enrollment Settings section, and a Change IP Settings section.

- Set Offline - click this button to set the drive offline. When the drive is offline, the button label changes to Set Online. Use this button to set the drive to the desired state.
- Enroll - will perform the enrollment after you have entered and committed the enrollment parameter settings.
- IPL - performs an initial program load of the Ethernet (Dione) card.
- Commit - saves the desired enrollment or IP change in NV RAM (the Dione does not reboot if you change the enrollment settings only, but it does reboot when you change an IP setting).
- Cancel - clears all pending change selections.

FIGURE 5-4 Configure Panel

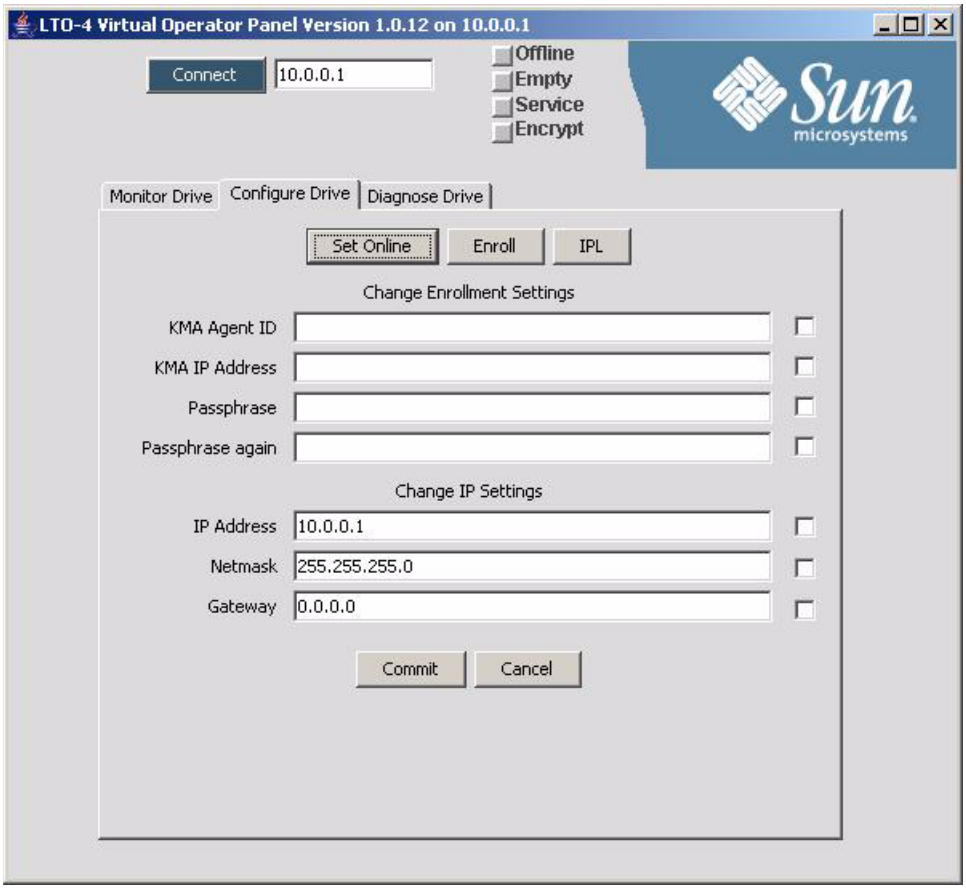


Enter a value into the appropriate text field to change an enrollment or IP setting. The checkbox to the right of the text field will contain a check mark. If you decide against an entered change, uncheck the box and the commit operation will ignore that value.

Note – Only those fields with an active check box will be updated when you click the Commit button.

The figure below shows that the drive is offline (grey status indicator) and the button label in the configure panel has changed to Set Online. Click this button if you want to toggle the drive state to online.

FIGURE 5-5 Set Online Button

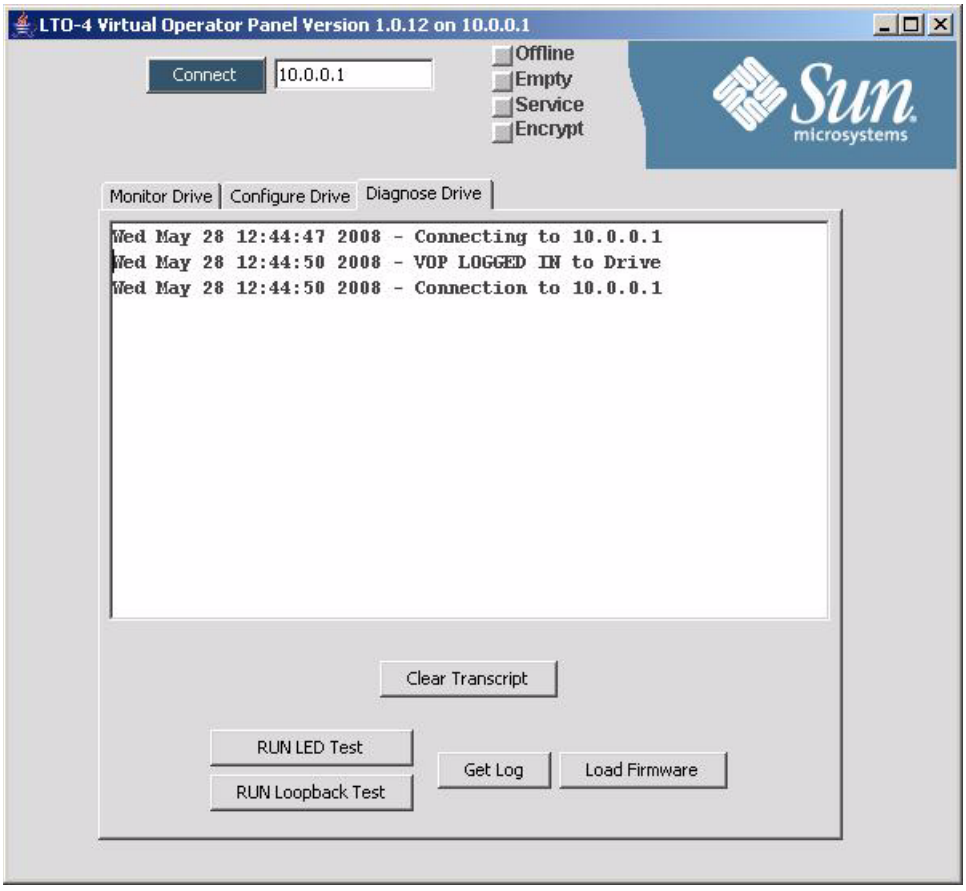


Diagnose Drive

The Diagnose Drive panel contains a text-based transcript area and five buttons.

- Clear Transcript - erases the content from the text pane.
- Run LED Test - sets the Ethernet (Dione) card in the LED test mode. Press the switch on the drive tray (for example, IP Reset on the SL3000 drive tray) and the LED flashes.
- Run Loopback Test - performs an internal loopback test with the LTO-4 drive. Results are posted in the text pane.
- Get Log - saves the Ethernet (Dione) card log file with the name you enter and your specified location.
- Load Firmware - implements the Ethernet card firmware update procedure. You are prompted to identify the directory that contains the *dione.bin* and *dione.hdr* files.

FIGURE 5-6 Diagnose Drive Tab



APPENDIX **A**

Changing the Computer IP Address

This appendix provides guidelines to set a static IP address required to connect to the drive, and to reset a single Ethernet port for obtaining a dynamic IP address.

Note – If your computer has two, or more Ethernet ports, you can dedicate one for static IP addressing, and leave the one used to connect to the LAN set for dynamic IP.

Static IP Address

To connect VOP to a T10000 tape drive that has a static IP address, you must make sure your computer has a functional Ethernet port with compatible static IP address.

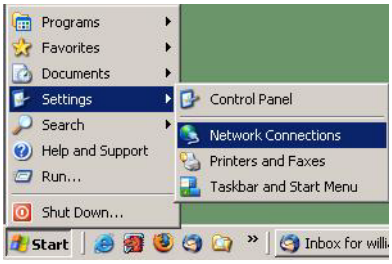
Note – See your system administrator for Linux/UNIX operating systems.

▼ Setting static IP, Windows OS

Use the following procedure to check/set a static IP address for your computer:

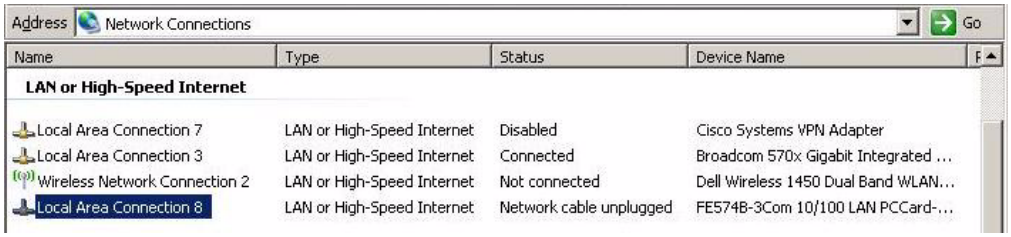
1. **Click Start, then select Settings > Network Connections. (**FIGURE A-1**).**

FIGURE A-1 Network Connections Selection



The Network Connections window (FIGURE A-2) lists all network connections.

FIGURE A-2 Network Connections Window

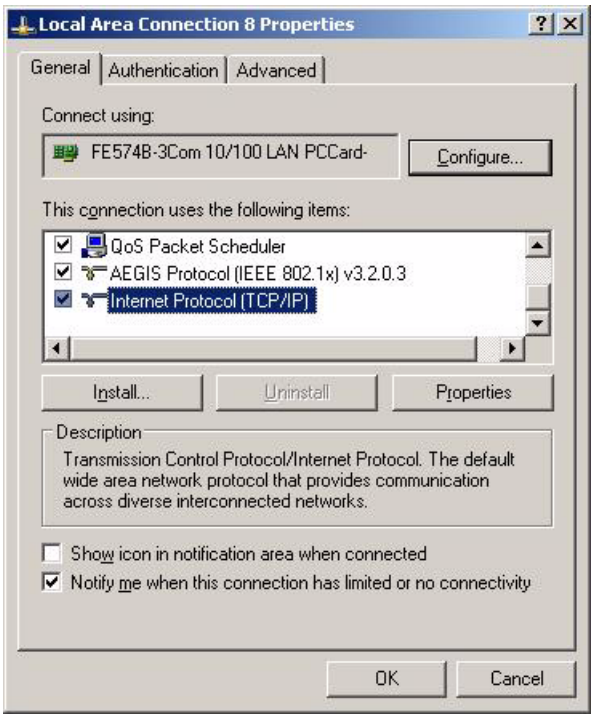


2. **Double-click the appropriate connection.**

   The Local Area Connection Properties dialog box (FIGURE A-3) opens.

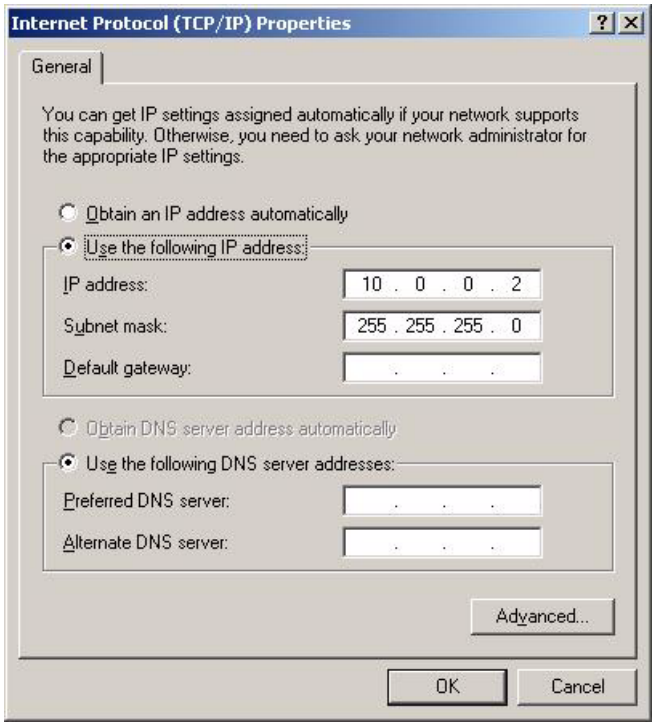
3. **Scroll down to select Internet Protocol (TCP/IP), the click on Properties.**

FIGURE A-3 Local Area Connection Dialogue Box



The TCP/IP properties dialogue box (FIGURE A-4 on page 133) opens.

FIGURE A-4 Internet Protocol (TCP/IP) Properties Dialogue Box



Note – If the port is set for the proper static IP and subnet mask, skip to Step 5. Otherwise, perform step 4 to enter/edit the static IP address and subnet mask.

4. **Make sure the radio button Use the Use the following IP address is selected, then enter a compatible static IP address, Subnet mask, and Default gateway.**

   See your system administrator, as needed for assistance.

Note – Static IP address 10.0.0.2 is typically used for the computer to be compatible with a drive factory preset static IP address 10.0.0.1. However, if the drive's static IP has been customized for your site, you must set the computer's static IP to be compatible with the target drive. The first three digit sets must match, and the last digit set must be different from the target drive. The last digit set should also be different than any other possible target drive on your site.

5. **Click OK.**

   The Local Area Connection Properties dialogue box (FIGURE A-3 on page 132) reappears.

6. **Click OK.**

   You can now connect to any on-site drive that has a compatible static IP address.

Dynamic IP Address

If you set a temporary static IP address for an Ethernet port normally used to connect to the LAN, you will need to reset the port to automatically obtain a dynamic IP address.

▼ Resetting IP to Auto, Windows OS

Use the following procedure to reset a local connection for dynamic IP address:

1. **Click Start, then select Settings > Network Connections (**FIGURE A-1 on page 131**).**

   The Network Connections window opens (FIGURE A-2 on page 132).

2. **Double-click the Local Area Connection associated with the Ethernet port that requires change.**

   The Local Area Connection Properties dialogue box (FIGURE A-3 on page 132) opens.

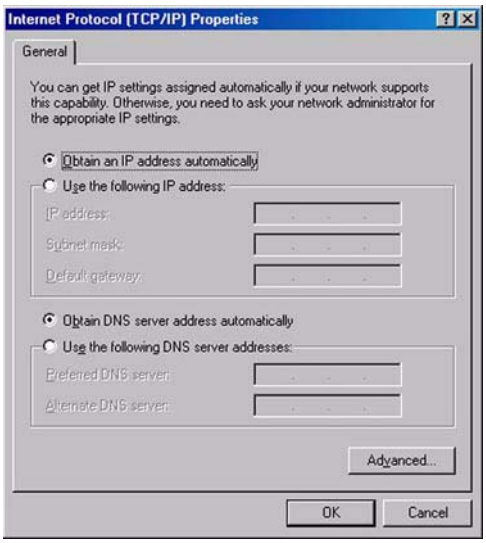
3. **Scroll-down, and select Internet Protocol (TCP/IP), then click on Properties.**

   You will need to scroll down as TCP/IP is the last selection. The TCP/IP properties dialogue box (FIGURE A-5) opens.

4. **Select Obtain an IP address automatically:**

   The three IP address fields go blank, and become unavailable for entries.

FIGURE A-5 Internet Protocol (TCP/IP) Properties (auto IP) Dialogue Box



5. **Click OK to save the reset.**

   The Local Area Connection Dialogue box (FIGURE A-3 on page 132) reappears.

6. **Click OK.**

   The Ethernet port is now set to connect to a LAN.

APPENDIX **B**

VOP to Drives on Private Networks

This appendix provides supplemental information about VOP to drives connected on a private network.

Private Network, SDP-Controlled

When a Service Delivery Platform (SDP) is present, all monitored drives are connected into a private network, controlled by the SDP site server.

The Ethernet port of every monitored drive is 100% dedicated to the service network, and each drive has an SDP-controlled dynamic IP address. Therefore, you do not have access to the drive Ethernet port and cannot connect your customer-version VOP to such drives.

Note – Only Sun StorageTek service representatives are authorized to access drives connected to an SDP-controlled private network. *Never* disconnect an Ethernet cable associated with an SDP-controlled private network.

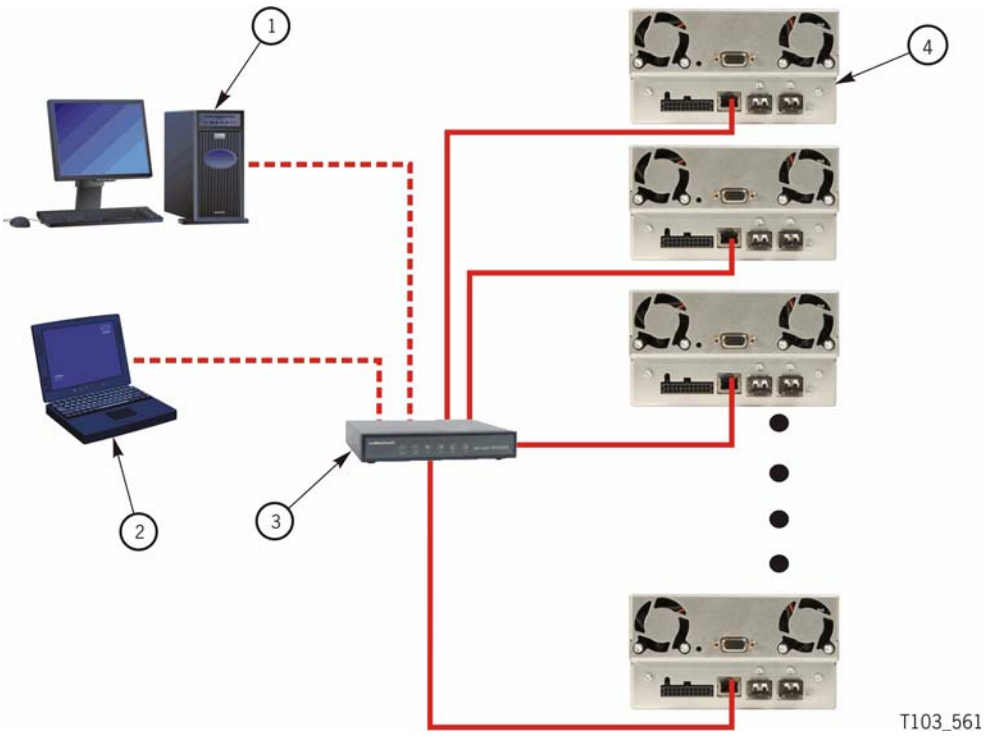
Contact your Sun StorageTek service representative to change drive configuration settings of any drive in the SDP-controlled private network.

However, when an SDP site server is not present, your site personnel can interconnect drives from one or more drive cabinets into a non-SDP private network. See "Private Network, non-SDP" on page 136.

Private Network, non-SDP

When an SDP site server is not present, a non-SDP private network (FIGURE B-1), can be set up, interconnecting the installed drives to one or more cascaded Ethernet switches. Such a network allows you to access any connected drive from a central point.

FIGURE B-1 Private Network, non-SDP



1. Desktop PC
2. Notebook PC
3. Ethernet switch
4. T10000 tape drives

Overview

In a non-SDP, customer-controlled private network, the Ethernet port of each drive is connected to an Ethernet switch. A desktop and/or notebook PC, running the customer-version VOP application, would also be connected to the network.

Note – Each connected drive and each computer requires an individual static IP address.

Components

The following components are required to operate VOP in a non-SDP private network:

- Computer - One or more desktop or notebook computers

Note – The computer must have the customer-version of VOP application installed, and an available Ethernet port configured with a compatible static IP address.

- Ethernet switches - One, or more Ethernet switches might be required to provide one port per drive, one port per computer, plus additional ports to cascade multiple switches, as needed.

Note – See the Ethernet switch vender documentation for setup guidelines.

- Ethernet Cat 5 cables - One cable per drive, one cable per computer, plus additional cables to cascade multiple switches, as needed.

Note – Each Ethernet cable must be long enough to connect to the Ethernet switch port with enough slack to allow strain relief.

- Ethernet cross-over cable - One cross-over cable for direct computer-to-drive connection.

▼ Setup

See your site IT manager, system administrator, and support personnel to install and setup the Ethernet components, and establish the private network static IP address scheme.

Note – Remember, each drive was preset at the factory with the following:
Static IP address: 010.000.000.001
Subnet mask: 255.255.255.000
Default gateway: 000.000.000.000

Use the following procedure to set up each drive for the private network.

1. **Set your computer static IP address to 10.0.0.2 and the subnet mask to 255.255.255.0.**

   See "Static IP Address" on page 131.

2. **Start VOP**

   See Chapter 3, "Starting VOP Programs" on page 61.

3. **Connect the Ethernet cross-over cable to the computer Ethernet port and to the drive Ethernet port.**

4. **Connect VOP to the cabled drive.**

   See "To Use the Connect to Drive Command".

5. **Reset the drive static IP address.**

   See "Static IP Address" on page 131

   Note – Enter the static IP address designated for the cabled drive.

   The VOP does not reconnect to the drive following the IPL because the drive static IP is no longer 10.0.0.1.

   ---

6. **Disconnect the Ethernet cross-over cable at the drive end.**
7. **Connect the Ethernet cross-over cable to the next drive Ethernet port.**

   The VOP should automatically connect to the drive because it is still attempting to reconnect to IP address 10.0.0.1.

8. **Repeat Step 5 through Step 7 for each drive.**

   When all drives are reset, continue with Step 9.

9. **Disconnect the cross-over cable from the computer.**
10. **Reset the computer static IP address to the private network-designated IP address.**

    See "Static IP Address" on page 131.

11. **Connect the computer Ethernet port to an available port on the Ethernet switch.**

    Make sure you use a straight Cat 5 Ethernet cable.

12. **Make sure every drive is connected to an Ethernet switch port.**

    Use a straight Cat 5 Ethernet cable for each drive.

    Note – Any drive can be connected to any available Ethernet switch port. It is not necessary to assign ports to specific drives. However, you should make a listing of the assigned IP address for each drive location.

    ---

13. **Connect VOP to a selected drive.**

    See "To Use the Connect to Drive Command".
    Use the private network-designated drive static IP address.

14. **Repeat Step 13 for a few different drives.**

    Note – You only need to enter the other drive's designated IP address into the Connect to Drive dialog box (FIGURE 4-4 on page 76).

    The non-SDP private network is now ready for VOP access to any connected drive.

Glossary

This glossary defines terms and abbreviations in this publication.

Some of the definitions are taken from other glossaries. The letters in the parentheses that follow some definitions indicate the source of the definition:

(A) *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

(E) The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

(I) The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electrotechnical Commission (ISO/IEC/JTC1/SC1).

(IBM) *The IBM Dictionary of Computing*, copyright 1994 by IBM.

(T) Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

A

address A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. (A).

C

capacity Total amount of User Data stored on one data cartridge in 8 bit bytes. *Synonymous with* "User Capacity" or "Native Capacity". This is the capacity that the user sees after the ECC/Format/ERP etc. overhead has been assessed (no compression).

capacity, raw Total amount of data stored on one data cartridge in 8 bit bytes before any ECC/Format/ERP etc. overhead has been assessed (no compression).

capacity, user Total amount of data stored on one data cartridge in 8 bit bytes that is sent by the host computer. This is the capacity that the user sees after the ECC/Format/ERP etc. overhead has been assessed (no compression).

cartridge A storage device that consists of magnetic tape on supply and takeup reels, in a protective housing. (IBM)

cleaning cartridge A data cartridge that contains special material to clean the tape path in a transport or drive.

compress To save space by eliminating gaps, empty fields, redundancy, or unnecessary data to shorten the length of records or files. (IBM)

configuration The manner in which the hardware and software of an information processing system is organized and interconnected. (T)

connector An electrical or optical part that joins two or more other parts.

D

data cartridge A container holding magnetic tape that can be processed without separating the tape from the container.

data security erase (DSE) A random binary pattern, over-writing existing data, from the point of an Erase command, to the end-of-tape.

data tape A data cartridge formatted for use as a regular data tape for the system in which it is used.

data track(s) The region(s) of recorded tape containing user data formed as discreet longitudinal “tracks” (similar to railroad tracks).

diagnostics Pertaining to the detection and isolation of errors in programs and faults in equipment. (IBM)

drive A device for moving magnetic tape and controlling its movement. (IBM)

dump To copy the contents of all or part of virtual storage to collect error information. (IBM)

E

emulation The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. (IBM)

EOT End of Tape.

error A discrepancy between a computed, observed, or measured value or condition and the true, specified, or theoretically correct value or condition. (I) (A)

ESD Electrostatic Discharge.

F

fault symptom code (FSC) A four-character hexadecimal code generated in response to an error to help isolate failures within the device.

FC *See fibre channel*.

fiber optics The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials such as glass, fused silica, and plastic. (E)

fiber-optic cable A cable made of ultrathin glass or silica fibers which can transmit data using pulses of laser light. Fiber-optic cables have several advantages over copper cables: they have much less signal loss; they allow information to be transmitted at higher speeds and over longer distances; they are not affected by external electrical noise; and they are better for transmissions which require security.

fibre channel The National Committee for Information Technology Standards standard that defines an ultrahigh-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

fibre connection (FICON) An ESA/390 and zSeries computer peripheral interface. The I/O interface uses ESA/390 and zSeries FICON protocols (FC-FS and FC-SB-2) over a Fibre Channel serial interface that configures units attached to a FICON-supported Fibre Channel communications fabric.

FICON *See fibre connection (FICON)*.

FICON channel A channel having a Fibre Channel connection (FICON) channel-to-control-unit I/O interface that uses optical cables as a transmission medium.

file-protect To prevent the erasure or overwriting of data stored on data cartridges.

FIPS Federal Information Processing Standards

FRU Field Replaceable Unit.

FSC Fault Symptom Code.

FTP Generic definition: File Transfer Protocol.

G

GB *See gigabyte (GB)*.

Gb Gigabit, equal to 10^9 bits.

Gbps Gigabits per second.

gigabyte (GB) One billion (10^9) bytes.

H

hardware All or part of the physical components of an information processing system, such as computers or peripheral devices. (T) (A)

hub A Fibre Channel Arbitrated Loop switching device that allows multiple servers and targets, such as storage systems, to connect at a central point. A single hub configuration appears as a single loop.

I

indicator A device that provides a visual or other indication of the existence of a defined state. (T)

interface Hardware, software, or both, that links systems, programs, or devices. (IBM)

internet protocol (IP) A protocol used to route data from its source to its destination in an Internet environment. (IBM)

internet protocol (IP) address A four-byte value that identifies a device and makes it accessible through a network. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be from 0 to 255. For example, 129.80.145.23 could be an IP address.

IP See *internet protocol (IP)*

L

library A robotic system that stores, moves, mounts, and dismounts data cartridges that are used in data read or write operations.

link A physical connection (electrical or optical) between two nodes of a network.

M

menu A list of options displayed to the user by a data processing system, from which the user can select an action to be initiated. (T)

N

network An arrangement of nodes and branches that connects data processing devices to one another through software and hardware links to facilitate information interchange.

O

offline Neither controlled by, nor communicating with, a computer. (IBM)

online Pertaining to the operation of a functional unit when under the direct control of the computer. (T)

P

performance One of two major factors, together with facility, on which the total productivity of a system depends. Performance is largely determined by a combination of throughput, response time, and availability. (IBM)

R

read/write head The data sensing and recording unit of a diskette magazine drive or tape drive. (IBM)

release A distribution of a new product or new function and fixes for an existing product. (IBM)

R/W Read/Write.

S

SDP Service Delivery Platform.

submenu A menu related to and reached from a main menu. (IBM)

sub-system A system that is part of some larger system.

switch In Fibre Channel technology, a device that connects Fibre Channel devices together in a fabric.

system A combination of functionally interrelated interacting mechanical and electrical elements designed to work as a coherent entity.

T

tape drive A device for moving magnetic tape and controlling its movement. (T)

TCP/IP Transmission Control Protocol/Internet Protocol

transmission control protocol/internet protocol (TCP/IP) A set of communication protocols that support peer-to-peer connectivity functions for both local and wide area networks. (IBM)

V

T10000 Tape Drive (VOP) A software application that allows a user to monitor and perform some operations on a large number of tape drives remotely.

VOLSER VOLume SERial Number. It is, usually 6 characters long and is both the paper label stuck on the back edge of the cartridge and in the VOLID label that is recorded, particularly by MVS systems, at the beginning of the media.

volume serial number (VOLSER) An alphanumeric label that the host software uses to identify a volume. It attaches to the spine of a cartridge and is both human- and machine-readable.

VOP See *T10000 Tape Drive (VOP)*.

W

wrap A single pass of tape from either BOT to EOT or EOT to BOT with the head(s) in a fixed transverse location.

write-enabled A setting on a data cartridge that allows data to be written on the tape.

write-protected A setting on data cartridges that prevents data from being written on the tape. Reading data is still possible.

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