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Scope of Document:

This document provides detailed procedures for replacing all firmware in all Qualstar TLS models. Refer to Table 1 for a list of the applicable boards (PCBA's – Printed Circuit Board Assemblies), firmware part numbers and the libraries in which they are used. All firmware is contained in *dual-inline* integrated circuits which are easily changed without the need for special tools.

Additionally, the firmware found on the Executive boards is contained in Flash-EPROMs which may be uploaded through the Medium changer's interface (SCSI or optional Fibre Channel), the Q-Conn RS-232 interface (using XMODEM file transfer) or the optional Q-Link Web Interface. The Q-Link Web Interface firmware can only be uploaded through its LAN or Internet connection.

Models TLS-412xxx, 68xxx and 88xxx are referred to as dual bay libraries because of their dual tape drive bays. These libraries have two executive boards with identical firmware in each board. All other models are single bay libraries, which contain one executive board.

NOTE

Firmware should only be updated after consulting with Qualstar's Technical Support Department. They can be reached at 805-583-7744 or E-mail them at support@qualstar.com

Board Name	Board P/N	Firmware	Used in
Executive I	500657-01-0	700099	TLS-2000, -4000
Executive II	501137-01-2	700105	TLS-6000, -412xxx
Executive III	501387-01-3	700105	TLS-4000, -6000, -8000, -412xxx
Executive IV	501447-01-5	700115	TLS-4000, -6000, -8000, -412xxx
Drive Bay, 2X	501327-01-9	700111	TLS-4000
Drive Bay, 4X	501337-01-8	700108	TLS-4000
Drive Bay, 6X	501357-01-6	700108	TLS-4000, -412xxx
Drive Carrier	501267-01-7	700106	TLS-6000
Drive Carrier	501267-01-7	700116	TLS-8000

Table 1 Library Usage of Boards Containing Updateable Firmware

Tools Required for Integrated Circuit Replacement:

- A number 2 Phillips screwdriver
- A flat blade screwdriver
- Pocketknife or equivalent tool to pry an integrated circuit out of its socket.
- A 1/4-inch open end wrench or nut-driver for replacing 700106 on DLT Drive Carriers.

Determining the Installed Hardware and Required Firmware:

1. All TLS-2000 models utilize the Executive I PCBA (P/N 500657-01-0)
2. For all other models, the Executive PCBAs type can be determined by removing the service panel from the rear of the library and reading the part number printed on the Executive PCBA. There are two such panels on the TLS-412xxx, 68xxx and 88xxx models. Follow steps 3 through 5.
3. Remove power from the TLS: first turn the power switch off and then remove the power cord.
4. Remove the six Phillips screws securing the service panel on the rear of the library – refer to Figure 1 below. Care must be taken to not remove the four screws securing the heatsink panels.

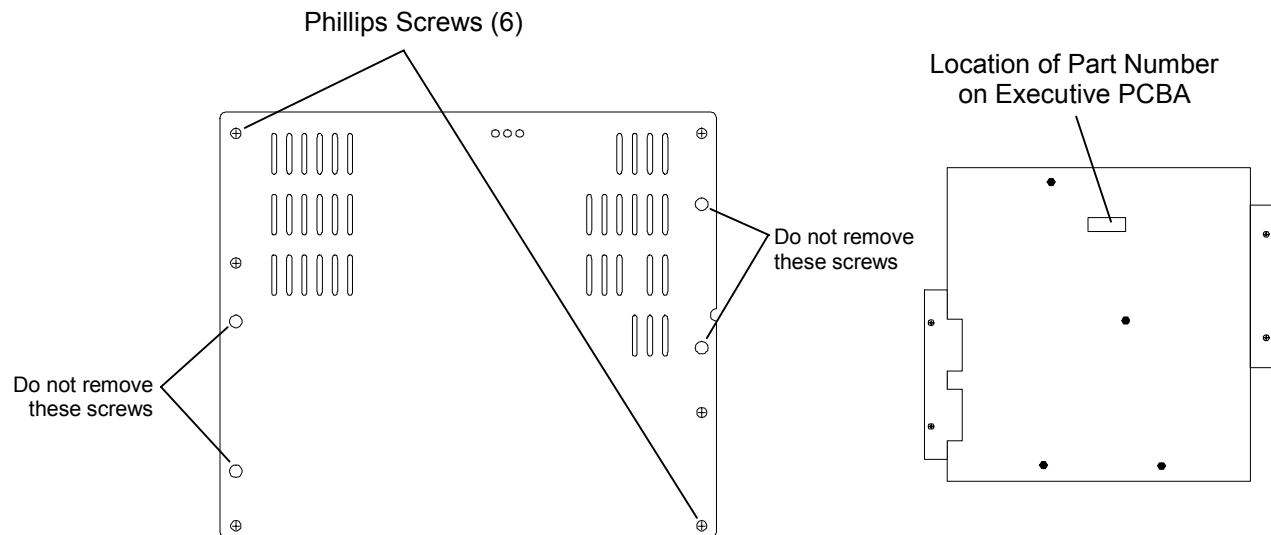


Figure 1 Rear Service Panel and PCBA Part Number Location

5. Refer to Table 2 for a list of the Executive PCBAs board names and their part numbers. The Executive PCBAs type can be determined by reading the part number printed on the circuit board. For example, a board with a PCBA NO. 501387- printed on it is an Executive III board.

Board Name	Board Part Number
Executive I	500657-01-0
Executive II	501137-01-2
Executive III	501387-01-3
Executive IV	501447-01-5

Table 2 Executive PCBA Identification

6. The current Executive firmware part number and revision can be determined by viewing the Display Revision status screen under the Maintenance menu. Follow the steps in Table 3.



Service Technician Action:	Display:
Press the MENU key followed by the ▼ key.	Top Menu •Configuration →•Maintenance
Press the ENTER key followed by the ▼ key.	•••••••Maintenance •Display Log •Display Prevents •Display Reservs. →•Display Revision
Press the ENTER key. In this example, the firmware part number is 700105 and the revision is 2.11.	M•••Display Revision Date: mm/dd/yy Part Number:700105 Revision: 2.11 Checksum: xxxx Id: xxxxxxxx
Press the MENU key to return to the top menu.	

Table 3 Steps to View the Display Revision Status Screen

7. Table 4 lists the Executive PCBA board names, part numbers and corresponding firmware part numbers for each library series.

Model	Board Name	Board P/N	Firmware P/N
TLS-2000	Executive I	500657-01-0	700099
TLS-4000	Executive I	500657-01-0	700099
	Executive III	501387-01-3	700105
	Executive IV	501447-01-5	700115
TLS-412xxx	Executive II	501137-01-2	700105
	Executive III	501387-01-3	700105
	Executive IV	501447-01-5	700115
TLS-6000	Executive II	501137-01-2	700105
	Executive III	501387-01-3	700105
	Executive IV	501447-01-5	700115
TLS-68xxx	Executive III	501387-01-3	700105
	Executive IV	501447-01-5	700115
TLS-8000/88xxx	Executive III	501387-01-3	700105
	Executive IV	501447-01-5	700115

Table 4 Executive PCBA Firmware usage by Model

8. In all TLS-4000 models with Executive III or IV boards and in all TLS-412xxx models, a Drive Bay board is utilized to interface the tape drives to the Executive board. There are three sizes of Drive Bay boards (2-drive, 4-drive and 6-drive) and each contains a programmed micro-controller integrated circuit (IC) that is also replaceable. The firmware part number is 700108 for the 4 and 6-drive boards and 700111 for the 2-drive board.
9. All DLT and LTO tape drives are enclosed in a metal carrier that contains a programmed micro-controller IC that is also replaceable. DLT tape drives are found in TLS-6000/68xxx models and LTO tape drives are in TLS-8000/88xxx models. The firmware part number is 700106 for DLT tape drives and 700116 for LTO tape drives.



Executive Firmware Updating via the SCSI or Fibre Channel Interface

A working SCSI or fibre channel interface to the TLS' Medium changer is required. To update via the SCSI interface a PC compatible computer running DOS, Windows 95, 98, XP, NT, or 2000 is required. To update via the fibre channel interface a PC compatible computer running Windows XP, NT or 2000 is required.

NOTE

Using a DOS system requires the use of Adaptec's ASPI interface for SCSI.

1. The TLS must be powered on and connected to the host computer prior to booting the host computer. [Note that when updating the firmware in a dual bay library (with two executive PCBAs), only one of the PCBAs needs to be connected. While one PCBA is being updated, the firmware will be transferred to the other PCBA].
2. The Windows console program `upload.exe` is used to upload firmware to the library. These files are contained in a self-extracting zip file `upload.zip`. Contact [Technical Support](#) for access to the update tools and firmware files.
3. Unzip the file to extract the following files:
 - `Upload.exe` - Qualstar's TLS Library firmware upload program.
 - `Scanscsi.exe` - Utility to search the bus for SCSI devices.
4. Execute the program `scanscsi.exe` from a Windows command prompt or "DOS box". This program will perform a SCSI Inquiry operation on Ids (0-15), Luns (0-15) and Hosts (0-15). If a device is found, it will display the general information obtained from the inquiry response.

Example of `scanscsi` execution and response.

```
>scanscsi *,*,*
```

Id,Lun,Host	Device Type	Vendor	Product	Revision
0, 0, 1	Medium-changer	QUALSTAR	TLS-68120	2091
1, 0, 1	Sequential-access	QUANTUM	DLT8000	2255
2, 0, 1	Sequential-access	QUANTUM	DLT8000	2255

In this example, the SCSI bus scan found three devices. The first device is a Qualstar TLS-68120, followed by two Quantum Tape Drives.

NOTE

Upload.exe will not work if the Id is greater than 15, or the Lun is greater than 15 when updating the firmware in a fibre channel environment.

5. The `upload` console program is executed from a Windows command prompt or "DOS box". The program's command syntax is as follows:

`Upload Id,[Lun[,Host]] f:<filename>`

Command Parameters:

Id,Lun,Host - TLS Library SCSI address. This address can be found using the `scanscsi` utility program. The default Id, Lun and Host is 0.



Filename - Filename of the new firmware update. This file is provided by Qualstar Technical Support.

Upload program example:

- Update the TLS Library with firmware file 700105c.209. The `scanscsi` program was used to locate the TLS Library is on SCSI Address : Id 0, Lun 0, and Host 1. Note that the firmware filename may contain a sub revision letter as shown in this example.

Upload 0,0,1 f:700105c.209

The program will display the upload transfers:

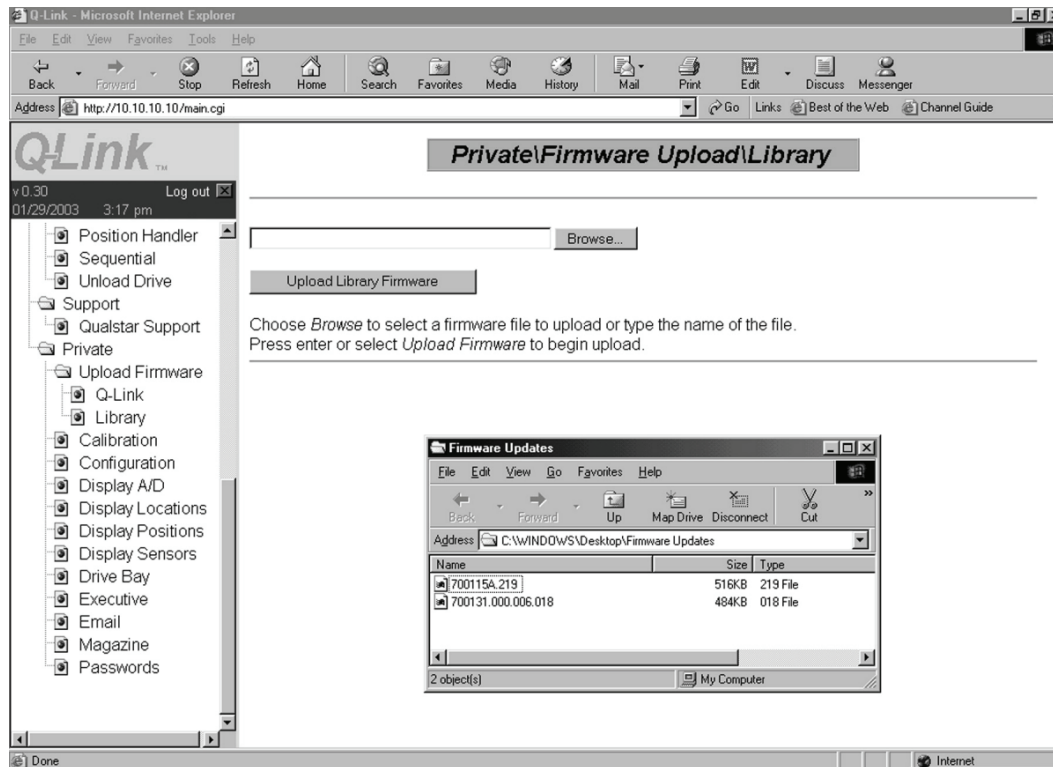
```
700105 Executive Firmware, Revision 2.09c  
### Packets
```

- Do not turn off TLS power while the update is in progress. The last packet is number 512.
- The TLS will begin the firmware update process. Wait for the following message to appear on the library's display:
**FIRMWARE UPGRADE
System Firmware
is being changed;
DO NOT POWER-OFF**
- It is very important not to power off the TLS Library while reprogramming is in progress. Doing so can cause the TLS Library to lose all of its program contents.*
- Following the upgrade, the TLS will perform an internal initialization function followed by a scanning of the TLS inventory.
- The FIRMWARE UPGRADE message will be cleared when the process has completed.
- Go to the Maintenance\Display Revision menu. The displayed Part Number and Revision must correlate with the firmware filename just uploaded in step 3 (see Table 3).

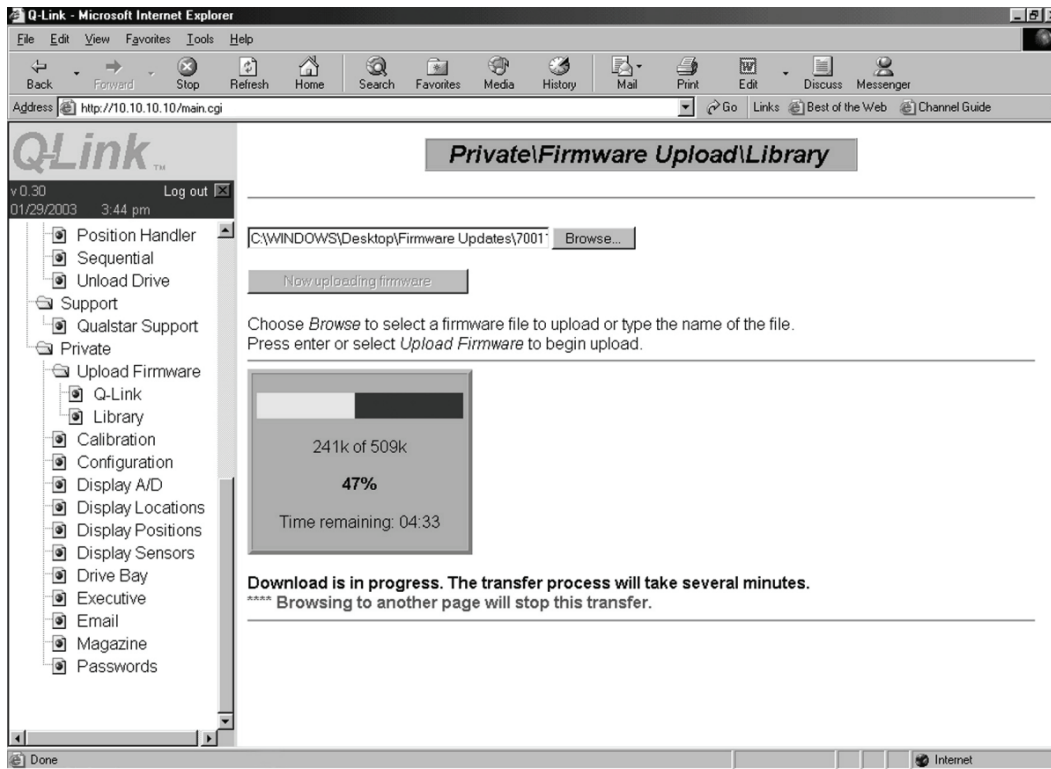
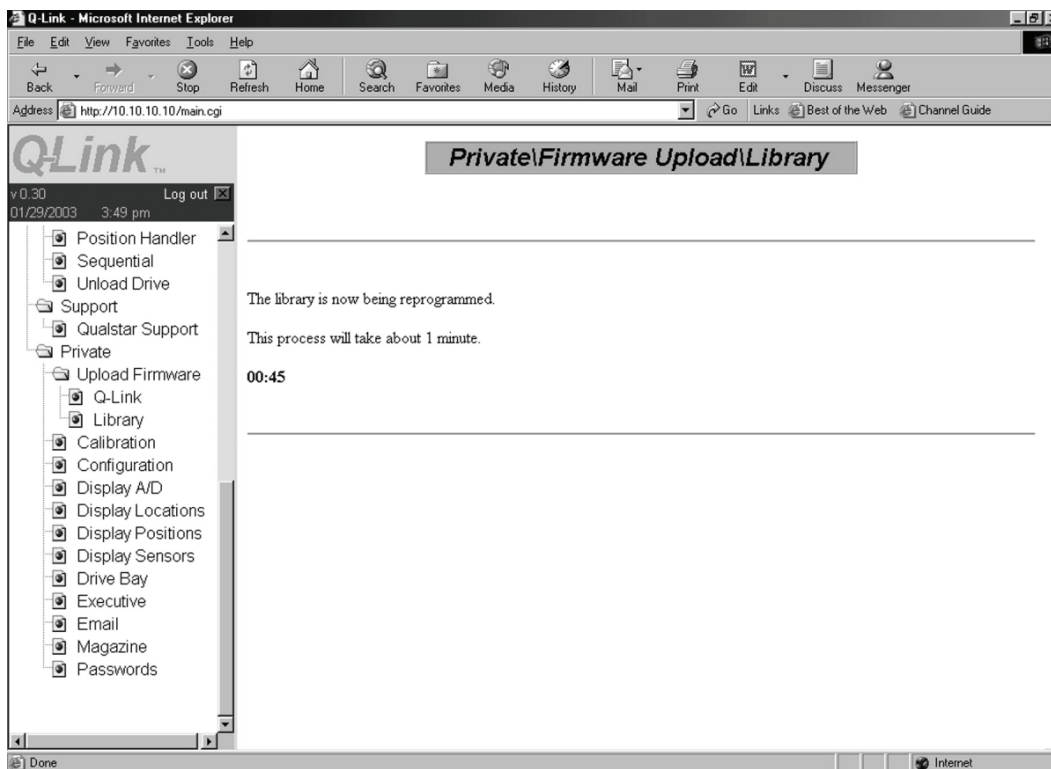
Executive Firmware Updating via Q-Link

Q-Link allows for the uploading of library firmware using your web browser. Please see the Click on the Library menu item under the Upload Firmware folder in the menu tree to access the Private\Firmware Upload\Library screen and follow the instructions below.

- Access the firmware file by either clicking on the Browse button or typing the file path to the firmware file.

**Figure 2 Sample of the Library Firmware Upload Screen**

2. Press the enter key or click on the Upload Firmware button to begin the uploading process.
3. Note that after the upload begins browsing to another page will stop the firmware uploading process.
4. Two different screens will appear as the uploading process proceeds. See Figure 3 and Figure 4.

**Figure 3 Sample of the Library Firmware Upload Progress Screen****Figure 4 Sample of the Library Firmware Reprogramming Progress Screen**

5. When the Q-Link uploading/programming is complete a screen will appear that shows the old and new firmware information. See Figure 5.

Library uploading/programming has finished.

Old firmware information:

Date: 1/15/2003

Part number: 700105

Revision: 2.11

New firmware information:

Date: 1/30/2003

Part number: 700105

Revision: 2.12

Figure 5 Sample of the Library Uploading/Programming Has Finished Screen

Executive Firmware Updating via Q-Conn

The user's host computer and the TLS are connected together using a NULL modem serial cable. This cable must have female DB-9 connectors at each end and wiring such that pins 2 and 3 are crossed over and pins 5 are connected to each other at both ends. See Table 5.

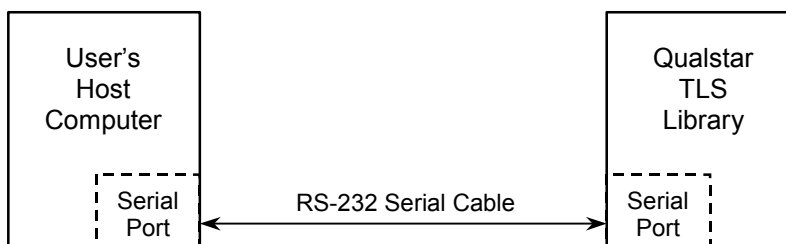


Figure 6 Host Computer Connected to TLS

User Host or PC RS232 Serial Female DB-9 Connector		TLS Library RS232 Serial Female DB-9 Connector	
Signal Name	Pin	Pin	Signal Name
Receive Data	2	3	Transmit Data
Transmit Data	3	2	Receive Data
Ground	5	5	Ground

Table 5 RS-232 Cable Wiring Requirements

Communication Parameter	Setting
Baud Rate	9600
Parity	None
Data Bits	8
Stop Bits	1

Table 6 RS-232 Serial Communication Parameters

Windows 9x and NT users can use the Communications accessory program, HyperTerminal.

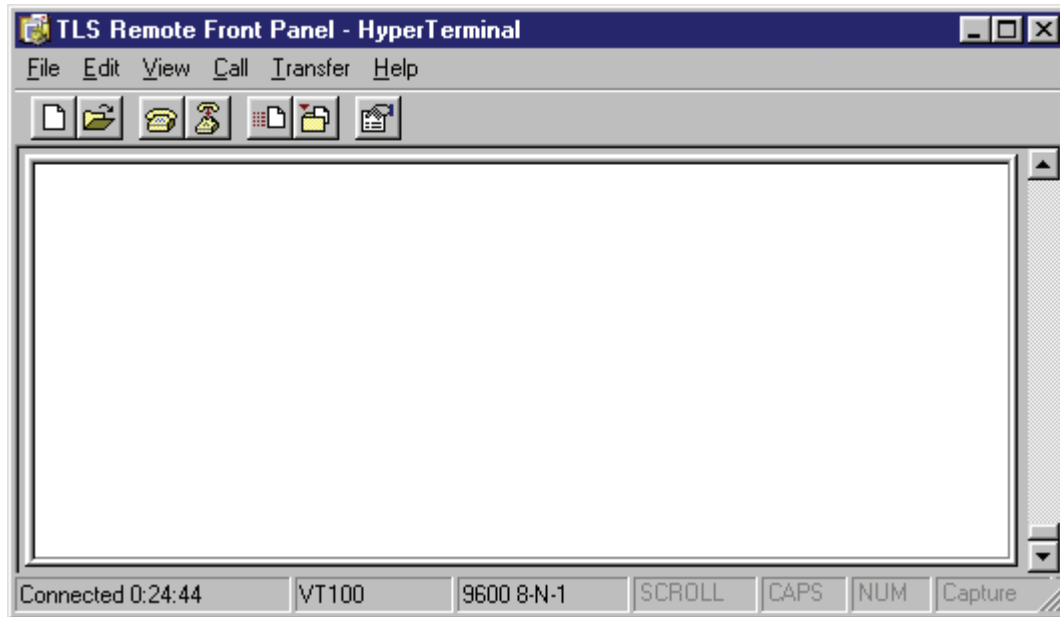


Figure 7 TLS Remote Front Panel Program Displayed in HyperTerminal

Use the **File\Properties** menu selection to configure the application for direct communications. Select the appropriate communications port. See Figure 8.



Figure 8 Properties Screen

Select the **Configure** button to set the communications parameters for a baud-rate of 9600, with 8 data bits, no parity, one stop bit and no flow control. See Figure 9.

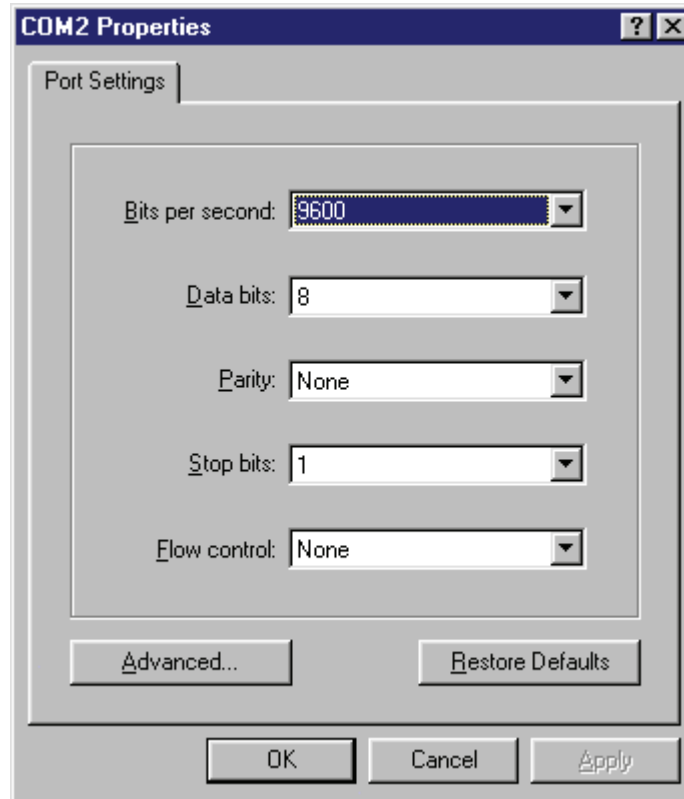


Figure 9 Configure Screen Under the Properties Menu

VT100 Terminal Emulation

Use the **File\Properties Settings** dialog tab to configure the application for VT100 terminal emulation.

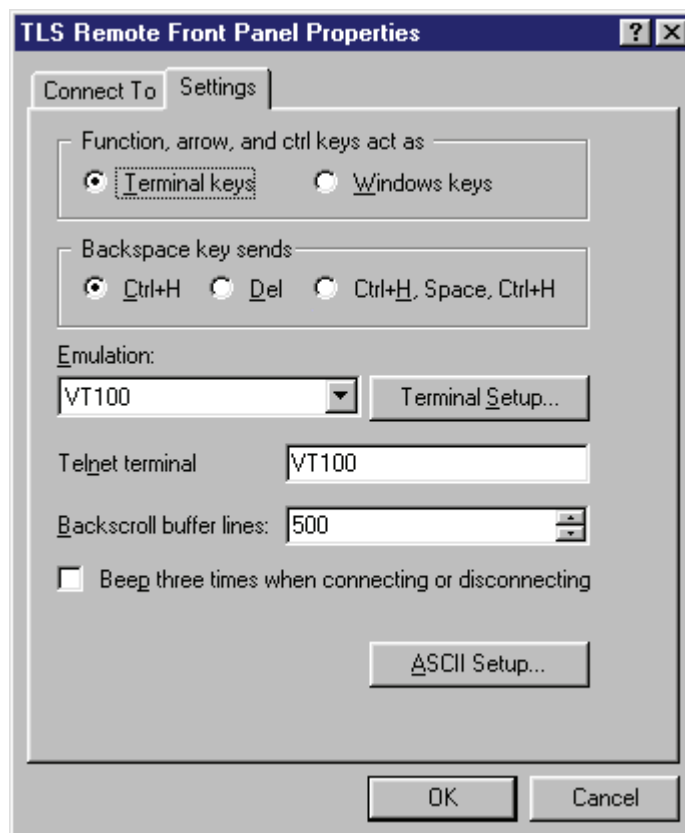


Figure 10 Settings Screen Under the Properties Menu

You may also consider ASCII Setup parameters to satisfy your display requirements.

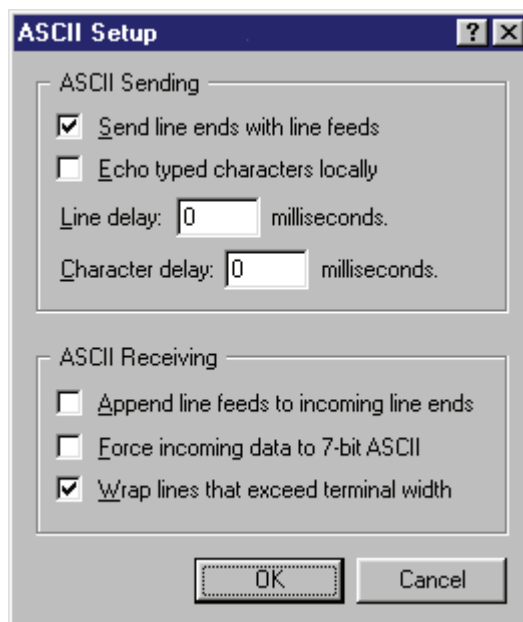


Figure 11 ASCII Setup Screen under Settings Screen

Remote Library command Mode

To access the Remote Library Command Mode, press the ESC key and type “cmd” followed by the <Enter> key. This will display the Command Help screen depicted in Figure 12 followed by a DOS-like command prompt “>”. Commands may now be entered in lower case text. All commands must end with the <Enter> key. Most terminal emulators support the backspace key for correcting typing errors. Quotation marks are shown for clarity and are not to be typed in the actual command line.

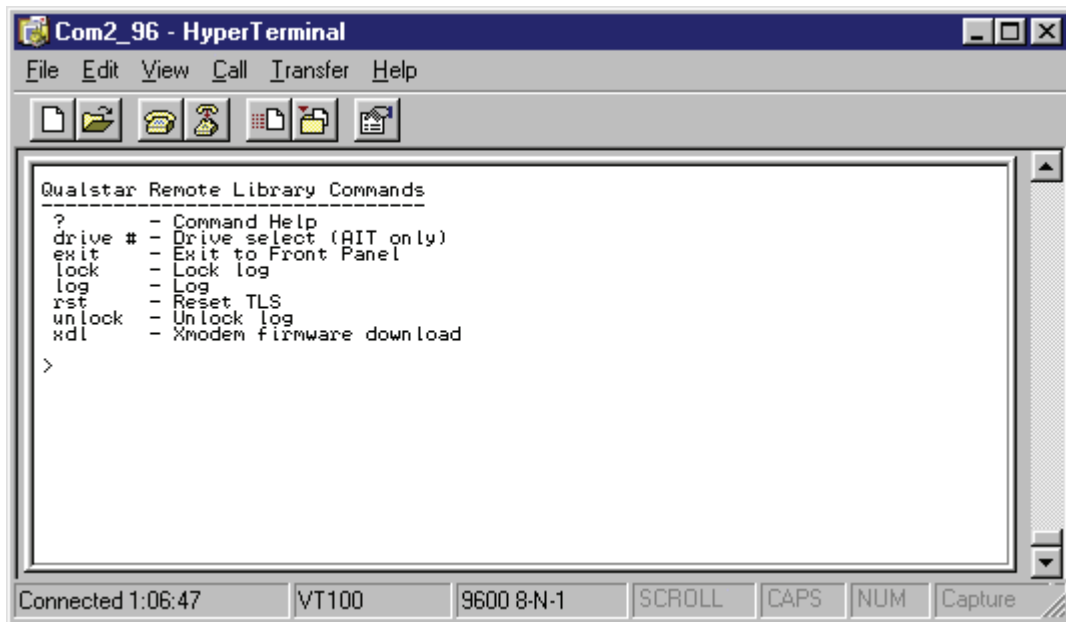


Figure 12 Remote Library Commands

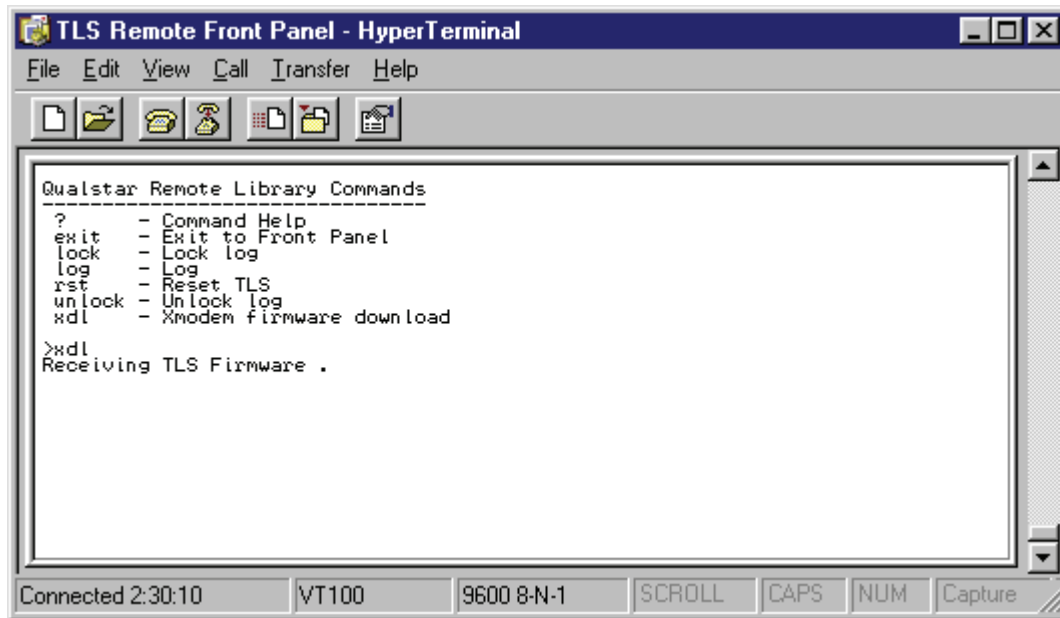
Xmodem Firmware Download <xdl>

The “xdl” command instructs the library to receive new TLS firmware via an object file on the remote terminal computer using the XMODEM communications protocol. If the transmission is terminated at the terminal emulator, the TLS will ignore the partial download. Do not turn off TLS power while the update is in progress. If the entire firmware object file is successfully downloaded, the TLS will reprogram itself and then restart automatically.

Once the library restarts, the user will see the Qualstar Remote Library Control Panel.

Example of a download session

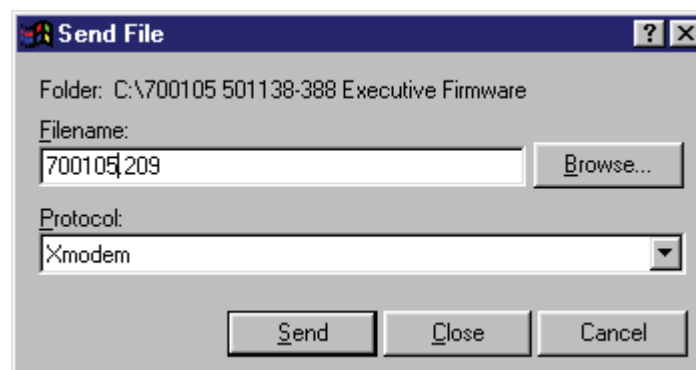
Enter the command “xdl”. The application will respond “Receiving TLS Firmware”, to indicate it is waiting for the user’s xmodem data.

**Figure 13 Example of Xmodem Firmware Download**

Use the HyperTerminal menu function Transfer->Send File, to download the TLS firmware file to the library. TLS firmware object files are typically named 700105.211 where 700105 represents the code-set name and 211 is the Version (Version 2.11 in this example). A revision letter may follow the code-set name.

NOTE

It is very important not to power off the TLS Library while reprogramming is in progress. Powering off the TLS Library is not necessary and can cause the TLS Library to lose its program contents.

**Figure 14 Send File Screen Under Transfer**

Procedure for Replacing the Firmware on Executive I Boards:

This procedure will lead you through the process of changing the TLS operating firmware on an Executive I board. It involves removing the rear service panel and replacing a 32-pin, DIP Flash–EPROM memory integrated circuit (IC). Contact Qualstar Technical Support (see the title block) to obtain the necessary integrated circuit.

1. Remove power from the TLS: first turn the power switch off and then remove the power cord.
2. Remove the six Phillips screws securing the service panel on the rear of the library – refer to Figure 15 below. Care must be taken to not remove the four screws securing the heatsink panels.

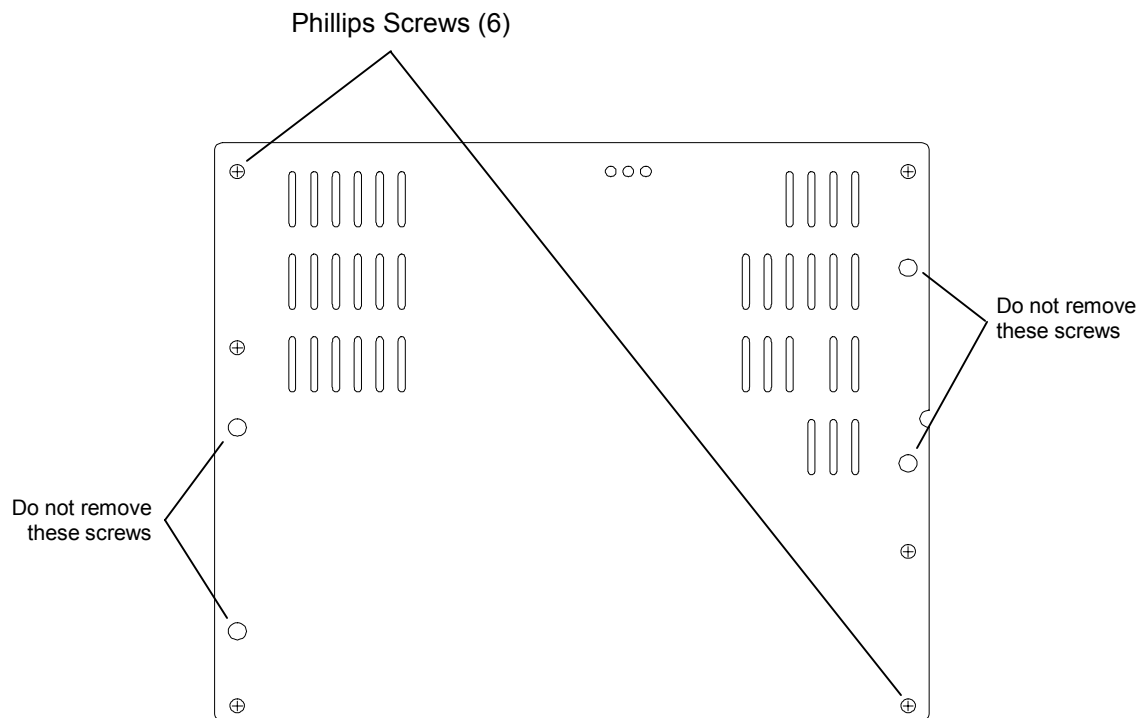
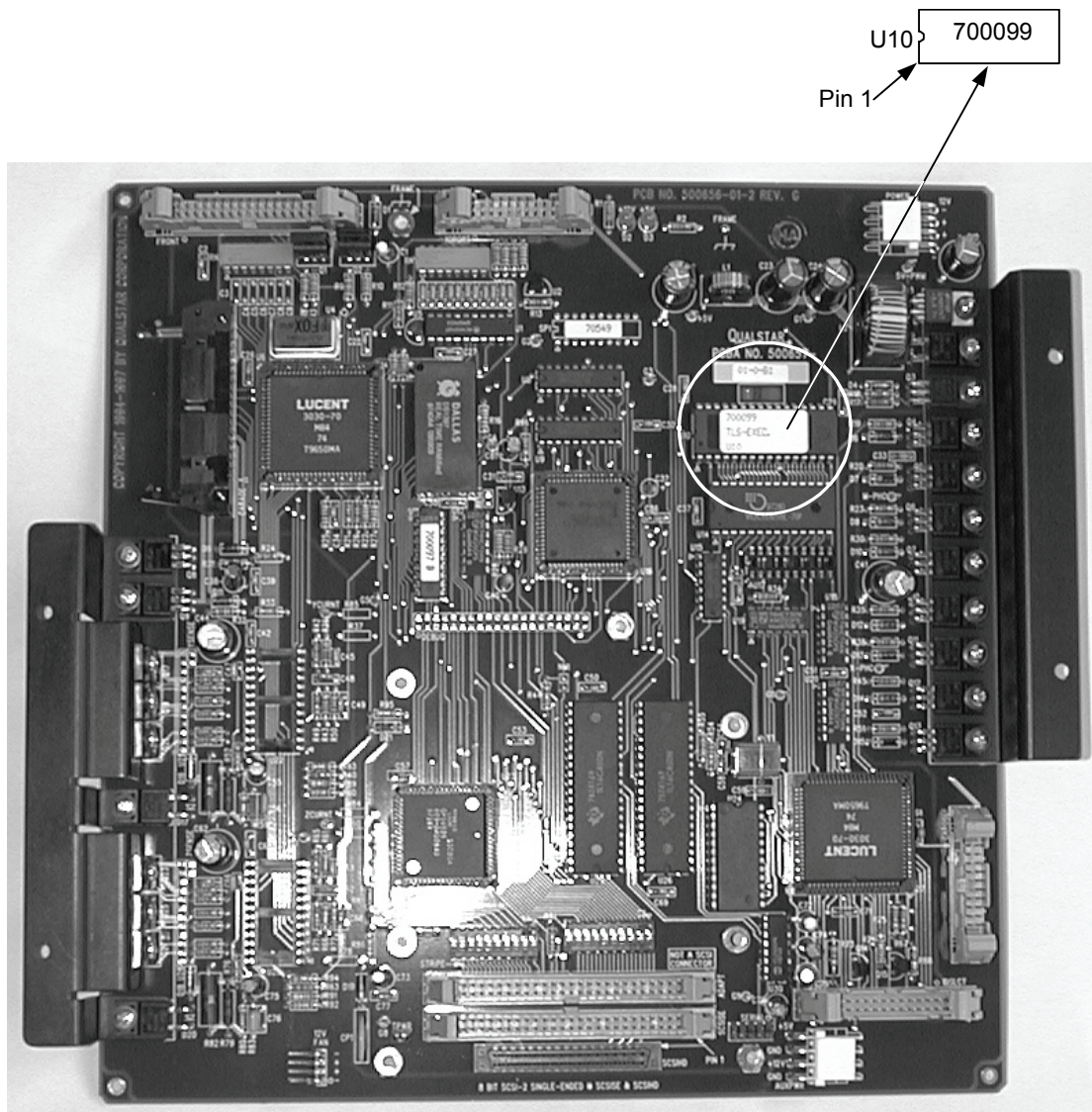


Figure 15 Rear Service Panel

3. Remove the Flash-Memory IC at U10 (Part Number is 700099) from the Executive I PCBA using a thin flat blade screwdriver, pocketknife or equivalent tool. Pry the IC from either end slightly and repeat for the other end. Continue this procedure until the part is loosened enough to be removed by hand. Refer to Figure 16 below.
4. Install the new 700099 Flash-Memory IC at U10. Note the orientation of pin 1. Make certain that all pins are fully inserted into the socket.
5. Replace the rear service panel and secure it with the six Phillips screws.
6. Connect the power cord and switch the power on.
7. Go to the Maintenance\Display Revision menu (see Table 3) and verify the firmware P/N and Revision are correct.

**Figure 16 500657-01-0 Executive I PCBA**

Procedure for Replacing the Firmware on Executive II, III or IV Boards:

This procedure will lead you through the process of changing the TLS operating firmware on an Executive II, III or IV board. It involves removing the rear service panel and replacing a 32-pin, DIP Flash–EPROM memory integrated circuit (IC). Contact Qualstar Technical Support (see the title block) to obtain the necessary integrated circuit(s).

1. Remove power from the TLS: first turn the power switch off and then remove the power cord.
2. Remove the six Phillips screws securing the service panel on the rear of the library – refer to Figure 15 or Figure 18 on TLS-412xxx and 68/88xxx models. Care must be taken to not remove the four screws securing the heatsink panels.
3. Remove the Flash-Memory IC at U4 (Part Number is 700105 or 700115) from the Executive PCBA using a thin flat blade screwdriver, pocketknife or equivalent tool. Note the IC location (U-number) is identical on Executive II, III and IV boards. Pry the IC from either end slightly and repeat for the other end. Continue this procedure until the part is loosened enough to be removed by hand. Refer to Figure 17.

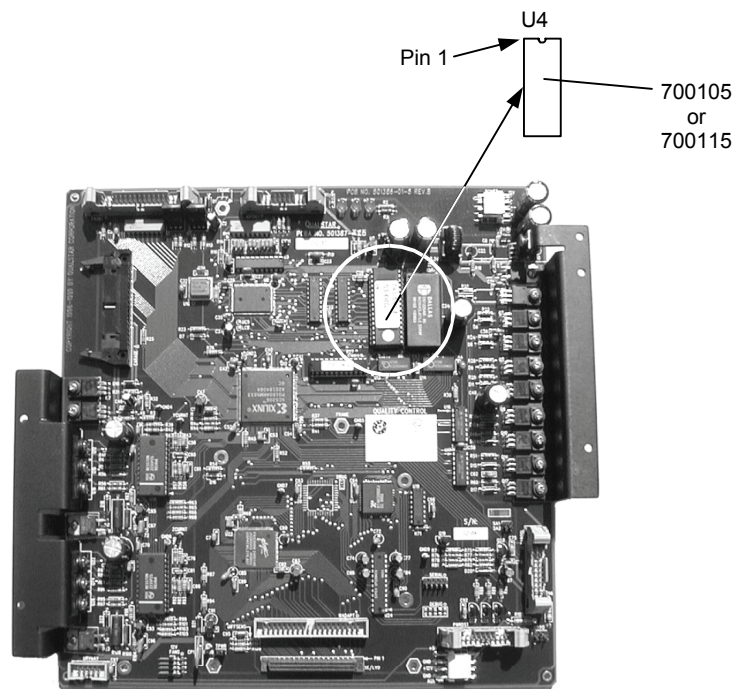
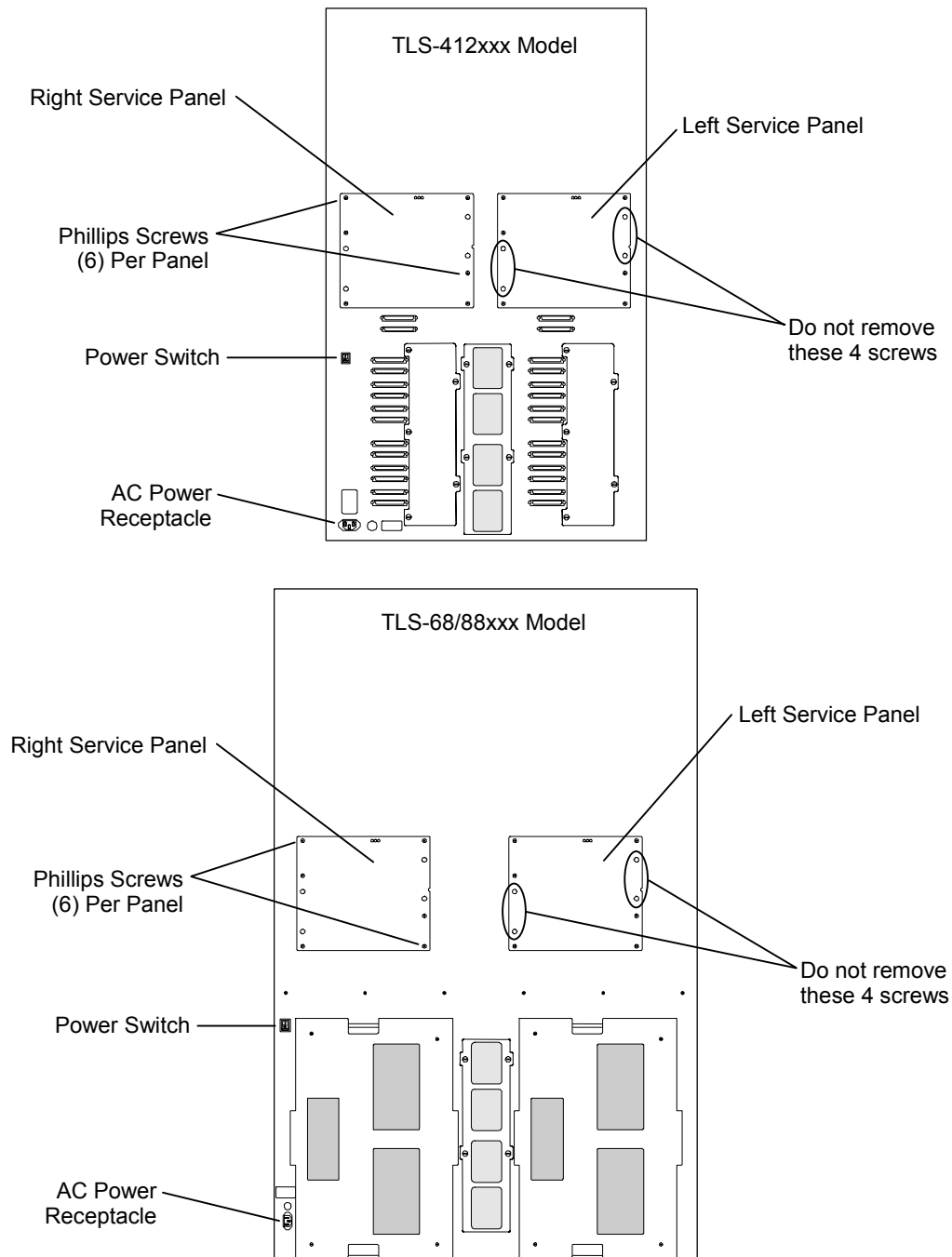


Figure 17 Executive II, III or IV PCBA

4. Install the new 700105 or 700115 Flash-Memory IC at U4. Note the orientation of pin 1. Make certain that all pins are fully inserted into the socket.

5. Replace the rear service panel and secure it with the six Phillips screws.
6. On TLS-412xxx and 68/88xxx models, repeat steps 2 through 5 for the other Executive board.
7. Connect the power cord and switch the power on.
8. Go to the Maintenance\Display Revision menu (see Table 3) and verify the firmware P/N and Revision are correct.

**Figure 18 TLS-412xxx and 68/88xxx Executive Board Access**

Procedure for Replacing the Firmware on Drive Bay Boards:

This procedure will lead you through the process of changing the operating firmware on a TLS-4000 or TLS-412xxx Drive Bay Board. It involves opening a drive access hatch or removing a drive access panel and replacing a 28 pin DIP Micro-controller integrated circuit (IC) on the Drive Bay board. Note there are two (left and right) Drive Bay boards in TLS-412xxx models. Contact Qualstar Technical Support (see the title block) to obtain the necessary integrated circuit(s).

1. Remove power from the TLS: first turn the power switch off and then remove the power cord.
2. On TLS-42xx series libraries, open the Drive Access Hatch at the rear of the TLS by turning its two 1/4-turn fasteners one quarter-turn counter-clockwise (see Figure 19). On all other models, remove the Drive Access Panel at the rear of the TLS by turning the three to five 1/4-turn fasteners one quarter-turn counter-clockwise (see Figure 20 or Figure 22).
3. Locate the Drive Bay PCBA (Figure 21 or Figure 23). Remove the Flash-Memory IC from the Drive Bay board (see Figure 24) using a thin flat blade screwdriver, pocketknife or equivalent tool. Pry the IC from either end slightly and repeat for the other end. Continue this procedure until the part is loosened enough to be removed by hand.
4. Install the new Flash-Memory IC on the Drive Bay PCBA. Note the orientation of pin 1. Make certain that all pins are fully inserted into the socket.
5. After replacing the Flash-Memory IC on a 42xx series library, close the Drive Access Hatch, and then fasten it by turning the two 1/4-turn fasteners clockwise. On other models, align the Drive Access Panel, and then fasten it by turning the 1/4-turn fasteners clockwise.
6. On TLS-412xxx models, repeat steps 2-5 for the other side.

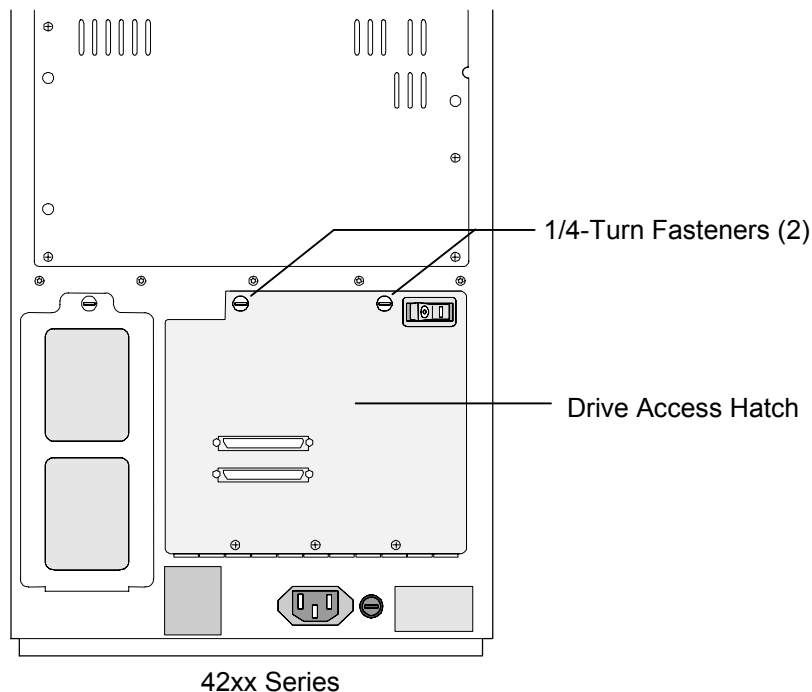


Figure 19 TLS Rear View (42xx shown)

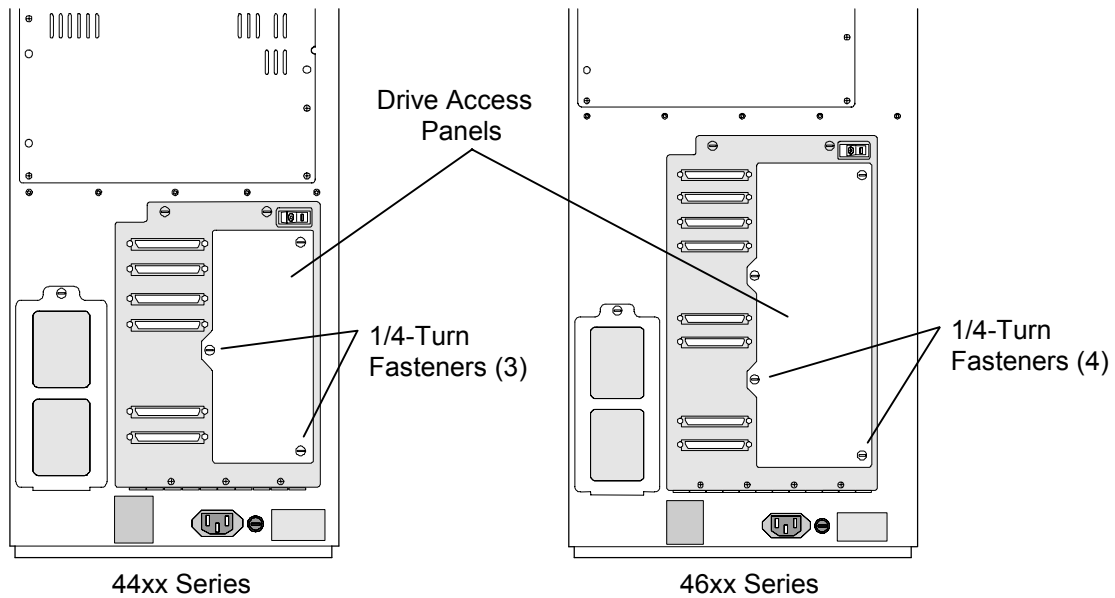


Figure 20 TLS Rear View (44xx and 46xx shown)

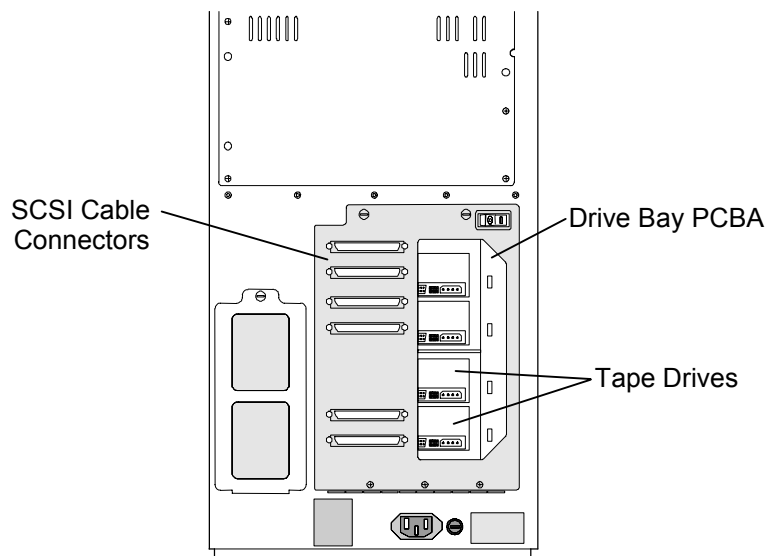
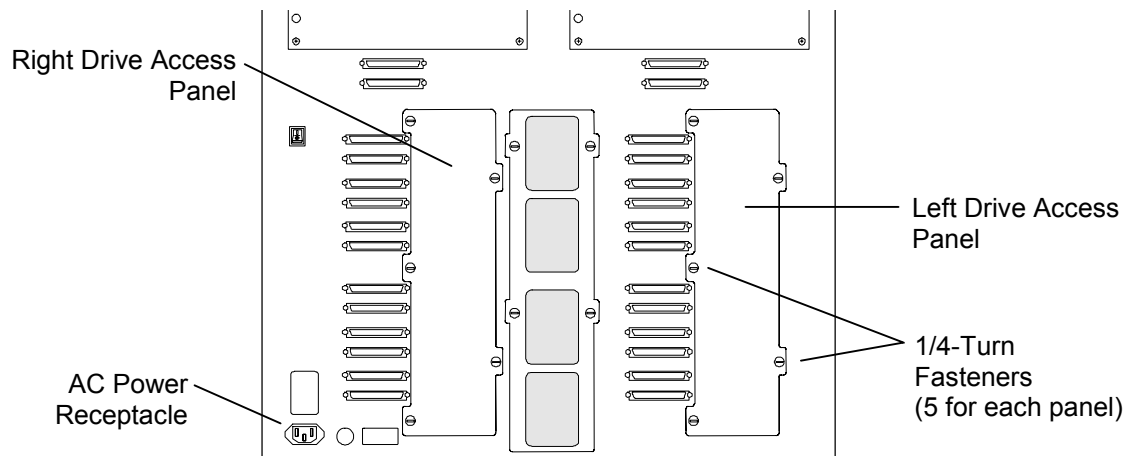
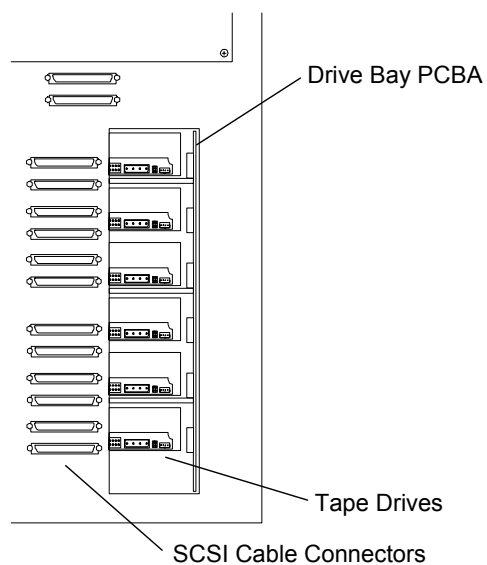


Figure 21 Drive Bay PCBA (TLS Rear View)

**Figure 22 Access Panels on TLS-412xxx****Figure 23 Drive Bay Board on TLS-412xxx (Rear View)**

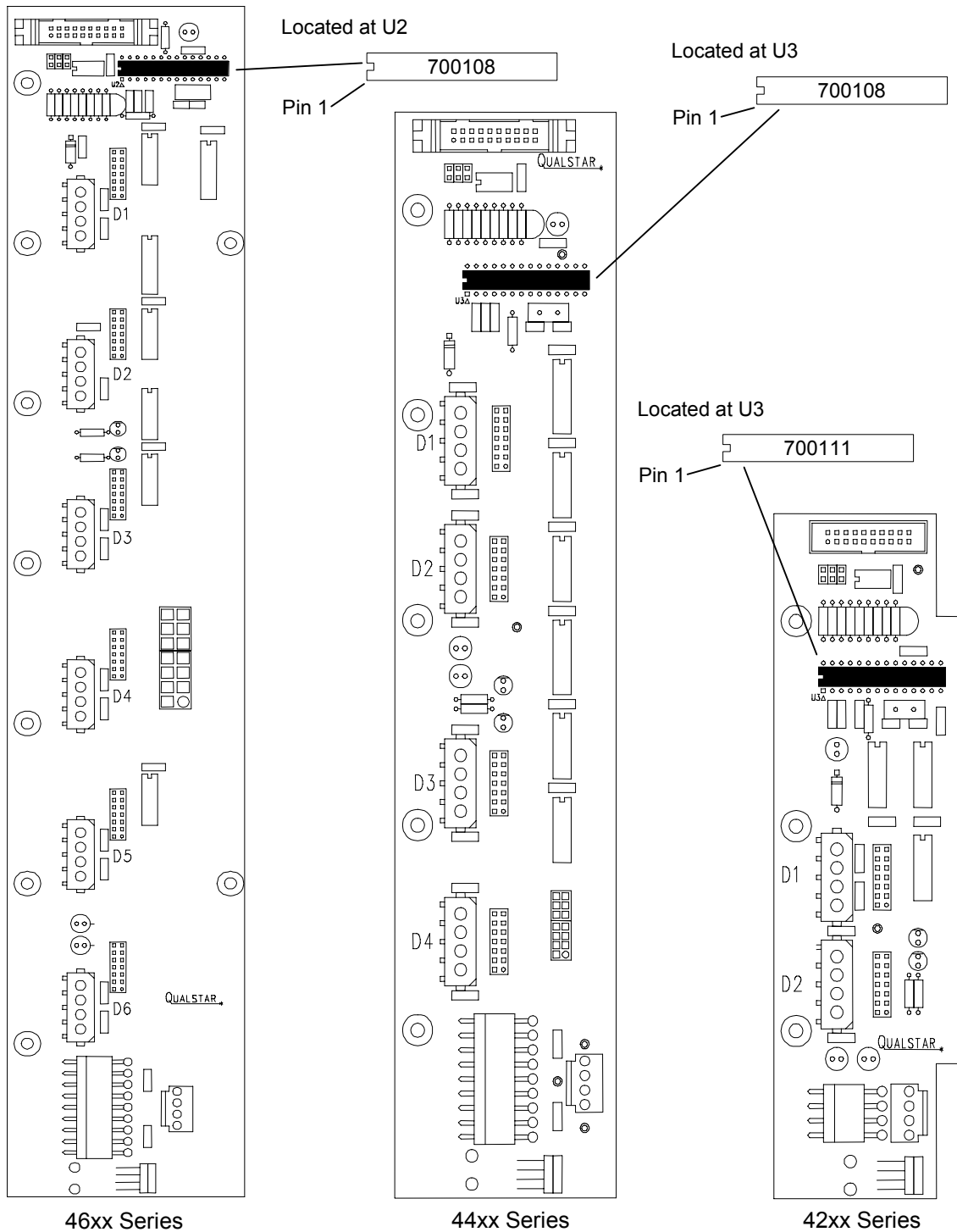


Figure 24 Drive Bay Boards: 6X, 4X, 2X

Procedure for Replacing the Firmware in the DLT and LTO Tape Drive Assemblies:

*This procedure will lead you through the process of changing the operating firmware within a DLT or LTO Tape Drive Assembly. It involves removing the drive assembly from the TLS and replacing a 28-pin DIP Micro-controller integrated circuit (IC) on the Drive Carrier board. Contact Qualstar Technical Support (see the title block) to obtain the necessary integrated circuit(s).

1. Remove power from the TLS: first turn the power switch off and then remove the power cord.
2. Detach both SCSI cables (or SCSI cable and terminator) attached to the rear of the assembly (see Figure 25).
3. Turn the Adjustable Grip Latch on the tape drive assembly all the way counterclockwise.
4. Grasp the tape drive assemblies Carrier Handles and gently slide the unit rearward, until it is removed from the TLS.
5. Carefully stand the tape drive assembly on its Carrier Handles and remove the four 1/4-inch locking nuts that secure the back panel. Do not remove the two locking nuts securing the circuit board. Refer to Figure 26.
6. Gently remove the back panel using caution to not damage the wiring. Disconnect the SCSI cable from the tape drive to allow access to the Drive Carrier PCBA. Refer to Figure 27 below.
7. Remove the Micro-controller IC at U2 (P/N 700106 or 700116) from the Drive Carrier board using a thin flat blade screwdriver, pocketknife or equivalent tool. Pry the IC from either end slightly and repeat for the other end. Continue this procedure until the part is loosened enough to be removed by hand. Refer to Figure 27 below.
8. Install the new Microprocessor IC at U2. Note the orientation of pin 1. Make certain that all pins are fully inserted into the socket.
9. Reconnect the SCSI cable to the tape drive.
10. Replace the back panel on the tape drive assembly that was removed in Figure 26 and retighten the four 1/4-inch locking nuts securely.

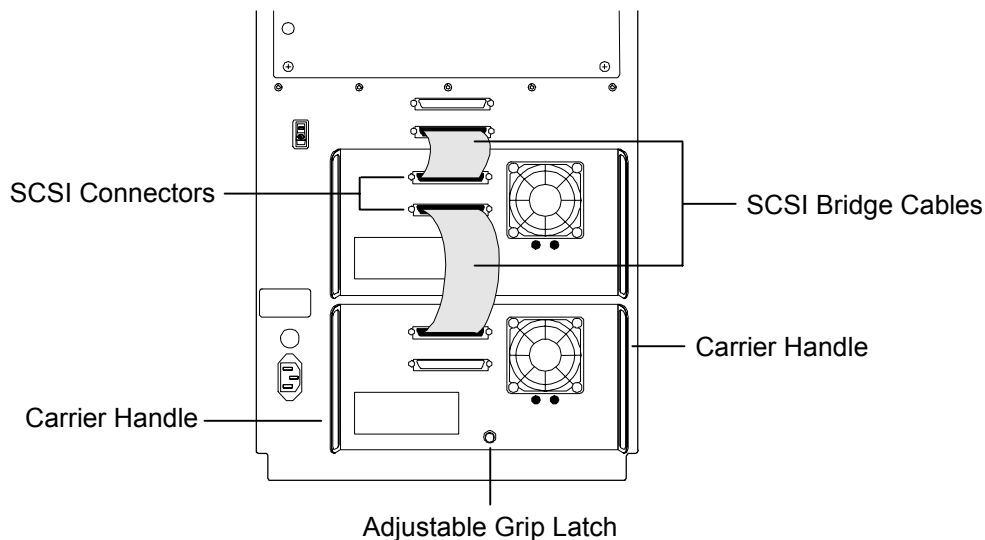


Figure 25 Tape Drive Assembly (Rear View)

*(Assumes all tape cartridges have been removed from the tape drives)

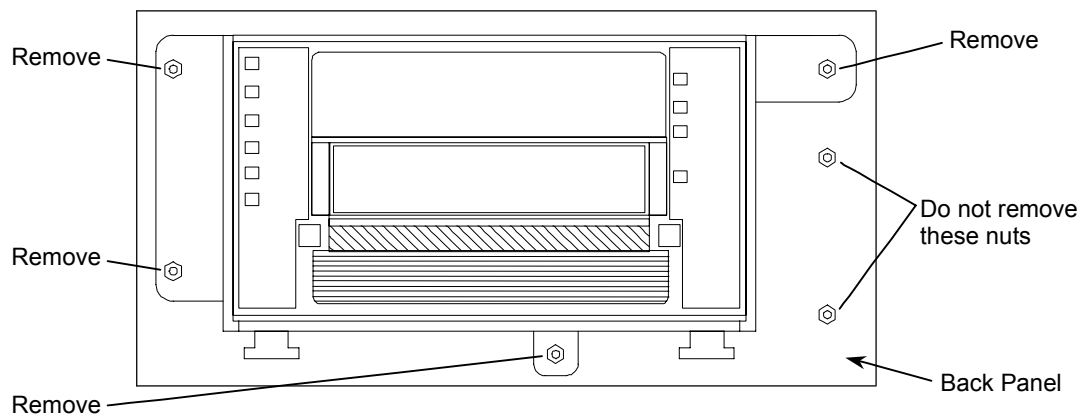


Figure 26 Tape Drive Assembly (Front View)

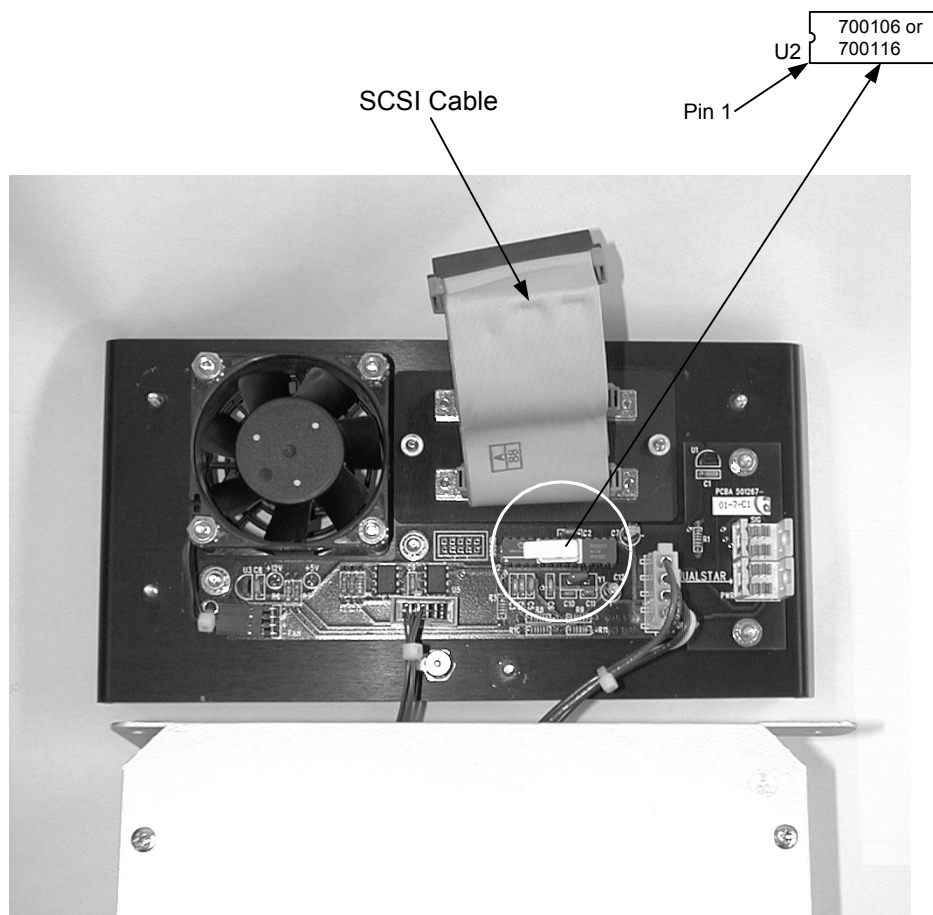
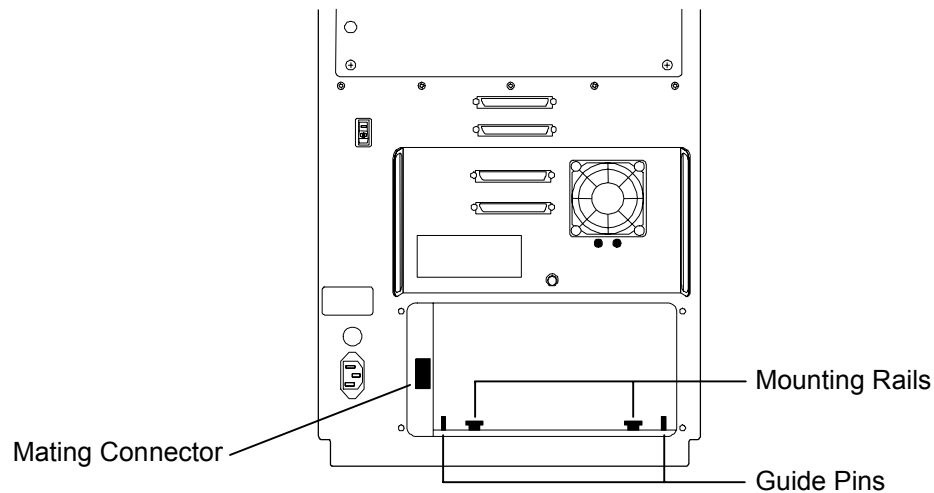


Figure 27 Drive Carrier PCBA

11. To reinstall the tape drive assembly in the TLS, hold the assembly right side up, place it on the Mounting Rails between the Guide Pins, then gently slide it all the way into the TLS. Refer to Figure 28.
12. Turn the adjustable grip latch on the tape drive assembly all the way clockwise by hand, until it is finger-tight. Refer to Figure 25. Do not over-tighten.
13. Pull on the tape drive assembly's carrier handles to make sure that the tape drive assembly is locked in place. Refer to Figure 25.
14. Reconnect both SCSI cables or cable and terminator.

**Figure 28 Tape Drive Assembly-Mounting Rails/Guide Pins**