QUALSTAR ®

The Tape Library Experts™

TLS-5000

TLS-6000

TLS-8000

Technical

Service Manual

501090 Rev. F

Important Manual/Firmware Revision Information

This manual and the operating firmware for the TLS are revised periodically as the product is improved. This manual was revised to correspond with the firmware version indicated below. Do not use this manual with different part numbers or prior versions of the firmware. Check with Qualstar Technical Support about use of this manual with newer firmware.

Manual	Corresponding Firmware
TLS-5000 / TLS-6000 / TLS-8000 Technical Service Manual 501090 Rev. F, 31 March 2006	TLS Executive Firmware 700105 Version 2.24

Copyright Notice

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Notices

Qualstar products are covered by one or more of the following patents:
6,163,139 and 6,560,061. Other patents pending.

Qualstar equipment is manufactured from new parts, or new and used parts. In some cases, Qualstar equipment may not be new and may have been previously installed. Regardless, Qualstar's warranty terms apply unless the equipment is specifically identified by Qualstar as "used" or "refurbished".

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Shielded cables are required for this device to comply with FCC Rules. Use shielded cables when connecting this device to others.

European Union Directive 89/336/EEC and Standard EN55022 (Electromagnetic Compatibility)

> **Warning**
> This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Directive on Waste Electrical and Electronic Equipment (WEEE)

Qualstar encourages its customers to use current recycling practices in order to reduce the burden that waste electronic products place on the environment.

If you are retiring a fully functional tape library, you are encouraged to transfer the functional unit to a new user, thereby extending the useful life of the tape library. The manufacture of all products requires the consumption of energy. By extending the life of the tape library, energy is conserved.

In accordance with environmental directives that are being implemented in many countries (refer to the European Directive on Waste Electrical and Electronic Equipment - WEEE) Qualstar provides customers with "End of Life Instructions" that iden-

tify the process for recycling the materials and components that make up a Qualstar tape library.

End of Life Instructions

Tools required

- P1 and P2 Phillips head screwdrivers
- T20 Torx head screwdriver
- Hex head (Allen) wrench/driver set
- 1/4-inch hex nut driver

Disassembly procedure

1. Remove door.

2. Remove top panel.

3. Remove side external panels.

4. Remove internal subassemblies.

Items recyclable using conventional methods

- **Aluminum:** Door, exterior panels, frame, robotics
- **Stainless steel:** Robot guides
- **Steel:** Some frames, fasteners
- **Plastic:** Window, cartridge magazines, tape cassettes
- **Copper:** Internal wiring, motors, SCSI cables
- **Paper:** Manuals

Items requiring special disposal due to lead-based solder

- **Printed Circuit Boards:** Controller, miscellaneous small printed circuit boards

Items that may have salvage or resale value

- Tape drives
- EMI line power filter

Reduction of Hazardous Substances (RoHS)

Qualstar is committed to the implementation of RoHS (Restriction of the use of certain hazardous substances in electrical and electronic equipment) in accordance with

the European Directive. The effectivity date for compliance is July 1, 2006, at which time Qualstar will certify that its Tape Library products are compliant with the RoHS standard. With the exception of Lead Based Solder, Qualstar will certify that its products are free of all other substances listed in the Directive.

Qualstar Tape Libraries fall under the category of "Information Technology Storage Array Systems" for which the RoHS Directive provides for a lead solder exemption until the year 2010. Insofar as lead free solders are new to the electronics industry and no quality or reliability data is available, Qualstar will invoke the lead based solder exemption until such time as industry data verifies that lead free solders are capable of meeting or exceeding the documented reliability and quality standards achieved with lead based solders.

Until such time as Qualstar replaces lead based solder with lead free solder, effected subassemblies must be disposed of appropriately.

Technical Support Information

The best source for service-related information is your system reseller. Alternately, the Qualstar Technical Support Department can be reached Monday through Friday, between the hours of 7:30 A.M. and 4:30 P.M. Pacific Time, at:

Qualstar Corporation

3990-B Heritage Oak Court
Simi Valley, CA 93063

Attn: Technical Support
Fax: (805) 583-7749
Phone: (877) 444-1744
Monday – Friday 7:30 a.m. to 4:30 p.m. PST
After hours support: (805) 526-7480 or (805) 583-7748
E-Mail support@qualstar.com

E-Mail: sales@qualstar.com
Web: www.qualstar.com

Table of Contents

1. Introduction

1.1 Who Should Read This Manual

This *Technical Service Manual* is for Tape Library System (TLS) service personnel. It describes the Maintenance Menu, the Private Menu and instructions for removing and replacing Field Replacement Units (FRU's). It also contains troubleshooting procedures and after–maintenance testing procedures.

The following topics are covered in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450):

- **Unpacking Instructions**
- **Control Panel**
- **Menu System**
- **System Configuration**
- **System Operation**
- **Preventative Maintenance**
- **Repacking Instructions**

For information about the SCSI interface, or other information outside the scope of this manual, please refer to the appropriate documents listed below.

Subject	Document	Qualstar Document Number
SCSI Command Information	TLS-5000/6000/8000 SCSI-2 Interface Manual	501205
Installation and Operation	TLS-5000/6000/8000 Installation and Operation Manual	501450
Specifications	TLS-5000 Product Specification	501561
	TLS-6000 Product Specification	501080
	TLS-8000 Product Specification	501498
Fibre Channel Option	Fibre Channel Option Installation and Operation Manual	501440
Supported Tape Drives	Product Information Note	PIN-014
Approved Data Cartridges	Product Information Note	PIN-038
Barcode Label Specifications	Product Information Note	PIN-040
SCSI-2	ANSI X3.131-1994	N/A
SCSI SPI-2 Specification	ANSI X3.302-1998 SCSI Parallel Interface-2 (SPI-2)	N/A
SCSI-3	ANSI X3.253:199X and Amendment AM1 to X3.253.1995	N/A

Table 1-1 Applicable Documents

Although Qualstar has made every effort to insure the accuracy of the information contained in this manual, no guarantee is expressed or implied that the manual is error-free. Qualstar reserves the right to make changes at any time without prior notification.

The Qualstar Tape Libraries are sophisticated, state-of-the-art computer peripherals. They should only be serviced by a competent service technician who is experienced with the operation and maintenance of tape libraries, and only after reading and understanding this manual and the TLS-5000/6000/8000 Installation and Operation Manual.

1.2   Important Safety Information

All of the operating instructions and maintenance procedures in Qualstar manuals must be followed to prevent personal injury or damage to the equipment. In the interests of safety, there are two kinds of warnings used in Qualstar documents, as shown below.

DANGER

PERSONAL INJURY MAY RESULT IF YOU DO NOT FULLY COMPLY WITH THE HANDLING, OPERATING, OR SERVICE INSTRUCTIONS FOUND IN A DANGER PARAGRAPH.

GEFAHR

UNSACHGEMAESSE BENUTZUNG, BEDLENUNG ODER RAPARATUR AUFGRUND VON NICHTBEGEFAHR DER SICHERHEITSANWEISUNG KANN ZU VERIET-ZUNGEN FUEHREN.

CAUTION

EQUIPMENT DAMAGE OR LOSS OF DATA may result if you do not fully comply with the handling, operating, or service instructions found in a CAUTION paragraph.

In addition, useful information and tips may be found throughout the document in the following formats:

NOTE

SPECIAL ATTENTION to explanatory statements found in a NOTE paragraph will help you avoid mistakes and/or save time.

NOTICE

A **NOTICE** box contains additional important information.

1.3   Lithium Battery

Please observe the following information when repairing the unit.

DANGER

U9, A DALLAS SEMICONDUCTOR CORPORATION DS1225AB OR A SGS-THOMPSON MICROELECTRONICS M48258X IC ON THE EXECUTIVE PCBA CONTAINS AN INTEGRAL LITHIUM BATTERY. AN EXPLOSION DANGER EXISTS IF THE IC IS INCORRECTLY REPLACED. REPLACE THE IC ONLY WITH THE SAME PART NUMBER, OR AN EQUIVALENT DESIGNATED BY THE MANUFACTURER. DISPOSE OF THE USED IC ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

GEFAHR

DER U9, EIN DALLAS SEMICONDUCTOR CORPORATION DS1225AB ODER EIN A SGS-THOMPSON MICROELECTRONICS M48258X IC AUF DEM EXECUTIVE BOARD ENTHAELT EINE INTEGRIERTE LITHIUM BATTERIE. WENN DIESE UNSACHGEMAESS AUSGETAUSCHT WIRD, BESTEHT EXPLOSIONS GEFAHR. DER IC DARF NUR DURCH EINEN ARTIKEL MIT DER SELBEN ARTIKELNUMMER, BZW, MIT EINEM VERGLEICHBAREN ARTIKEL LAUT HERSTELLER ANGABE ERSETZT WERDEN. DIE ENTSORGUNG DES ALTEN IC'S DARF NUR GEMAESS HERSTELLERANGABEN ERFOLGEN.

2. Description and Theory of Operation

2.1   Model Identification

6110	6210, 6220	5433, 5466	58132, 58264
8111	8211, 8222	6430, 6460	68120, 68240
		8433, 8466	88132, 88264
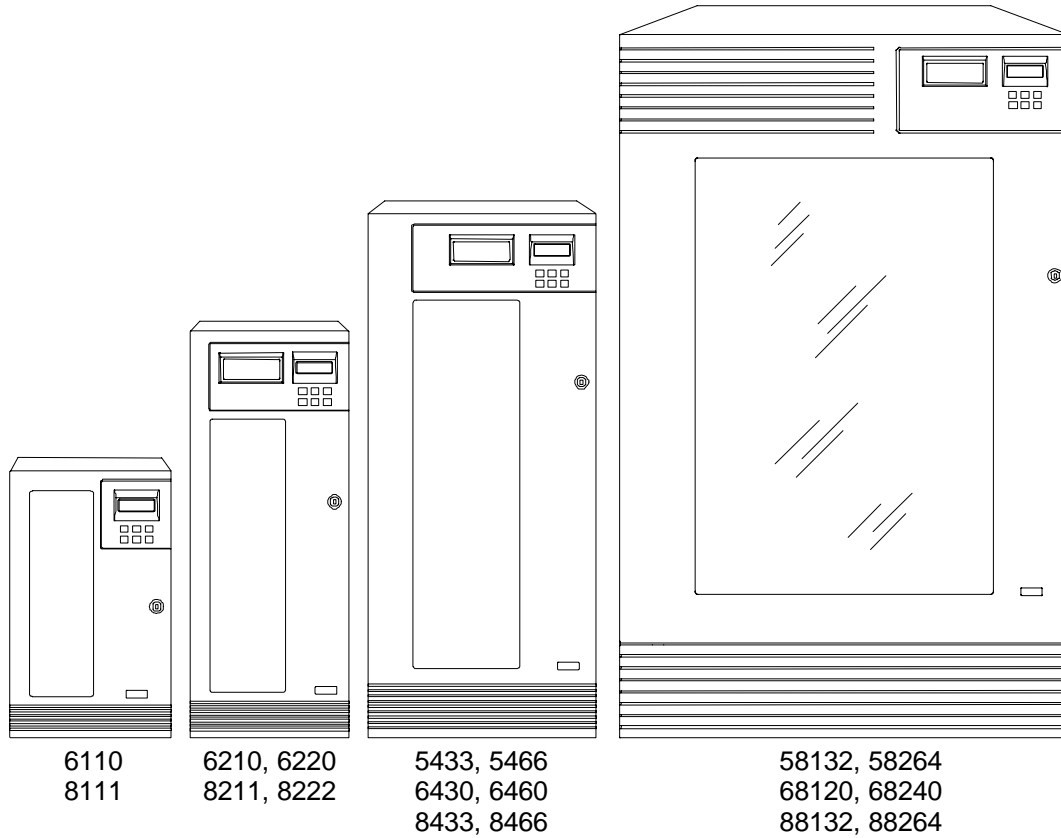
Figure 2-1   TLS-5000/6000/8000 Models

TLS-5000 Feature/Model	5433	5466	58132	58264
Maximum number of tape drives	4	4	8	8
Media capacity in cartridges (11 cartridges per magazine)	33	66	132	264
Barcode Reader(s)	Std.	Std.	Std.	Std.
I/O Port for automated cartridge insertion/removal	Std.	Std.	Std.	Std.
Carousel(s) (rotary positioning of magazines)	1	1	2	2
Number of Cartridge Handlers	1	1	2	2
Fibre Channel Option	Opt.	Opt.	Opt.	Opt.
Q-Link Remote Manager	Opt.	Opt.	Opt.	Opt.

Table 2-1   SAIT based TLS-5000 Features

TLS-6000 Feature/Model	6110	6210	6220	6430	6460	68120	68240
Maximum number of tape drives	1	2	2	4	4	8	8
Media capacity in cartridges (10 cartridges per magazine)	10	10	20	30	60	120	240
Barcode Reader(s)	Opt.	Opt.	Opt.	Std.	Std.	Std.	Std.
I/O Port for automated cartridge insertion/removal	N/A	Opt.	Opt.	Std.	Std.	Std.	Std.
Carousel(s) (rotary positioning of magazines)	N/A	Opt.	1	1	1	2	2
Number of Cartridge Handlers	1	1	1	1	1	2	2
Fibre Channel Option	N/A	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.
Q-Link Remote Manager	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.

Table 2-2   SDLT based TLS-6000 Features

TLS-8000 Feature/Model	8111	8211	8222	8433	8466	88132	88264
Maximum number of tape drives	1	2	2	4	4	8	8
Media capacity in cartridges (11 cartridges per magazine)	11	11	22	33	66	132	264
Barcode Reader(s)	Opt.	Opt.	Opt.	Std.	Std.	Std.	Std.
I/O Port for automated cartridge insertion/removal	N/A	Opt.	Opt.	Std.	Std.	Std.	Std.
Carousel(s) (rotary positioning of magazines)	N/A	Opt.	1	1	1	2	2
Number of Cartridge Handlers	1	1	1	1	1	2	2
Fibre Channel Option	N/A	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.
Q-Link Remote Manager	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.

Table 2-3   LTO based TLS-8000 Features

Series Identifier
Maximum Number of Drives
Maximum Number of Cartridges in Magazines

TLS-00000
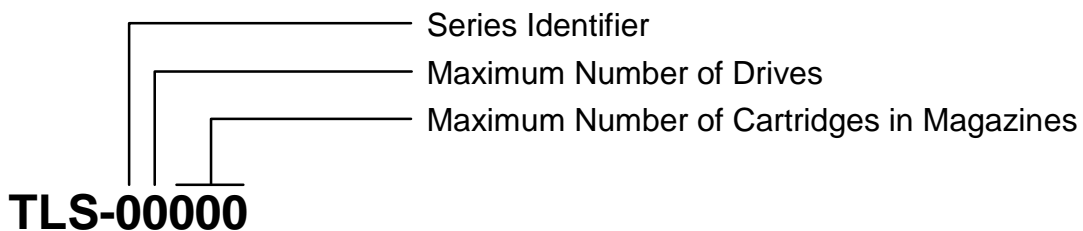
Figure 2-2   Model Number Identification Scheme

This manual applies to all models. The installation and operation of the various models is virtually identical. Models 58xxx, 68xxx and 88xxx are referred to as dual bay libraries because of their dual Drive Bays. All other models are single bay libraries. Differences among the models are noted where required.

MODEL	HEIGHT (in./cm)	WIDTH (in./cm)	DEPTH (in./cm)	EMPTY [4] WEIGHT (lb./kg)	SHIPPING [2] WEIGHT (lb./kg)
6110, 8111	22.9 / 58.2	13.1 / 33.3	24.9 / 63.2	58 / 26.3	90 / 40.8
6210, 6220 8211, 8222	34.7 / 88.1	13.1 / 33.3[1]	24.9 / 63.2	89 / 40.3	125 / 56.7[3]
5433, 5466 6430, 6460 8433, 8466	44.5 / 113.0	18.75 / 47.6[1]	30.5 / 77.5	153 / 163	235 / 107[3]
58132, 58264 68120, 68240 88132, 88264	61.9 / 157.3	37.25 / 94.62	30.5 / 77.5	359 / 163	602 / 273[3]

[1] Stabilizer feet add 5.0 inches (12.7 cm) to the base width of the 54xx, 62xx, 64xx, 82xx and 84xx series.

[2] Shipping weights include the TLS, data cartridge magazines and accessories.

[3] Weight includes accessory box (shipped separately).

[4] Empty weights exclude tape drives, magazines and data cartridges.

Table 2-4   TLS Dimensions (fully loaded units)

2.2   General Description

The three family members of Qualstar's ½-inch TLS series of tape libraries are:

- TLS-5000 series utilizing SAIT (SuperAIT) tape technology

- TLS-6000 series utilizing SDLT (SuperDLT) tape technology

- TLS-8000 series utilizing LTO (all generations) tape technology

Each TLS-5000/6000/8000 cabinet contains a high-performance robotics system for handling data cartridges, one or two drive bays to accommodate the cartridge tape drives, removable cartridge magazines, power supplies and printed circuit board assemblies (PCBAs) that contain the TLS electronics. An I/O port for inserting and removing cartridges under secured host system control is supported in every model, except for the 6110 and 8111 models. All units operate on any internationally available AC power source, with the TLS power cable and SCSI interface cables being the only required connections. The entire cabinet is pressurized and cooled by filtered air to ensure an optimum operating environment.

These tape libraries are not intended for use in mobile applications. They were designed for use in an office environment.

2.2.1   Motion Systems

The TLS contains up to five independent motion systems.

- **Carriages move up and down vertically along the Vertical (Y) Axis and are driven by brushless DC motors, which turn a nut around a fixed, precision leadscrew.**

- **Handler assemblies extend and retract along the Insertion (Z) Axis and are driven by brushless DC motors that turn precision leadscrews.**

- **The I/O port slot extends to receive or deliver a cartridge and then retracts. The I/O port slot's leadscrew is driven by a DC stepper motor.**

- **A large gear at the bottom of each Carousel Assembly is turned by a pinion gear on a DC stepper motor.**

- **On dual bay libraries, models 58xxx, 68xxx and 88xxx, the Shuttle travels along the Horizontal (X) Axis to allow for the transferring on single cartridges between the left and right sides. It is driven by a brushless DC motor that turns a leadscrew.**

The drive circuitry for all motion systems is located on the Executive Printed Circuit Board Assemblies (PCBAs). Each of the brushless DC motors has three internal Hall-Effect sensors. The Hall-Effect sensors are used to commutate the motors and determine their relative positions. The brushless DC motors are driven by a three-phase MOSFET bridge, using a 12 volt supply. Each stepper motor is driven by four discrete MOSFET devices from the same 12 volt supply.

Each motion system has an opto-switch (infrared, opto-interrupter-type detector), which is used to determine its reference position.

2.2.2 Sensors

TLS models have two types of infrared optical sensors: analog and digital. Each optical sensor has two parts: an emitter and a corresponding detector.

Analog Sensor Operation
Analog sensors are used over longer distances than the digital sensors, which have a range of about only one inch.

All analog infrared optical sensors produce a DC voltage proportional to the strength of the infrared signal at the sensor. This signal is measured by the Analog to Digital (A/D) Converter on the Executive PCBAs.

Analog Sensors

- **Y-Clear Sensors**
  These sensors are referred to in the Installation and Operation Manual as the Inventory Sentry Beam. A sensor consists of an infrared emitter mounted on the bottom pan and a detector mounted at the top of the library. The detector in single bay libraries library is mounted on the I/O port PCBA. The detector on the right side of dual bay libraries is mounted on the I/O port PCBA and the one on the left side is mounted on the Y-Receiver PCBA. The infrared beam is modulated at a high frequency. The sensor circuitry is AC–coupled to eliminate its sensitivity to ambient light. The Y-Clear sensor serves three purposes:

  1. When the front door is closed, the Y–Clear sensor verifies that the vertical path traveled by the handler is unobstructed and that it is therefore safe for the carriage to move vertically.

2. When the front door is open, the Y–Clear sensor determines whether or not the inventory has been violated by someone reaching inside the cabinet and removing or inserting a cartridge. Just the presence of someone's hand between the Y–Clear sensor's emitter and detector is sufficient to interrupt the sensor's infrared beam and trigger an audible alarm.

3. When inserting and removing cartridges, the Y–Clear sensor is used in conjunction with the Cartridge Presence sensor to check the position of a cartridge in the Handler's Gripper Assembly.

- **Cartridge Presence Sensors**
  These sensors, which are mounted on handlers, detect the presence of a tape cartridge in any storage location, including a tape drive (cartridge must be in ejected position). They utilize the same modulated circuit as the Y–Clear sensors. The Cartridge Presence sensors also work in conjunction with the Y–Clear sensors to determine the position of a cartridge in a Handler's Gripper Assembly.

Digital Sensor Operation
The processor on the Executive PCBAs read the digital signals produced by the digital sensors' detectors.

The carousel axis has a position sensor, which looks at a pattern encoded on the gear guard. The other three axes of motion (I/O port, vertical and insertion) have home position sensors. These sensors are used for reference purposes during initialization and operation.

Digital Sensors

- **Door Sensor**
  This sensor detects the condition of the cabinet door: open or closed. When a door-open condition is detected, the system stops all moving assemblies.

- **Carousel Position Sensors**
  The pattern output to these sensors by a carousel is used to determine the position of the carousel(s).

- **Vertical Axis Home Sensors**
  These sensors use the tall pin(s) mounted in the bottom of the cabinet to detect when each Carriage Assembly reaches its home position at the bottom of the cabinet.

- **Insertion Axis Home Sensors**
  These sensors detect when a Carriage's Handler Assembly (on the Insertion Axis) is in its home position: fully retracted.

- **I/O Port Full Sensor**
  This sensor detects when a tape cartridge is fully inserted into the I/O port slot. It consists of an infrared emitter on a small PCBA in the I/O port assembly and a sensor on the I/O port PCBA.

- **I/O Port Home Sensor**
  **This sensor detects when the I/O port slot is in its home position: fully re-
  tracted.**

- **I/O Port Clear Sensor**
  This sensor detects the presence of a tape cartridge in the I/O port slot.

2.2.3 Handler Solenoid

A solenoid–operated Gripper Assembly is mounted on each Handler for grasping and
releasing cartridges. When current is applied to the solenoid's windings, the solenoid's
plunger extends, opening the Gripper. When the current is removed, a spring closes
the Gripper. The solenoid plunger's tip is covered with a wear-resistant nosepiece to
provide extended life.

2.2.4 Barcode Reader

A barcode reader for each carriage is standard on TLS-58xxx, 68xxx an 88xxx models.
For single bay libraries, a barcode reader is standard on models TLS-54xx, 64xx and
TLS-84xx, and optional on the others. They are intended for use in systems where
each cartridge is identified by a barcode label. Pre-printed barcode labels, which are
both human- and machine-readable, are available from a number of sources, including
Qualstar.

The barcode reader consists of a charge-coupled sensor (similar to those used in video
cameras) and associated electronics. They are mounted under the carriages. The bar-
code readers can scan all cartridges in the TLS (except those loaded inside LTO tape
drives), as well as cartridges introduced into the I/O port.

NOTE

*The changer automatically moves a cartridge in the I/O port slot, to a temporary location where
its barcode label can be scanned. The changer then returns the cartridge to its original location.*

2.2.5 Barcode Labels

Pre-printed barcode labels, which are both human- and machine-readable, are avail-
able from a number of sources including Qualstar.

Barcode labels must conform to ANSI/AIM BCI-1995, Uniform Symbology Specifica-
tion Code 39. Please refer to PIN-040 at www.qualstar.com (click on Support tab) for
more information.

By default, the TLS expects a modulus 43 check character at the end of each label.
The use of a check character helps assure that labels are read error-free. The TLS con-
figuration must be changed before using barcode labels without a check character. All
of the labels within the TLS must match the check character configuration: either all
with or all without a check character.

2.2.6   Barcode Label Usage

If the library contains a barcode reader (and barcode labels are affixed to the cartridges), when barcode information is read, it is stored as part of the inventory database in the library's non-volatile RAM, and is available to the host computer upon request. When the changer moves a cartridge, the inventory database is updated to reflect the change.

If the changer's inventory becomes invalid (e.g. if the Inventory Sentry Beam is violated), the changer rescans the inventory. The updated barcode label and cartridge position data is then stored in the inventory database. Example: After an alert that invalidates the inventory (e.g., when a cartridge is moved by hand) is cleared, the changer rescans the inventory. Any existing barcode labels are read and the new inventory data is stored in the inventory database.

By default, the library expects a modulus 43 check character. The user must change the changers' configuration option before using barcode labels without a check character. All of the labels within the TLS must be of the same check character definition: either all with or all without.

The following steps will allow the changers' configuration option to be set to not expect a check character.

1.   Press the MENU key to display the `Top Menu`.

2.   Press the ENTER key once to enter the `\Configuration` menu.

3.   Press the ENTER key once to enter the `\Configuration\Advanced` menu.

4.   Press the ENTER key once to enter the `\Configuration\Advanced\Changer` menu.

5.   Use the ▼ (DOWN) key to move the pointer to `LabelCheckChar`.

6.   Press the ENTER key once to begin editing the `LabelCheckChar` value.

7.   Press the ▲ (UP) or ▼ (DOWN) key to change the `LabelCheckChar` value from `YES` to `NO`.

8.   Press the MENU key to return to the `Top Menu`.

2.3   Component Identification

Most of the major components are common to all models. The number of tape drives varies between models (from one to eight), depending upon the size of the TLS and the number of drives installed.

Figure 2-3 through Figure 2-8 show the location of the major components in TLS-5000/6000/8000 models.
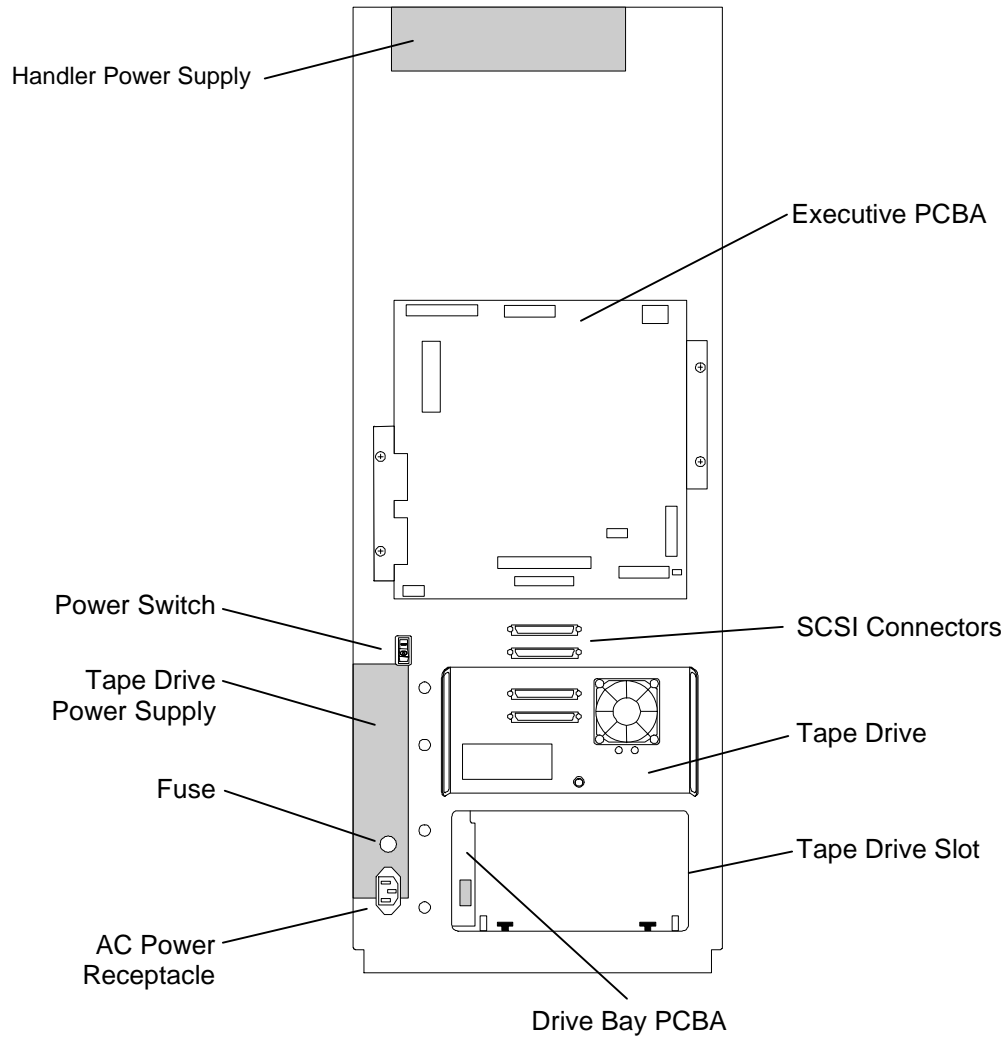
Figure 2-3   Single Bay TLS Rear View

Handler Power Supply

Executive PCBA

Power Switch

SCSI Connectors

Tape Drive
Power Supply

Tape Drive

Fuse

Tape Drive Slot

AC Power
Receptacle

Drive Bay PCBA

Handler Power Supply

I/O Port Front Opening

Carousel

Carousel PCBA

Tape Drives

Y-Clear
Emitter Assembly

Control Panel

Carriage, Handler,
Gripper and
Barcode Reader

Front Guide Shaft

Carousel Motor

Tape Drive
Power Supply

Cooling Fans

Vertical (Y) Axis
Home Sensor Probe

Figure 2-4   Single Bay TLS Front View
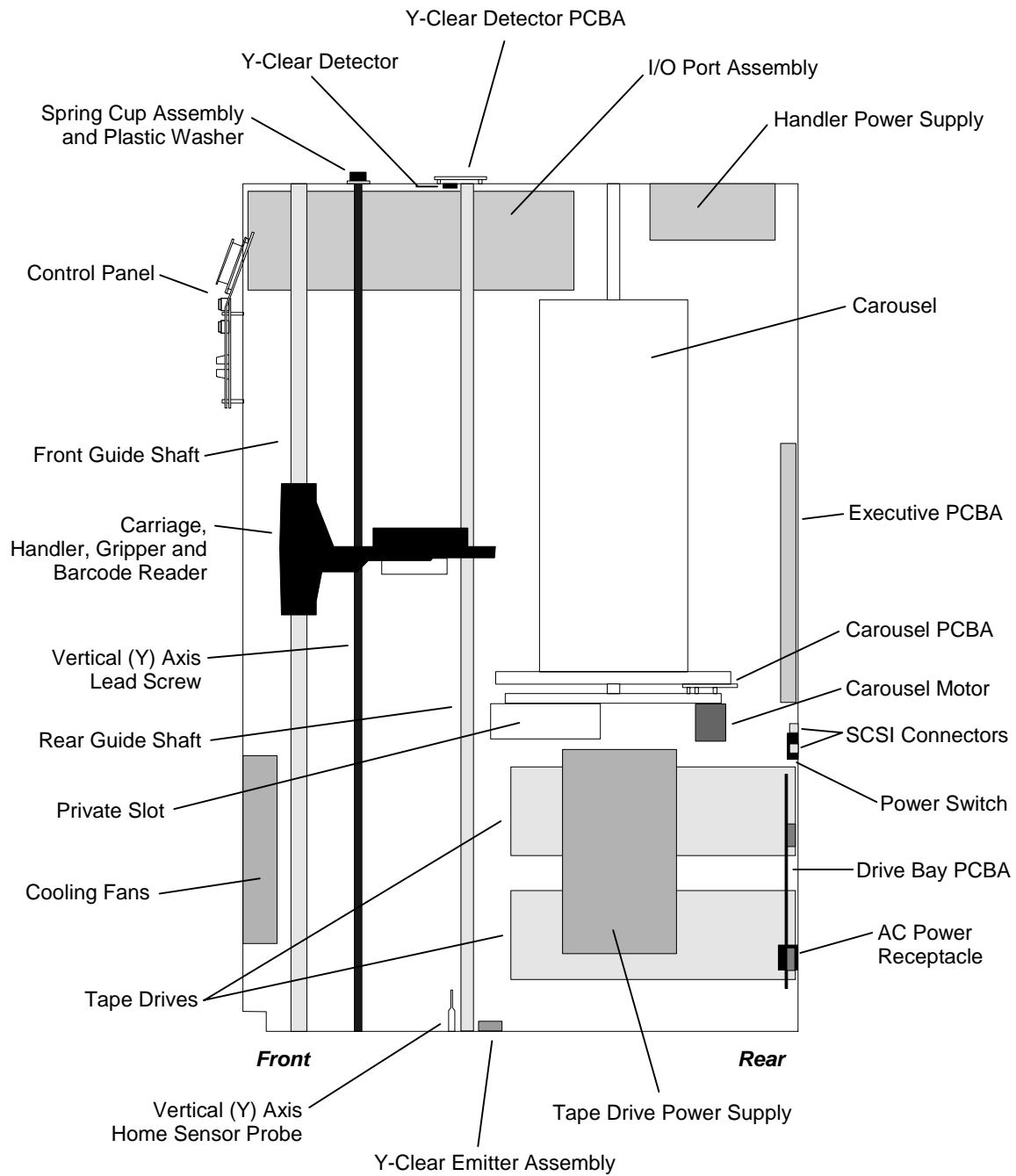
Figure 2-5   Single Bay TLS Side View
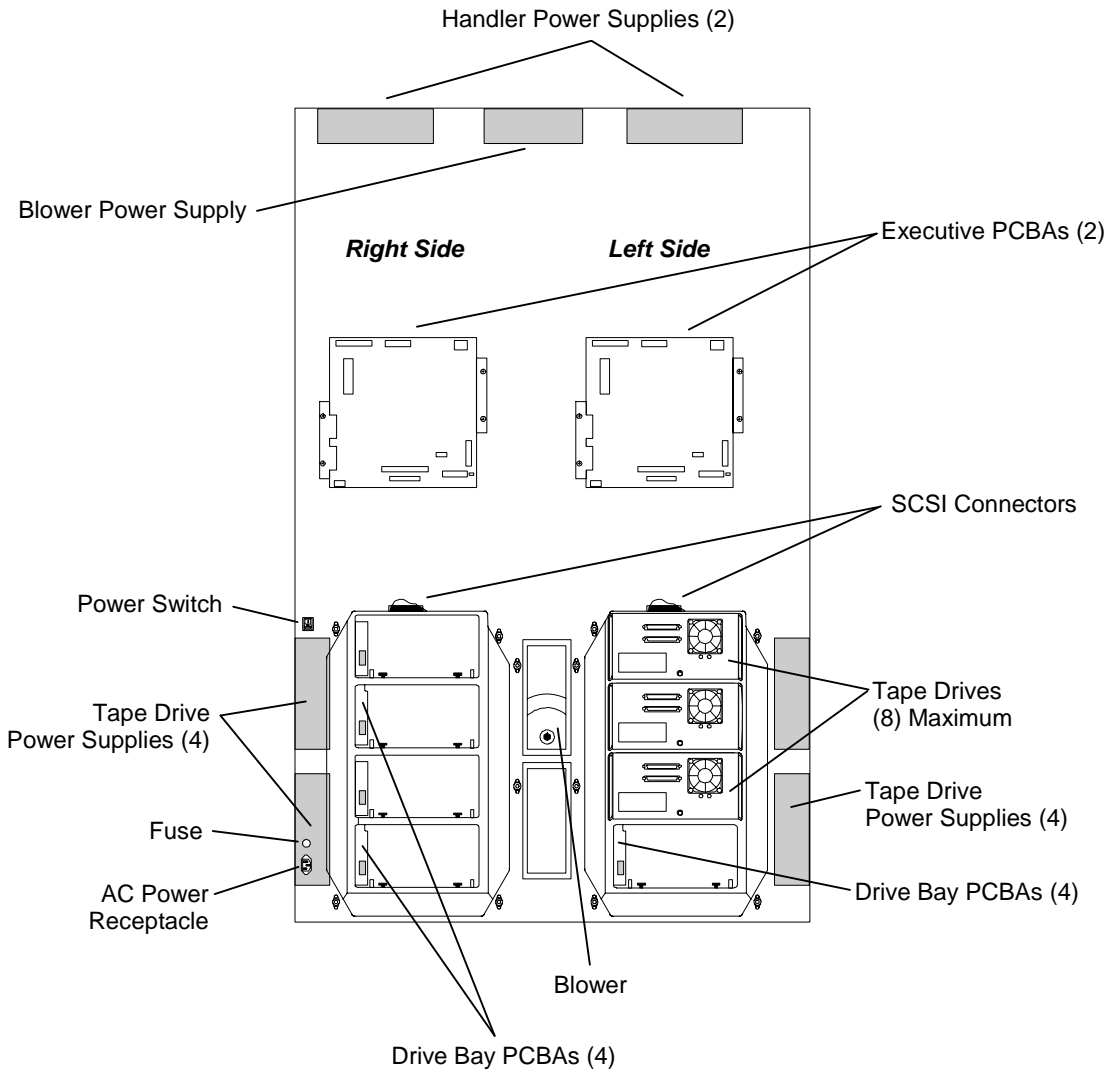
Figure 2-6   Dual Bay TLS Rear View

Handler Power Supplies (2)

Left Side   **Right Side**   I/O Port Front Opening

Blower Power Supply   Control Panel

Carousels   Front Guide Shaft (2)

Carriage, Handler, Gripper and Barcode Reader (2)

Supporting Guide Shaft (2)

Carousel PCBA (2)   Carousel Motor (2)

Shuttle Motor   Shuttle Mechanism

Blower   Tape Drives (8)

Tape Drives Power Supplies (2)   Tape Drives Power Supplies (2)

Blower PCBA

Y-Clear Emitter Assembly (4)   Vertical (Y) Axis Home Sensor Probe (2)

Figure 2-7   Dual Bay TLS Front View
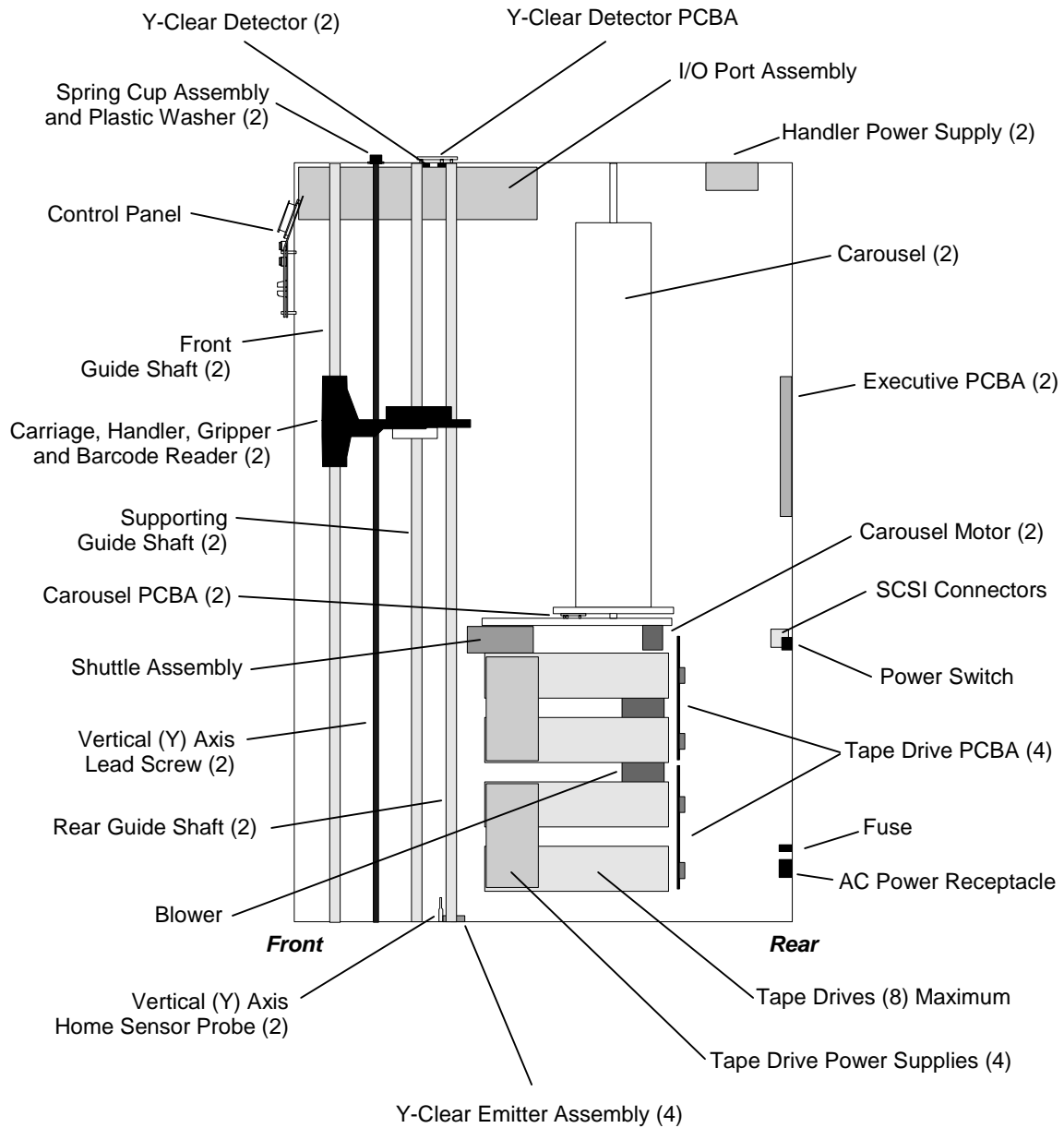
Figure 2-8   Dual Bay TLS Side View

2.3.1 Handler

Figure 2-9 shows the major components of a TLS-5000/6000/8000 cartridge Handler. The components of the left and right Handlers are identical.
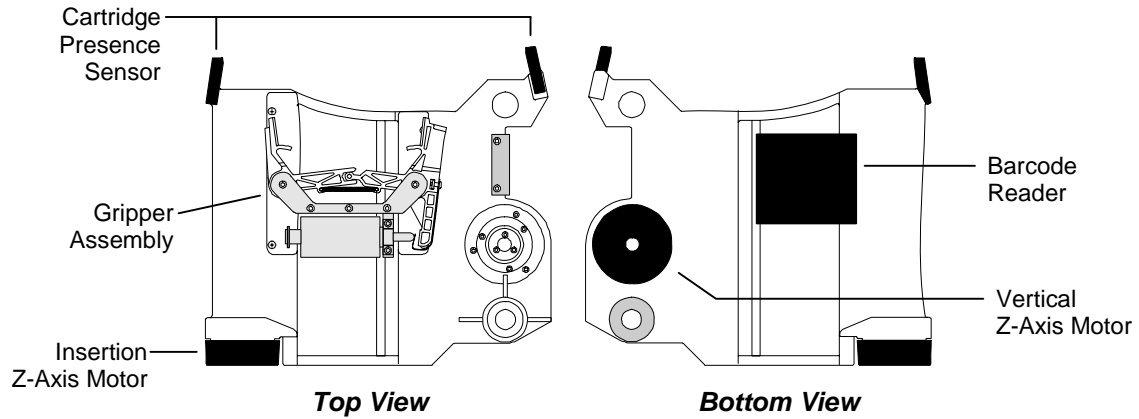
Figure 2-9   Handler – Top and Bottom Views

2.3.2 I/O Port Assembly

Figure 2-10 shows the major components of the I/O port assembly.
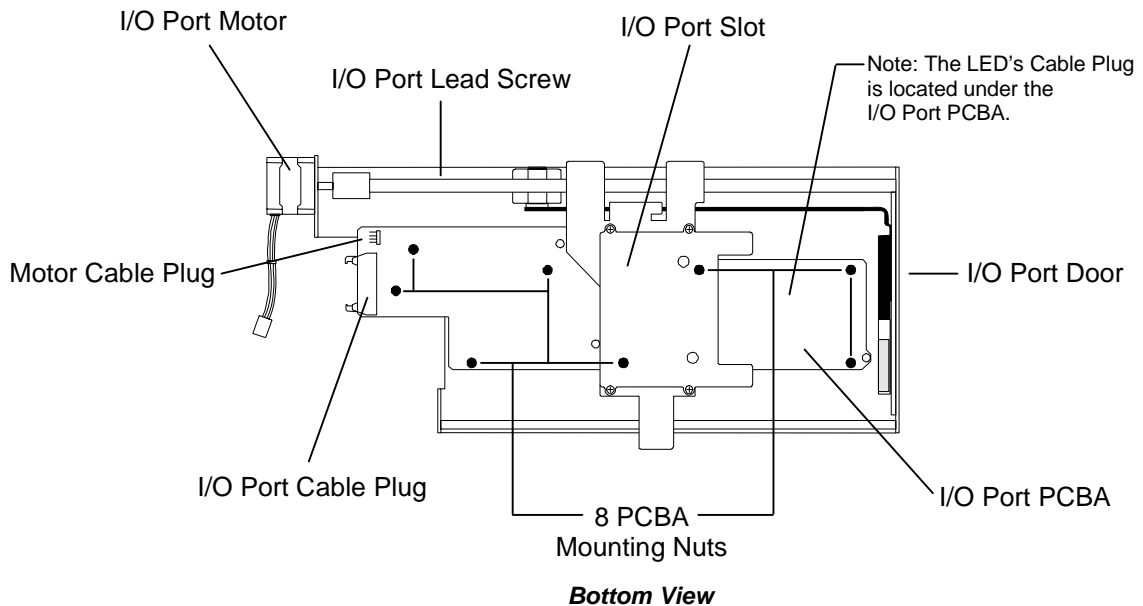
Figure 2-10   I/O Port Assembly

2.3.3   Field-Replaceable Units (FRUs)

Many of the library's major components are available separately as Field-Replaceable Units (FRUs). These components can be removed and replaced in the field by qualified personnel. See Chapter 7 for a complete list of FRUs, their part numbers and removal/replacement instructions.

Some FRUs can be added to a unit as an expansion item. The instructions for installing an expansion FRU for the first time, or for permanently removing an expansion FRU are contained in Chapter 9.

3. The Menu System

The Menu system allows the user to perform routine operations. It also allows a qualified individual to make configuration changes to the TLS and to perform diagnostics. This chapter explains the Menu system, the types of information it presents, and how to use it. Specific information about Configuration or Operation menu items can be found in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450).

3.1 Using the Menu Control Keys

The control keys make it possible to point to a particular item and change or edit its value, or to execute a command. The function of each control key is dependent upon the location within the menu structure. The control keys are shown in Figure 3-1.
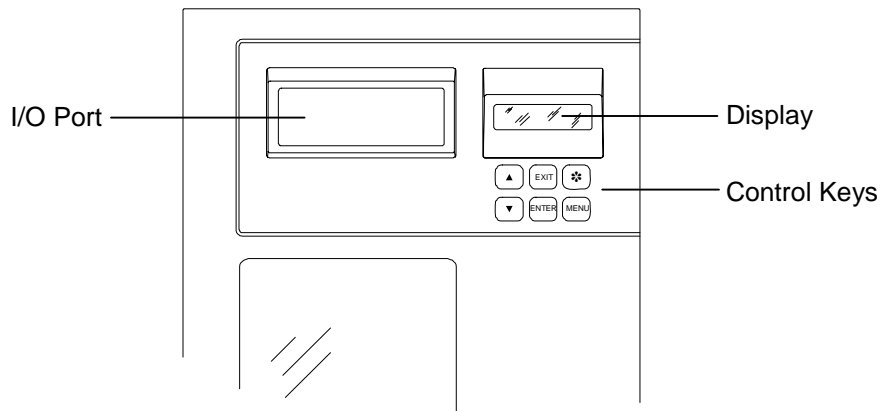
Figure 3-1 TLS Control Keys

3.1.1 The MENU Control Key

Press the MENU key to enable the menu system. The menu system can be used without interrupting ongoing changer operations. If the Top Menu is not displayed, pressing the MENU key at any time always returns control to the Top Menu (Figure 3-4). If the Top Menu is displayed, press the MENU key to return to the Operating Display.

3.1.2 The ▲ (UP) and ▼ (DOWN) Control Keys

- While navigating through the menu system, the ▲ (UP) and ▼ (DOWN) keys move the item pointer (right-pointing arrow) up and down the left column of the display. The display automatically scrolls when necessary. The pointer identifies the current selection, as shown in Section 3.1.3 below.

- If a value is highlighted, the ▲ (UP) and ▼ (DOWN) keys change the value of the highlighted character or word. The DOWN key changes the character to the preceding character in the sequence (i.e., from B to A, or from 2 to 1). Pressing the ▲ (UP) key has the opposite effect.

- If a multiple choice value is highlighted, the ▲ (UP) and ▼ (DOWN) keys cycle through the available choices.

- If the ▲ (UP) or ▼ (DOWN) key is pressed and held down, the control key's action repeats at a rapid rate.

3.1.3   The ENTER Control Key

The ENTER key behaves as follows:

- If the item pointer is pointing at a sub-menu (indicated by a leading bullet), pressing ENTER will display the selected sub-menu.

```
O•••••Element Status
➜•Display
 •Find Label
 INITIALIZE
    Skip Labels: NO
 INVALIDATE
 SET DRIVES EMPTY
```

- If the item pointer points to a command such as POSITION (commands are always displayed in all upper case letters), pressing ENTER executes the command.

```
O•••Position Handler
 To Location:llllll
➜POSITION
```

- When a command is executed, only the top line of the menu and the command name (centered on the third line) are displayed for the duration of the command's execution.

```
O•••Position Handler

         POSITION

```

- If a value contains an editable field, pressing ENTER highlights the first character of the field by superimposing a flashing cursor over it. This indicates the Edit mode is active and the value of the highlighted character can now be changed using the ▲ (UP) and ▼ (DOWN) keys.

- In the Edit mode, pressing ENTER moves the cursor one character to the right. If the cursor is over the rightmost character, pressing ENTER moves it back around to the leftmost character. The action repeats if the ENTER key is held down.

- If a value contains a multiple-choice field, pressing ENTER highlights the field by superimposing a flashing cursor over it. Pressing ENTER again has no effect.

3.1.4 The EXIT Control Key

The EXIT key behaves as follows:

While editing a menu item's value, pressing the EXIT key exits the editor and restores the pointer to the menu item. Note that all values changed during editing are actually changed, exiting does not undo those changes. Press the EXIT key, while pointing to any item in a menu, to return to the next higher menu. Press the EXIT key while the Top Menu is displayed to exit the Menu mode.

3.1.5 The ✿ (Daisy) Key and I/O Port Operation

When the Operating Display is visible, the ✿ (Daisy) key can be used together with the ▲ (UP), ▼ (DOWN), or MENU key to perform any one of three special functions:

✿ + MENU: Operates the I/O port.

✿ + ▲: Executes the PARK HIGH command.
This command moves the carriages to the top of their range of motion in the TLS.

✿ + ▼: Executes the PARK LOW command.
This command moves the carriages to the bottom of their range of motion in the TLS.

3.1.5.1 Operating the I/O Port

An I/O port must be installed, *and enabled* (using the `CALL Key` menu item in the `Configuration\Advanced\Changer\I/O Port` menu), before the I/O port function can be used.

1. While the operating display is visible (Figure 3-1), press and hold down the ✿ (Daisy) key to view the ✿ (Daisy) key display (Figure 3-2), press the MENU key to extend the I/O port slot, then release both keys. The I/O port door opens automatically when the I/O port slot extends.

```
┌─────────────────────────────────────┐
│                                      │
│   PARK HIGH                    ✿     │
│                                      │
│                                      │
│                                      │
│                                      │
│   PARK LOW              I/O PORT     │
│                                      │
└─────────────────────────────────────┘
```
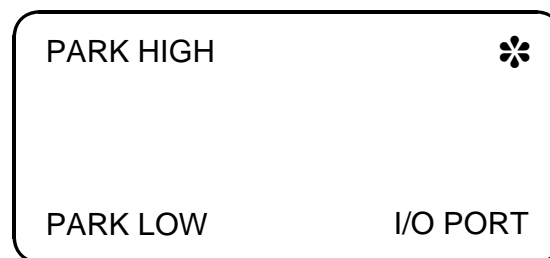
Figure 3-2 ✿ (Daisy) Key Display

2. Make certain the Write Enable/Protect tab on the tape cartridge is set correctly (see Figure 3-3), then fully insert the tape cartridge into the I/O port slot as shown.

    - **When the optical sensors detect a fully-inserted tape cartridge, the I/O port slot retracts, closing the I/O port door.**

- **If the tape cartridge is not fully inserted, the door will remain open.**

- **If no tape is inserted, the I/O port slot retracts one or two minutes after the I/O port is summoned.
Use the `Configuration\Advanced\Changer\I/O Port CALL Key` menu item to select either the one or two minute delay time.**

3. The host software then determines where the tape cartridge should be stored. The storage location can also be manually determined using the menu system provided the menu system has not been locked by the system administrator.
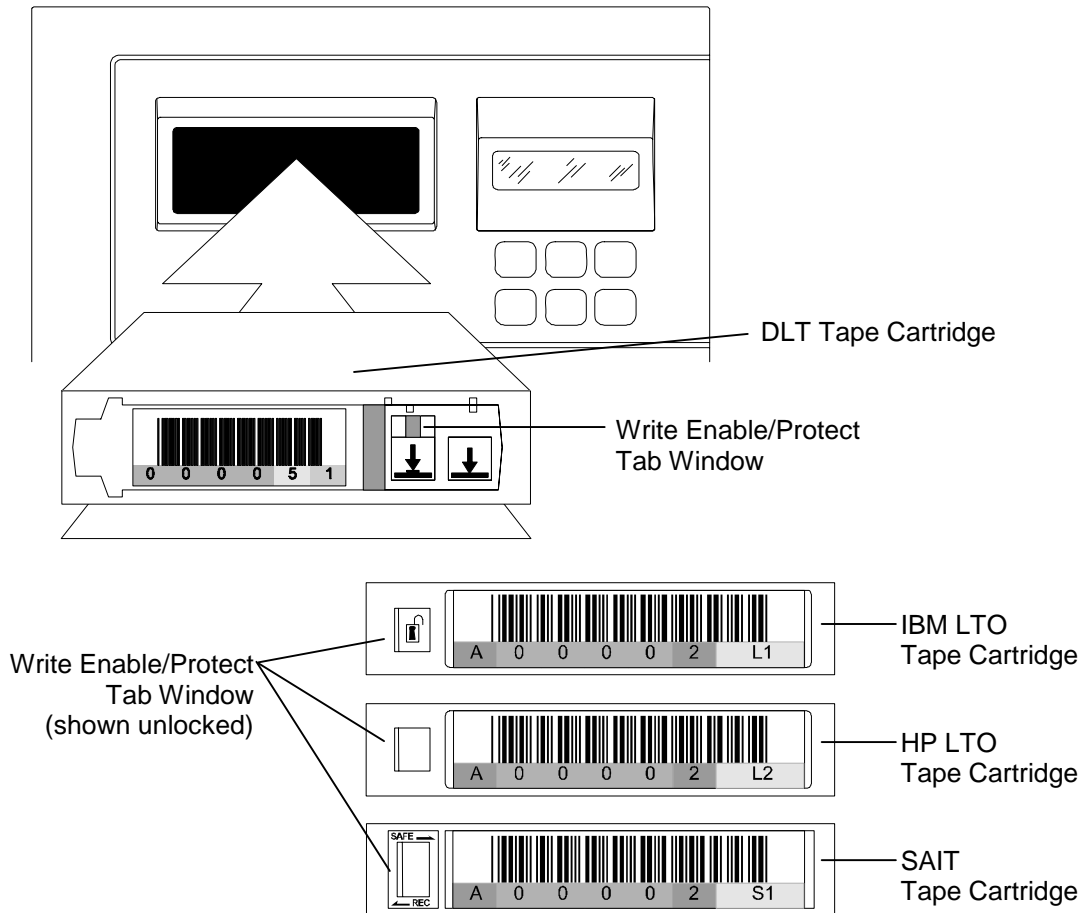
Figure 3-3   Inserting a Tape Cartridge into the I/O Port

NOTE

DLT tape cartridges are write-protected when the Enable/Protect tab is moved to the left, showing an orange stripe through the tab's window.

LTO tape cartridges are write-protected when the Enable/Protect tab is moved to the right. Tape cartridges will show a "locked" symbol on the face of the tab.

SAIT tape cartridges are write-protected when the Enable/Protect tab is moved to the right.

3.1.5.2 Parking the Handler(s)

While the operating display is visible (Figure 3-1), press and hold down the ✿ (Daisy) key to view the ✿ (Daisy) key menu (Figure 3-3), press the ▲ (UP) or ▼ (DOWN) key to execute the PARK HIGH or PARK LOW command, then release both keys.

3.2   The Top Menu

To see the Top Menu, turn on the TLS, wait until it displays the date and time, then press the MENU key. The operator should see a display like the one in Figure 3-4.

Display line one always indicates the title (or its abbreviation) of the current menu or function.

T	o	p		M	e	n	u												
→	•	C	o	n	f	i	g	u	r	a	t	i	o	n					
	•	M	a	i	n	t	e	n	a	n	c	e							
	•	O	p	e	r	a	t	i	o	n									↓

The **item pointer** to the left of an item indicates which item will be acted upon when the ENTER key is pressed. For example, press ENTER when the arrow points to Configuration and the display will change to the Configuration menu.

A dot in front of an item indicates a sub-menu. To go to the sub-menu, press the ENTER key.

DOWN and UP arrows indicate additional lines are to be seen by scrolling the display with the UP and DOWN key.

Figure 3-4   Top Menu Display

If the arrow is positioned next to Operation and then ENTER is pressed, a display similar to that shown in Figure 3-5 will be observed.

The up and down arrows at the right edge of the display indicate that additional choices are available. These additional choices can be viewed by using the ▲ (UP) and ▼ (DOWN) keys to scroll the display.

To go back to the Top Menu from any point, press the EXIT key until the Top Menu is displayed. The MENU key can also be pressed to accomplish the same result with a single keystroke. To leave the menu system entirely, press the EXIT or MENU key while the Top Menu is displayed.

Display line one gives the title of the current menu or function. The TLS will always try to spell out menu names as completely as possible in the 20 characters available.

A series of leading dots indicates that the next higher menu is the Top Menu.

•	•	•	•	•	•	•	•	•	•	•	O	p	e	r	a	t	i	o	n
→	•	E	l	e	m	e	n	t		S	t	a	t	u	s				
	•	E	x	c	h	a	n	g	e		C	a	r	t	s	.			
	•	M	o	v	e		C	a	r	t	r	i	d	g	e				↓
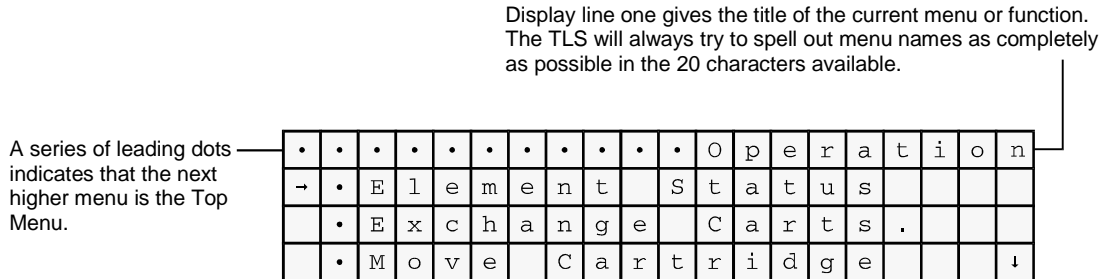
Figure 3-5   The Operation Menu

3.3   Menu Elements

3.3.1   Menu Items

Line 1 of any menu display always indicates the name of the menu, with the exception of the Top Menu, where menu names are right justified. If space permits, the name of, or an acronym for, the parent menu will precede the menu name. The parent menu name (if it is displayed) is left justified. Bullets fill the space between the two menu names. Examples:

LINE 1 DISPLAY	INTERPRETATION
Top Menu	Top Menu
•••••••Configuration	Configuration Menu
CA•••••Control Panel	Configuration\Advanced\Control Panel Menu
CA•Changer•Inventory	Configuration\Advanced\Changer\Inventory Menu
OES••••••••••Display	Operation\Element Status\Display Menu

Lines 2 through 4 of any menu display may contain the following items:

Menu Name	A Menu Name is displayed with a single leading bullet and an upper/lower case name. Example:
	• Maintenance
Command Name	A Command Name is displayed in all upper case letters without a bullet or colon. Example:
	SET TO DEFAULTS
Value Name	A Value Name is displayed with an initial capital letter, a colon after the name, followed by a right-justified value field. Example:
	Contrast: 48

3.3.2   Values

The data to the right of the colon after a value name represents the current value of that item. There are several types of values:

3.3.2.1   Numeric Values

These values may contain leading zeros. Valid values are separately determined for each item and are always within a contiguous range. All numeric values carry and borrow to or from their more significant neighbors. There are three types of numeric values found within the system:

- **Unsigned Decimal Values**
  Examples:
  23, 07, 123

- **Signed Decimal Values**
  These values are always indicated by the presence of a plus or minus sign in front of the numeric value. The plus or minus signs are editable.
  Examples:
  +07, +7, -123

- **Hexadecimal Values**
  These values are always unsigned and consist of the digits 0-9, and upper case letters A-F. Leading zeros are always indicated.
  Examples:
  003F, FE10

3.3.2.2   Alpha/Numeric Values

These values can contain up to 96 different characters including ten digits (0-9), upper and lower case letters and special characters, such as spaces, dashes, etc. There is no roll-over between digits. (See Table 3-4)
Example:
Qualstar TLS-88264

3.3.2.3   Multiple Choice Values

Each multiple choice value has its own list of valid choices. These values are not editable. The choices available may vary with different system configurations.
Examples:
YES, NO, BOTH, FRONT, HOST

NOTICE

The values displayed are always the actual values. If a displayed value is changed in the display, it is immediately changed within the system. If it is necessary to change back to an original value, the displayed value must be changed back to the original value.

3.3.3   Location Designators

A Location Designator contains six characters used to describe any *physical* location. A "**p**" in the first character signifies a *physical* location and then the five remaining characters are defined below. **When a character is not required to define a particular location, the character is replaced with a decimal point or dot.**

Space	Side	Face	Type/Story	Digit	Digit
p	L or R	1-6	A,B,H,I,P,S or T	0-9	0-9

Table 3-1   The *physical* Location Field

Character	Definition
Space	This character is always a lower-case "p" when describing the *physical* space. Characters a-d indicate logical libraries a-d element address space.
Side	The Side character will only appear in the 88xxx line of dual bay libraries. L for Left or R for Right. Defines which side the location is on. This is needed for all tape drives and magazine locations. A decimal point appears when this character is not needed.
Face	This character is only needed to describe which face the desired magazine is located on. A decimal point appears when this character is not needed.
Type/ Story	When describing a magazine location, the story (A, or B) is defined here. Note that stories are always uppercase. Besides magazine location, there are five other types of locations defined by this character: H for Handler, I for I/O Port, P for Private, S for Shuttle and T for Tape Drive.
Digits	These two digits are used to describe which tape drive or which magazine slot is selected.

Table 3-2 *physical* Character Definitions

Example	Definition
p..H..	The Handler (single bay models)
pL.H..	The left Handler (dual bay models)
pR.H..	The right Handler (dual bay models)
p..S..	The Shuttle (runs between the two handlers in dual bay models)
p..I..	The I/O Port (all models)
p.1A01	The first magazine storage location: Face 1, Story A, Slot 01 (single bay models)
p.1A11	The last storage location in the first magazine: Face 1, Story A, Slot 11 (single bay models) Note that TLS-6000 models have 10 slots and the TLS-5000 and TLS-8000 models have 11.
pL1A01	The first magazine storage location: Left Carousel, Face 1, Story A, Slot 1 (dual bay models) Note that TLS-6000 models have 10 slots and the TLS-5000 and TLS-8000 models have 11.
pL1A11	The last storage location in the first magazine: Left Carousel, Face 1, Story A, Slot 11 (dual bay models)
p..T1.	The topmost tape drive (single bay models)
pLT1.	The topmost tape drive on the left side (dual bay models)
pRT4.	The bottommost tape drive on the right side (dual bay models)
p.....	An unassigned location (all models)

Table 3-3 Location Designator Examples

3.3.4   Editing Values

To change a displayed value, point to its name using the ▲ (UP) and ▼ (DOWN) keys, then press ENTER. Not all values are editable. If the cursor does not appear over the value when the ENTER key is pressed, then the value cannot be changed. If the cursor appears over the first character only, the value is either numeric, alphanumeric, or a cartridge location. If the cursor appears over the entire value, it is a multiple-choice value.

3.3.4.1 Editing Multiple-Choice Values

If the item contains a multiple-choice value, the entire value will be overlaid with flashing block cursors. Use the ▲ (UP) key to select the next value and the ▼ (DOWN) key to select the previous value, then press EXIT when done. The list of choices wraps around, so the operator can see all the choices by using just the ▲ (UP) or ▼ (DOWN) key.

3.3.4.2 Editing non-Multiple-Choice Values

If only the first character of the value is highlighted with a flashing block cursor after pressing the ENTER key, the value is either numeric, alphanumeric, or a cartridge location. These values may be edited one character at a time, using the ENTER key to select the character to be edited, and then using the ▲ (UP) or ▼ (DOWN) key to change the character's value.

NOTE

The cursor wraps around from the last to the first character. Also, the ENTER, ▲ (UP) or ▼ (DOWN) keys automatically repeat when held down.

3.3.4.3 Editing Numeric Values

Numeric values may be edited one digit at a time, or the entire value may be changed, by simply incrementing or decrementing the least significant digit (or any intermediate digit). When incrementing the digit 9, it goes to 0 and a carry is added to the more significant digits. The opposite effect is true for decrementing. This process will automatically stop at the upper and lower limits of the valid range for each item. Remember to take advantage of the automatic key repeat feature by holding down either the ▲ (UP) or the ▼ (DOWN) key.

The system will never allow making any value invalid. The choice for each digit is limited to valid values. For example, valid values for the CAS LEFT Initiators or CAS RIGHT Initiators range from 0 to 15. The range of some valid values may change with a system's particular configuration.

3.3.4.4 Editing Alphanumeric Values

Either the ▲ (UP) or the ▼ (DOWN) keys can be used to edit alphanumeric characters one at a time. There are no carries or borrows to other characters. The choice for each particular character will be limited to valid characters, which vary with the item and the character's position within it.

The following table shows the available alphanumeric characters (A/N) and their hexadecimal (hex) equivalents. The characters occur in the order shown in the table, starting with the "space" character, followed by the "A" character and ending with the "ˋ" character. The hex equivalents are those values sent over the SCSI interface in response to SCSI commands.

A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex	A/N	hex
(space)	20	L	4C	X	58	j	6A	v	76	7	37	*	2A	[	5B
A	41	M	4D	Y	59	k	6B	w	77	8	38	+	2B	¥	5C
B	42	N	4E	Z	5A	l	6C	x	78	9	39	,	2C	]	5D
C	43	O	4F	a	61	m	6D	y	79	!	21	-	2D	^	5E
D	44	P	50	b	62	n	6E	z	7A	"	22	.	2E	_	5F
E	45	Q	51	c	63	o	6F	0	30	#	23	/	2F	{	7B
F	46	R	52	d	64	p	70	1	31	$	24	:	3A	|	7C
G	47	S	53	e	65	q	71	2	32	%	25	;	3B	}	7D
H	48	T	54	f	66	r	72	3	33	&	26	<	3C	→	7E
I	49	U	55	g	67	s	73	4	34	'	27	=	3D	←	7F
J	4A	V	56	h	68	t	74	5	35	(	28	>	3E	@	40
K	4B	W	57	i	69	u	75	6	36	)	29	?	3F	`	60

Table 3-4   Alphanumeric/Hex Equivalents

3.3.4.5   Editing Cartridge Location Values

There are two ways to edit cartridge location values with either the ▲ (UP) or the ▼ (DOWN) key. First, like an alpha/numeric value, a cartridge location value can be edited one character at a time. Alternately, the entire cartridge location value can be incremented or decremented, through a range of locations, by editing the least significant digit (or intermediate digits), in a manner similar to editing a numeric value. Refer to Section 3.3.4.3 for details about editing numeric values.

Cartridge location designators always contain one letter as follows:

A or **B**	Magazine Locations (B location not found on all models)
H	Handler
I	I/O Port Slot
L or R	Left or Right side of dual bay libraries
P	Private Slot (not available on all models)
S	Shuttle on dual bay libraries
T	Tape Drive Locations

Refer to Chapter 3 in the TLS-5/6/8000 Installation and Operation Manual (Qualstar document number 501450) for the ranges of location values and their physical locations.

To select a different designator, place the cursor on the letter and use the ▲ (UP) or the ▼ (DOWN) key to select a different letter. To further select a location that has digits, place the cursor over a digit. When magazine location digits are incremented or decremented, the value rolls over to the next (or previous) magazine. Examples:

```
A to B, 3L1B10 to 4L1A01, or 4R2A01 to 3R2B10
```

3.4   The Menu Hierarchy

The hierarchical menu system is divided into three menus: Configuration, Maintenance and Operation. Each of these menus contains several sub-menus. Some of the sub-menus may also contain more sub-menus beneath them.

The Top Menu is the highest level in the menu hierarchy. Press the MENU key to go to the top level at any time and from any point within the menu system. When the Top Menu is displayed, press the EXIT key to exit the menu mode. Figure 3-6 shows the available menu items in the Top Menu. The line items in menus and sub-menus are organized in alphabetical order.

Line 1		T	o	p		M	e	n	u											
Line 2	→	•	C	o	n	f	i	g	u	r	a	t	i	o	n					
Line 3		•	M	a	i	n	t	e	n	a	n	c	e							
Line 4		•	O	p	e	r	a	t	i	o	n									

Figure 3-6   Top Menu

The Configuration menu contains items that may need to be changed when the TLS is installed. Once the configuration parameters have been correctly set for a given installation, they are not changed unless something in the system's configuration is changed. The functions available under the Configuration menu are fully explained in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450).

NOTE

Be aware that the configuration parameters may also be set by the SCSI interface. A change may have been caused by the host software.

The Maintenance menu is designed to help a qualified repair technician diagnose and repair the TLS.

The Operation menu is designed for the user, and lets the user perform off-line tasks associated with the operation of the TLS. The Operation menu is described in detail in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450).

3.5   Displaying the TLS Firmware Revision

The revision of the changer's firmware may be displayed by using the `Maintenance` menu. Press the MENU key to display the `Top Menu`. Press the ▼ (DOWN) key until the arrow on the left side of the display points to `MAINTENANCE`, then press the ENTER key. Again, press the ▼ (DOWN) key until the arrow on the left side of the display points to the `Display Revision` sub-menu. Press the ENTER key to view the Date, Part Number, Revision, Checksum and Id of the changer's installed firmware.

3.6   Alerts

Alerts are important messages, which take over the entire display and remain visible until dismissed by the operator. If the alert message is longer than four lines, a down arrow in the lower right corner indicates more text is visible by scrolling the display with the ▼ (DOWN) key. The top line of an alert is always displayed in upper case letters and is centered with bullets filling out the line. Example:

•	•	•	M	O	V	E		C	A	R	T	R	I	D	G	E	•	•	•
	T	h	e		d	e	s	t	i	n	a	t	i	o	n		i	s	
	f	u	l	l	.														

Figure 3-7   Alert Example

Alerts can always be dismissed by pressing the EXIT key. When the EXIT key is pressed while an alert message is visible, the unit returns to the state it was in before the alert. The MENU key can also be used to dismiss alerts. When the MENU key is pressed while an alert message is visible, the display returns to the Top Menu.

3.7   Dynamic Menus and Menu Items

Dynamic menus and menu items only appear if all the required conditions for the menu have been configured and satisfied. For example, the Clean Drive Menu only appears when all conditions are correct. Additionally, the `Operation\Sequential` menu will only appear when one or more tape drives are configured for Sequential operation.

4.   Maintenance Menu

The Maintenance menu is used to display detailed information about the TLS and its operating history, and to test the functionality of the liquid crystal display and menu control keys. The Maintenance menu is available to the system user and is considered safe. The user cannot break anything by using, or misusing, this menu. Diagrams showing the entire structure of the Maintenance menu system are shown in Figure 4-1 and Figure 4-2.

```
LEGEND
l = cartridge location
d = decimal number
x = hexadecimal number
? = alphanumeric character
```

```
·········Maintenance
·Display Log
·Display Prevents
·Display Revision
·Display Stats.
·Display Voltage
·Test Inventory
·Test Keyboard
·Test LC Display
```

```
M·········Display Log
·Display
·Display Left
·Display Right
BDC:            OFF
Clean:          OFF
Configuration: OFF
DriveBay:       OFF
Executive:      OFF
FC Events:      OFF
FC Replies:     OFF
FC States:      OFF
I2c:            OFF
Inventory:      OFF
Ioport:         OFF
RBT Actions:    OFF
RBT Client:     OFF
RBT Events:     OFF
RBT I/O Port:   OFF
RBT Machines:   OFF
RBT Operations:OFF
RBT States:     OFF
SCSI Commands:   ON
SCSI Interrupt:OFF
SCSI Phases:    OFF
SCSI States:    OFF
Sequential:     OFF
CLEAR
LOCK
UNLOCK
```

```
MDL·Display····Entry
MDLD·Left······Entry
MDLD·Right·····Entry
At:ddddddddd.ddddd
BDC:            OFF
Clean           OFF
Configuration: OFF
DriveBay:       OFF
Executive:      OFF
FC Events:      OFF
FC Replies:     OFF
FC States:      OFF
I2c:            OFF
Inventory:      OFF
Ioport:         OFF
RBT Actions:    OFF
RBT Client:     OFF
RBT Events:     OFF
RBT I/O Port:   OFF
RBT Machines:   OFF
RBT Operations:OFF
RBT States:     OFF
SCSI Commands:   ON
SCSI Interrupt:OFF
SCSI Phases:    OFF
SCSI States:    OFF
Sequential:     OFF
LOCK
```

```
M···Display Prevents
Initiator 0
Initiator 1
Initiator 2
Initiator 3
Initiator 4
Initiator 5
Initiator 6
Initiator 7
Initiator 8
Initiator 9
Initiator 10
Initiator 11
Initiator 12
Initiator 13
Initiator 14
Initiator 15
Initiator L0
Initiator L1
Initiator L2
Initiator L3
Initiator L4
Initiator L5
Initiator L6
Initiator L7
Initiator L8
Initiator L9
Initiator L10
Initiator L11
Initiator L12
Initiator L13
Initiator L14
Initiator L15
Initiator R0
Initiator R1
Initiator R2
Initiator R3
Initiator R4
Initiator R5
Initiator R6
Initiator R7
Initiator R8
Initiator R9
Initiator R10
Initiator R11
Initiator R12
Initiator R13
Initiator R14
Initiator R15
```

```
M···Display Revision
Date:    mm/dd/yyyy
Part Number:700105
Revision:     d.dd
Checksum:     xxxx
```

```
M·····Display Stats.
·Left
·Right
Aborts: dddddddddd
DoorOpn:dddddddddd
Exchang:dddddddddd
Filter: dddddddddd
Grips:  dddddddddd
I Calls:dddddddddd
I Moves:dddddddddd
I Steps:dddddddddd
Minutes:dddddddddd
Moves:  dddddddddd
Picks:  dddddddddd
Places: dddddddddd
PowerOn:dddddddddd
Resets: dddddddddd
S Cmnds:dddddddddd
X Moves:dddddddddd
X Steps:dddddddddd
Y Moves:dddddddddd
Y Steps:dddddddddd
Z Moves:dddddddddd
Z Steps:dddddddddd
```

```
MDS·············Left
Grips:  dddddddddd
Picks:  dddddddddd
Places: dddddddddd
X Moves:dddddddddd
X Steps:dddddddddd
Y Moves:dddddddddd
Y Steps:dddddddddd
Z Moves:dddddddddd
Z Steps:dddddddddd
```

Note that the bold menu items are model dependent. Libraries with single bays have a single SCSI ID sub-menu while libraries with dual bays (58xxx/68xxx/88xxx models), instead have SCSI ID LEFT and SCSI ID RIGHT sub-menus.

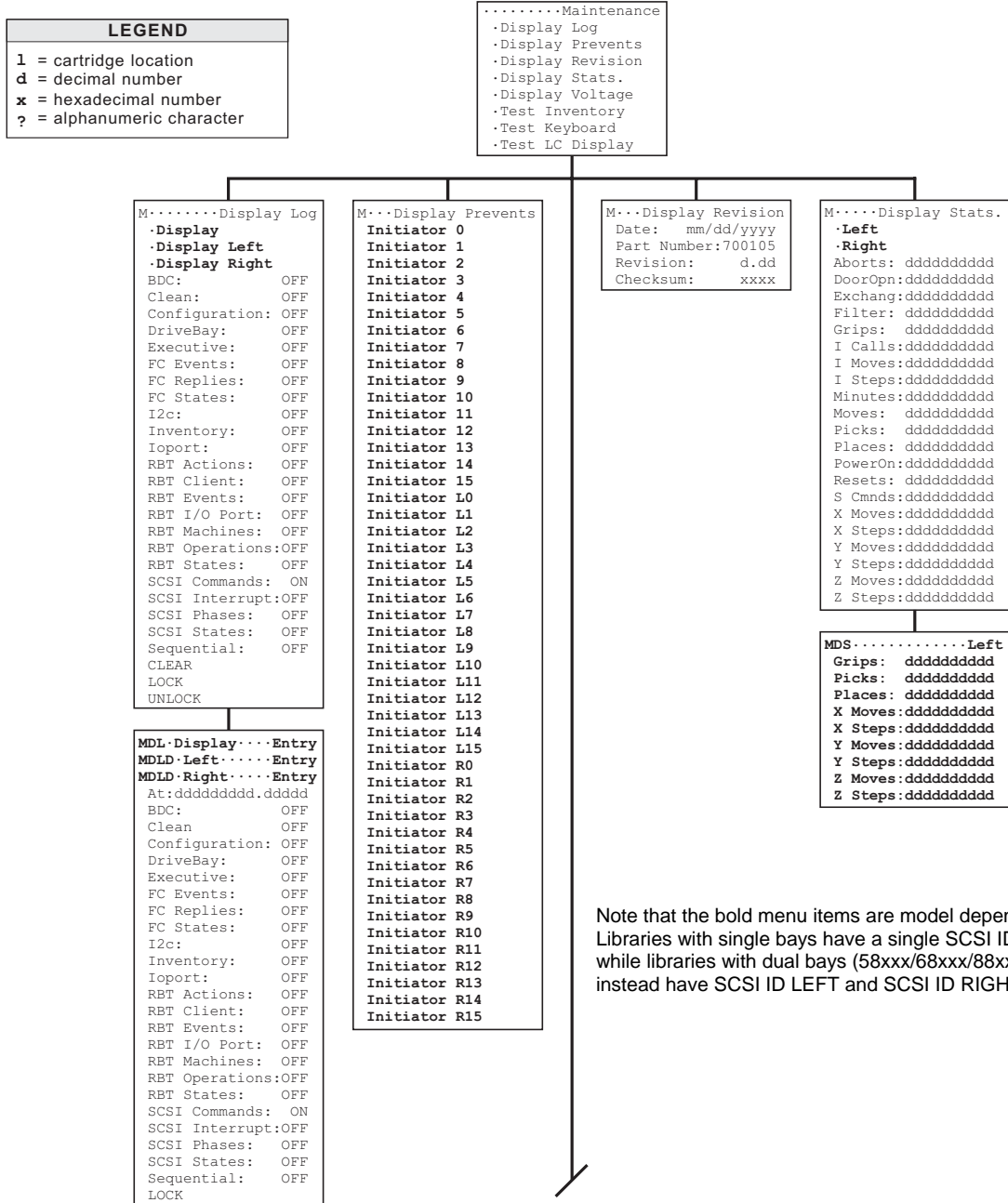Continued in Figure 4-2

Figure 4-1   Maintenance Menu (Part 1)

Continued from Figure 4-1

Note that the bold menu items are model dependent.
Libraries with single bays have a single SCSI ID sub-menu
while libraries with dual bays (58xxx/68xxx/88xxx models), in-
stead have SCSI ID LEFT and SCSI ID RIGHT sub-menus.

```
M····Display Voltage
·Left
·Right
+3.3V:      dd.ddd
+5V:        dd.ddd
+12V:       dd.ddd
```

```
MDV···········Left
+3.3V:      dd.ddd
+5V:        dd.ddd
+12V:       dd.ddd
```

```
M·····Test Inventory
# Cartridges: ddddd
# Labels:     ddddd
CLEAR
START
STOP
```

```
M······Test Keyboard
ENTER & EXIT to exit
Up?  Ex?  Re?
Do?  En?  Me?  ddddd
```

```
M····Test LC Display
!"#$%&'()*+,-./  □
0123456789:;<=>? □
@ABCDEFGHIJKLMNO
```

```
M····Test LC Display
PQRSTUVWXYZ[\]^_   □
`abcdefghijklmno  □
pqrstuvwxyz{|}~▒  ■
```

~ displays as a right-pointing arrow.
▒ displays as a left-pointing arrow.
\ displays as yen symbol.

```
·············Private
Private menu access
for setting passwords.
See Section 5.3.
```

(This screen blinks.)

Figure 4-2   Maintenance Menu (Part 2)

NOTE

The menus in this chapter reflect revision 2.24 of the Executive PCBA EPROM software. If a different revision of the software is being used, some menu items may not appear in the menus.

4.1   Maintenance Menu

```
·········Maintenance
·Display Log
·Display Prevents
·Display Revision
·Display Stats.
·Display Voltage
·Test Inventory
·Test Keyboard
·Test LC Display
```

The Maintenance menu contains multiple Display items. Display items look like the sub-menus found in the Configuration and Operation menus, but they generally do not contain editable values or executable functions. We prefer to call the Display items status screens, because they display the present status of various TLS elements.

NOTE

Note that the bold menu items are model dependent. Libraries with single bays have a single SCSI ID sub-menu while libraries with dual bays (58xxx/68xxx/88xxx models), instead have SCSI ID LEFT and SCSI ID RIGHT sub-menus.
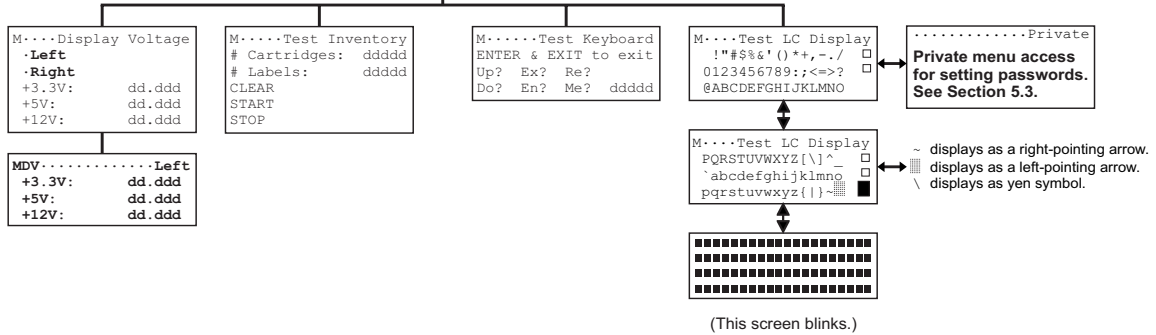
4.2   Maintenance\Display Log Menu

```
M·······Display Log
  Display
  Display Left
  Display Right
 BDC:          OFF
 Clean:        OFF
 Configuration: OFF
 DriveBay:     OFF
 Executive:    OFF
 FC Events:    OFF
 FC Replies:   OFF
 FC States:    OFF
 I2c:          OFF
 Inventory:    OFF
 Ioport:       OFF
 RBT Actions:  OFF
 RBT Client:   OFF
 RBT Events:   OFF
 RBT I/O Port: OFF
 RBT Machines: OFF
 RBT Operations:OFF
 RBT States:   OFF
 SCSI Commands:  ON
 SCSI Interrupt:OFF
 SCSI Phases:  OFF
 SCSI States:  OFF
 Sequential:   OFF
 CLEAR
 LOCK
 UNLOCK
```

The TLS has a built-in logging facility that can keep track of various system activities. The settings made in the Configuration\Advanced\Log menu determine which TLS activities are logged. (See the TLS-5000/6000/8000 Installation and Operation Manual. Qualstar document number 501450). The Display Log menu determines which of the logged items are to be displayed. If an item is set ON, any of its logged data will be displayed. If an item is set OFF, it will not be displayed. The logging facility is normally used to analyze complex SCSI interface or Handler operation problems.

The logging system is most effectively used by a field service person who is working under the direction of a Qualstar Technical Support technician. First, the field service person reports a problem's symptom(s) to a Qualstar Technical Support technician, then the technician directs the field service person to look only at problem–specific logged data. Finally, the logged data is evaluated to help determine the cause of the problem.

The TLS logs so much data about its internal workings that the data can overwhelm an inexperienced person. If intermittent or unusual system problems are encountered, we recommend that the user contact Qualstar's Technical Support Department first, before the user tries to analyze the problem using the logged activity information presented in this section.

NOTE

Use the Configuration\Advanced\Log menu to control which categories of information get logged. Since the data log memory size is fixed, turning off unwanted data categories frees up log memory space for the data categories that the user wishes to log. Refer to the Configuration\Advanced\Log section in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450) for details.

4.2.1   Maintenance\Display Log\CLEAR Command

CAUTION

Invoking the CLEAR command clears the entire data log.

4.2.2   Maintenance\Display Log\LOCK Command

This command locks the log so that no entries can be changed or new ones added.

4.2.3   Maintenance\Display Log\UNLOCK Command

This command unlocks the log and allows data to be tabulated.

A complete description of all of the possible data logged by the TLS is beyond the scope of field service requirements and is therefore not included in this manual. The logging system is most effectively used by a field service person who is working under the direction of a Qualstar Technical Support technician.

4.3   Maintenance\Display Log\Display\Entry Menu

```
MDL·Display····Entry
MDLD Left······Entry
MDLD Right·····Entry
 At:dddddddddd.ddddd
 BDC:           OFF
 Clean:         OFF
 Configuration: OFF
 DriveBay:      OFF
 Executive:     OFF
 FC Events:     OFF
 FC Replies:    OFF
 FC States:     OFF
 I2c:           OFF
 Inventory:     OFF
 Ioport         OFF
 RBT Actions:   OFF
 RBT Client:    OFF
 RBT Events:    OFF
 RBT I/O Port:  OFF
 RBT Machines:  OFF
 RBT Operations:OFF
 RBT States:    OFF
 SCSI Commands:  ON
 SCSI Interrupt:OFF
 SCSI Phases:   OFF
 SCSI States:   OFF
 Sequential:    OFF
 LOCK
```

CAUTION

> ***The information in the data log is frozen when the user enters the Entry menu.*** *No events are logged while the Entry menu is displayed. However, the system does track the number of events that would have been logged, while the Entry menu was displayed, and then adds that number as a log entry when the user exits the Entry menu. This tells the user how many events occurred while the Entry menu was displayed.*

1.   To view the Entry menu or the Left or Right Entry menu on dual bay units, press the ENTER key while the Maintenance\Display Status screen is displayed. The Display Log\Entry menu is the same as the Display Log menu, except that the At item has been added and the CLEAR and UNLOCK commands have been deleted.

NOTE

> *Use the Configuration\Advanced\Log menu to control which classes of information get logged. Since the data log memory size is fixed, turning off unwanted data classes frees up log memory space for the data classes that the user wishes to log. Refer to the Configuration\Advanced\Log section in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450) for details.*

The user can also use the Display Log\Entry menu to turn the data display class masks on or off, as the user can do with the Display Log menu. The difference here is that logging activity is suspended when the user enters the Display Status screen, and remains suspended while the Display Log\Entry menu is displayed. Logging activity is reactivated when the user returns to the Maintenance\Display Log menu.

2. Press the EXIT key twice to return to the Maintenance\Display Log menu.

4.4   Maintenance\Display\Prevents Status Screen

```
M···Display Prevents
 Initiator 0
 Initiator 1
 Initiator 2
 Initiator 3
 Initiator 4
 Initiator 5
 Initiator 6
 Initiator 7
 Initiator 8
 Initiator 9
 Initiator 10
 Initiator 11
 Initiator 12
 Initiator 13
 Initiator 14
 Initiator 15
 Initiator L0
 Initiator L1
 Initiator L2
 Initiator L3
 Initiator L4
 Initiator L5
 Initiator L6
 Initiator L7
 Initiator L8
 Initiator L9
 Initiator L10
 Initiator L11
 Initiator L12
 Initiator L13
 Initiator L14
 Initiator L15
 Initiator R0
 Initiator R1
 Initiator R2
 Initiator R3
 Initiator R4
 Initiator R5
 Initiator R6
 Initiator R7
 Initiator R8
 Initiator R9
 Initiator R10
 Initiator R11
 Initiator R12
 Initiator R13
 Initiator R14
 Initiator R15
```

The Display\Prevents Status screen displays the Initiator number (host SCSI ID) of every host that has issued a Prevent/Allow Medium Removal SCSI command with it's Prevent Bit set. Setting this bit completely disables the I/O port. This menu allows one to determine *who* disabled the I/O port.

4.5 Maintenance\Display Revision Status Screen

```
M···Display Revision
 Date:   mm/dd/yyyy
 Part Number:700105
 Revision:     d.dd
 Checksum:     xxxx
```

The Display Revision status screen displays the current revision level of the operating firmware and the unique identification number of the TLS. The values displayed include:

- Date:
  This is the release date of the current firmware.

- Part Number:
  This is the manufacturing part number of the current firmware.

- Revision:
  This is the revision number of the current firmware.

- Checksum:
  This is the checksum value of the current firmware. (It takes a second to calculate this value).

4.6 Maintenance\Display Stats. Status Screen

```
M·····Display Stats.
 ·Left
 ·Right
 Aborts: dddddddddd
 DoorOpn:dddddddddd
 Exchang:dddddddddd
 Filter: dddddddddd
 Grips:  dddddddddd
 I Calls:dddddddddd
 I Moves:dddddddddd
 I Steps:dddddddddd
 Minutes:dddddddddd
 Moves:  dddddddddd
 Picks:  dddddddddd
 Places: dddddddddd
 PowerOn:dddddddddd
 Resets: dddddddddd
 S Cmnds:dddddddddd
 X Moves:dddddddddd
 X Steps:dddddddddd
 Y Moves:dddddddddd
 Y Steps:dddddddddd
 Z Moves:dddddddddd
 Z Steps:dddddddddd
```

The Display Statistics status screen displays a summary of events that have occurred since the TLS was built. All values are decimal counts of the number of times an event has occurred. Displayed values include:

- Aborts
  This value is the number of times that a Handler movement has been aborted. The most frequent cause for Handler aborts is opening the front door.

- DoorOpn
  This value is the number of times that the front door has been opened.

- Exchang
  This value is the number of cartridge exchanges that have been performed, including exchanges executed by SCSI command and exchanges executed by operator command via the menu system.

- Filter
  This value is the number of minutes since the air filter was last changed.

- Grips
  This value is the number of times that the cartridge Gripper solenoid has been actuated.

- I Calls
  This value is the number of times that the � (Daisy) + MENU key have been pressed to activate the I/O port.

- I Moves
  This value is the number of times that the I/O port slot has moved. (The I/O port slot's extend/retract cycle counts as two moves.)

- I Steps
  This value is the number of I/O port stepper motor steps (200/revolution, 800/inch).

- Minutes
  This value is the number of power-on minutes.

- Moves
  This value is the number of cartridge moves.

- Picks
  This value is the number of times that a cartridge has been removed from a drive or storage location.

- Places
  This value is the number of times that a cartridge has been placed into a drive or storage location.

- PowerOn
  This value is the number of times that the power has been turned on.

- Resets
  This value is the number of Executive CPU resets, including power-on resets and SCSI bus resets.

- S Cmnds
  This value is the number of SCSI commands received by the TLS.

- X Moves

  This value is the number of carousel movements.

- X Steps

  This value is the number of X–Axis (carousel) motor steps (3200 steps/revolution).

- Y Moves

  This value is the number of vertical Y–Axis (up/down) cartridge Handler movements. (Note that some movements can be very small.)

- Y Steps

  This value is the number of Y–Axis motor commutations (24/revolution).

- Z Moves

  This value is the number of Z–Axis (in/out) cartridge Handler movements.

- Z Steps

  This value is the number of Z–Axis motor commutations (24/revolution, 120/inch).

4.7   Maintenance\Display Stats. (Left or Right) Status Screen

```
MDS············Left
 Grips:  dddddddddd
 Picks  :dddddddddd
 Places :dddddddddd
 X Moves:dddddddddd
 X Steps:dddddddddd
 Y Moves:dddddddddd
 Y Steps:dddddddddd
 Z Moves:dddddddddd
 Z Steps:dddddddddd
```

These are two identical menus for displaying a summary of the left or right side specific events in dual bay libraries that have occurred since the TLS was built. Only the left display text is shown. The right text is quite similar. All values are decimal counts of the number of times an event has occurred.

4.8   Maintenance\Display Voltage Status Screen

```
M····Display Voltage
 ·Left
 ·Right
+3.3V:      dd.ddd
+5V:        dd.ddd
+12V:       dd.ddd
```

In a dual bay library the Display Voltage status screen initially displays the three power supply voltages on the right side Executive circuit board. Select the Left sub-menu to see the voltages on the left Executive circuit board. Single bay libraries will simply display the three lines of voltage status information.

The +12V supply is the output from the Handler power supply or supplies. The +5Vand +3.3V supplies are the output of voltage regulators on Executive PCBA's. The

presence (but not the value) of all three supplies are indicated by LEDs on each Executive PCBA.

4.9   Maintenance\Test Inventory Status Screen

```
M.....Test Inventory
# Cartridges:  ddddd
# Labels:      ddddd
CLEAR
START
STOP
```

The Test Inventory operation allows continuous scans of the TLS. Updates to the `#  Cartridges` and `# Labels` occurs at the end of each scan. The `# cartridges` and `# Labels` are accumulated values. The increment that occurs for each scan should match the physical contents of the TLS. The Test Inventory menu is only visible if an access word has been entered into the TLS. (See Sections 5.3.1 and 5.3.2)

Perform a `CLEAR` command to clear the contents of the two accumulators. Perform a `START` command to start the test. Perform a `STOP` command to stop the test at the end of a complete pass. `STOP` only appears when a test is running. `START` and `CLEAR` only appear when a test is stopped.

4.10   Maintenance\Test Keyboard Status Screen

```
M······Test Keyboard
ENTER & EXIT to exit
Up*   Ex*   Re*
Do*   En*   Me*   ddddd
```

The Test Keyboard status screen provides a direct indication of menu control key functionality. Whenever a key is pressed, its 2-character abbreviation appears on the screen (Up, Ex, Re, Do, En, Me). If a key is pressed and held down, a blinking asterisk (*) appears on the screen next to the key's abbreviation.

To exit the Test Keyboard screen and return to the Maintenance menu, press the EXIT and ENTER keys at the same time.

NOTE

During normal operation, pressing and holding a key down results in automatic repeat keystroke activity.

When all keys are released, the bottom two lines of the Test Keyboard screen should be blank, with the exception of the keystroke counter display in the lower-right corner of the screen.

The keystroke counter display indicates the number of key presses that occur while the Test Keyboard screen is in use. The keystroke count should increase by one and

only one number each time a control key is pressed. The keystroke count should not increase while a key is held down or when a key is released. If the keystroke count does increase while a key is held down, or when a key is released, a problem with a control key switch or the keypad ground connection may exist. In this case, please refer to Chapter 6 of this manual for additional troubleshooting information.

4.11   Maintenance\Test LC Display Status Screen

```
M····Test LC Display
 !"#$%&'()*+,-./   □
 0123456789:;<=>?  □
 @ABCDEFGHIJKLMNO
```

↕

```
M····Test LC Display
 PQRSTUVWXYZ[\]^_   □
 `abcdefghijklmno  □
 pqrstuvwxyz{|}~▓
```

↕

```
■■■■■■■■■■■■■■■■■■■■
■■■■■■■■■■■■■■■■■■■■
■■■■■■■■■■■■■■■■■■■■   (This screen blinks)
■■■■■■■■■■■■■■■■■■■■
```

~ displays as a right-pointing arrow
▓ displays as a left pointing arrow
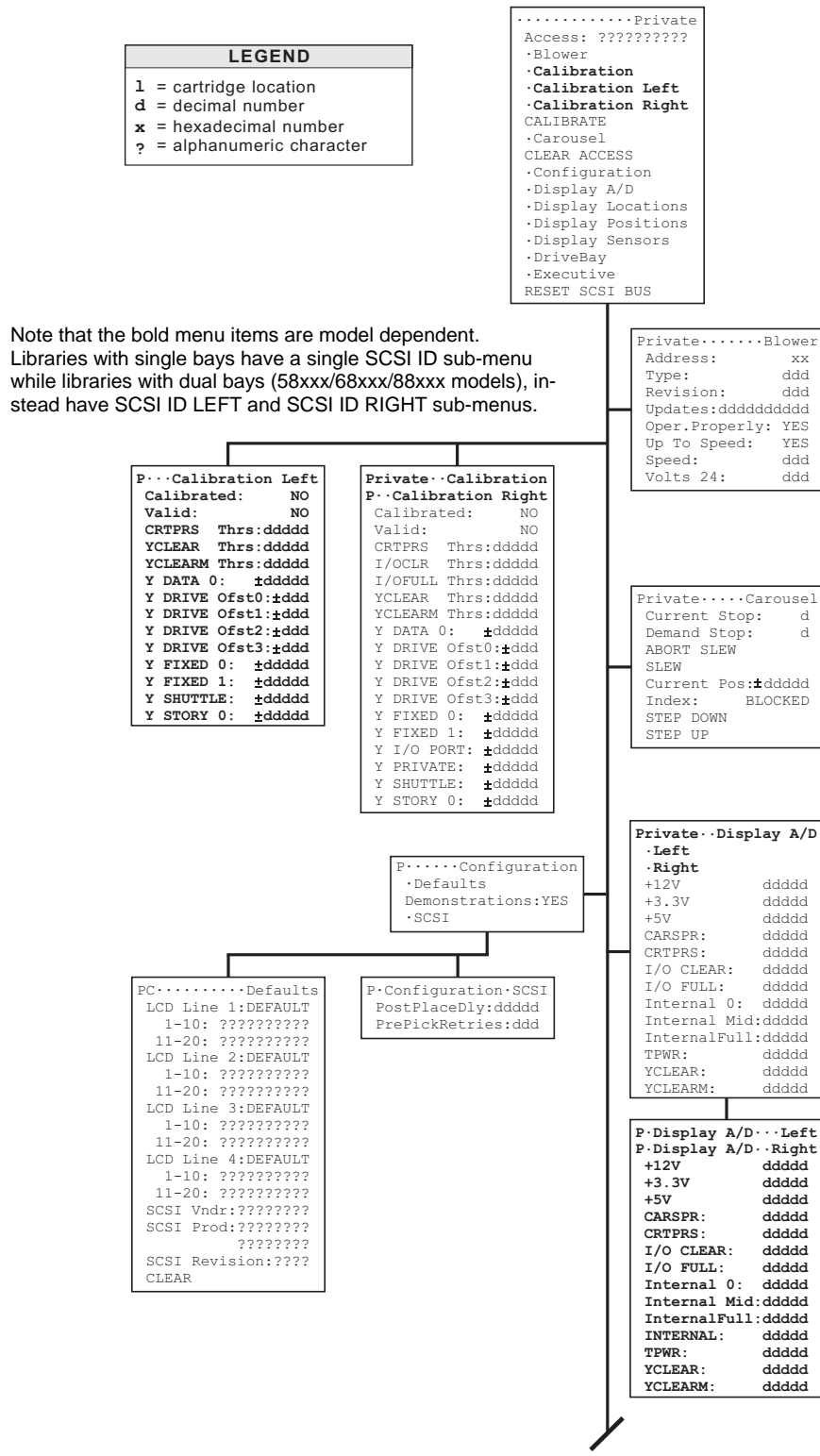\ displays as a Yen symbol
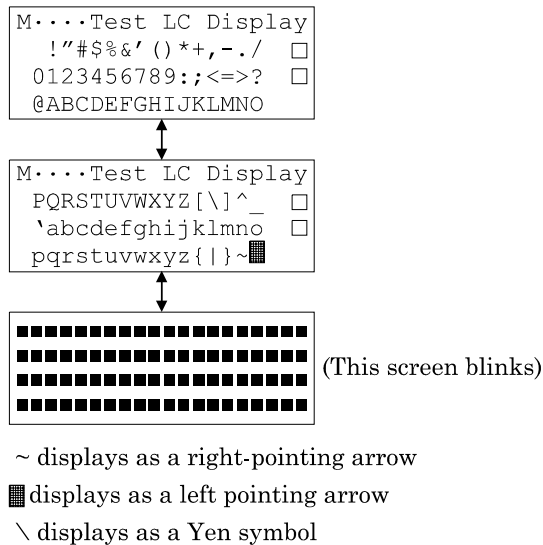
The TLS uses a four-line Liquid Crystal Display that displays 20 characters per line. This status screen uses three different test screens to check the operation of the display. After selecting the Maintenance\Test LC Display screen, use either the ▲ (UP) or ▼ (DOWN) key to select any one of the three test screens.

The first two test screens display the character set used by the TLS. The third test screen checks the operation of all display pixels, by turning them all on or all off at the same time (the screen blinks). When all of the pixels are turned on, the user should see four lines of 20 solid rectangles each. When all of the pixels are turned off, all four lines should be blank.

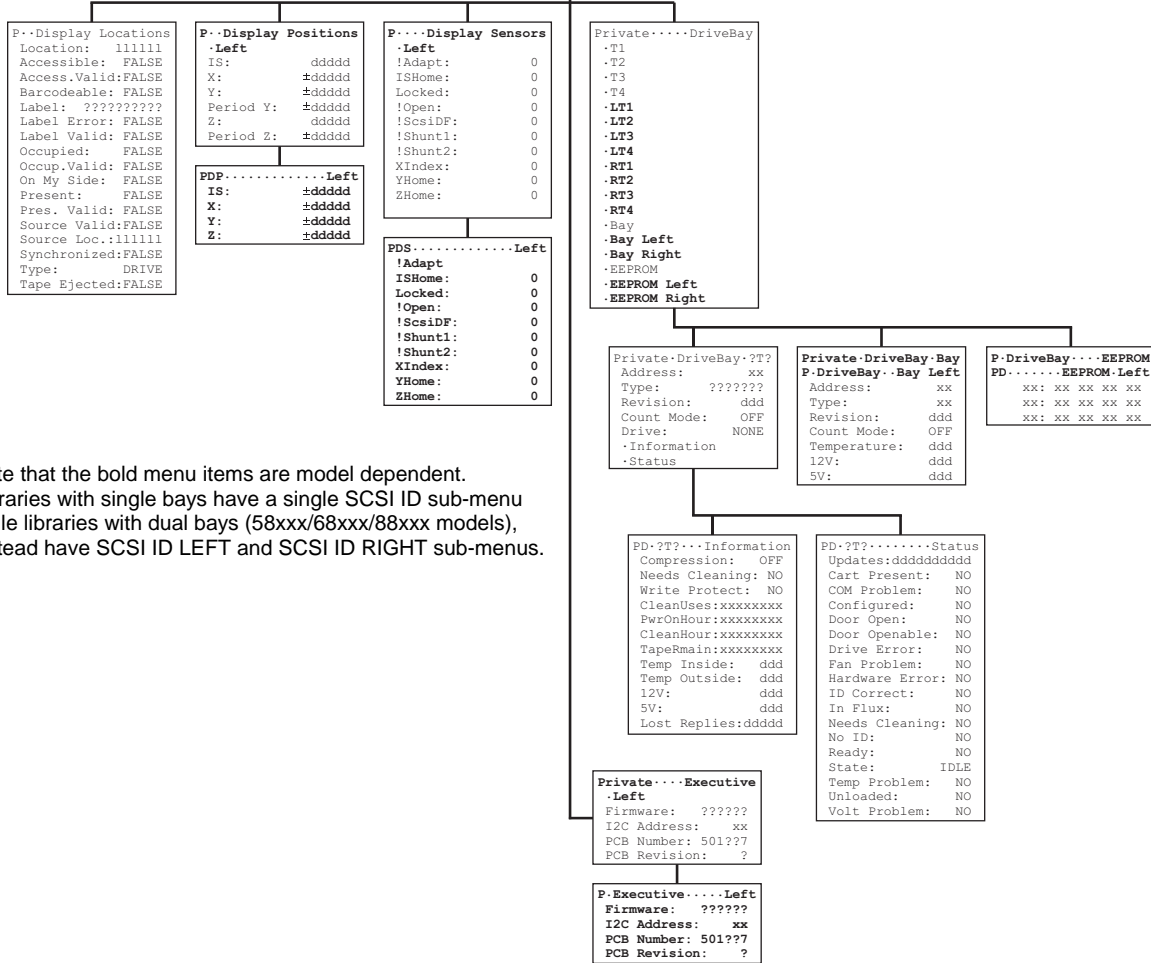Press the EXIT key to return to the Maintenance menu.

5. The Private Menu

```
············Private
Access: ??????????
·Blower
·Calibration
·Calibration Left
·Calibration Right
CALIBRATE
·Carousel
CLEAR ACCESS
·Configuration
·Display A/D
·Display Locations
·Display Positions
·Display Sensors
·DriveBay
·Executive
RESET SCSI BUS
```

LEGEND

l = cartridge location
d = decimal number
x = hexadecimal number
? = alphanumeric character

Note that the bold menu items are model dependent.
Libraries with single bays have a single SCSI ID sub-menu
while libraries with dual bays (58xxx/68xxx/88xxx models), in-
stead have SCSI ID LEFT and SCSI ID RIGHT sub-menus.

```
Private·······Blower
Address:       xx
Type:         ddd
Revision:     ddd
Updates:dddddddddd
Oper.Properly: YES
Up To Speed:   YES
Speed:        ddd
Volts 24:     ddd
```

```
P···Calibration Left
Calibrated:      NO
Valid:           NO
CRTPRS  Thrs:ddddd
YCLEAR  Thrs:ddddd
YCLEARM Thrs:ddddd
Y DATA 0:    ±ddddd
Y DRIVE Ofst0:±ddd
Y DRIVE Ofst1:±ddd
Y DRIVE Ofst2:±ddd
Y DRIVE Ofst3:±ddd
Y FIXED 0:   ±ddddd
Y FIXED 1:   ±ddddd
Y SHUTTLE:   ±ddddd
Y STORY 0:   ±ddddd
```

```
Private··Calibration
P··Calibration Right
Calibrated:      NO
Valid:           NO
CRTPRS  Thrs:ddddd
I/OCLR  Thrs:ddddd
I/OFULL Thrs:ddddd
YCLEAR  Thrs:ddddd
YCLEARM Thrs:ddddd
Y DATA 0:    ±ddddd
Y DRIVE Ofst0:±ddd
Y DRIVE Ofst1:±ddd
Y DRIVE Ofst2:±ddd
Y DRIVE Ofst3:±ddd
Y FIXED 0:   ±ddddd
Y FIXED 1:   ±ddddd
Y I/O PORT: ±ddddd
Y PRIVATE:   ±ddddd
Y SHUTTLE:   ±ddddd
Y STORY 0:   ±ddddd
```

```
Private·····Carousel
Current Stop:    d
Demand Stop:     d
ABORT SLEW
SLEW
Current Pos:±ddddd
Index:      BLOCKED
STEP DOWN
STEP UP
```

```
Private··Display A/D
·Left
·Right
+12V          ddddd
+3.3V         ddddd
+5V           ddddd
CARSPR:       ddddd
CRTPRS:       ddddd
I/O CLEAR:    ddddd
I/O FULL:     ddddd
Internal 0:   ddddd
Internal Mid:ddddd
InternalFull:ddddd
TPWR:         ddddd
YCLEAR:       ddddd
YCLEARM:      ddddd
```

```
P······Configuration
·Defaults
Demonstrations:YES
·SCSI
```

```
PC··········Defaults
LCD Line 1:DEFAULT
  1-10: ??????????
 11-20: ??????????
LCD Line 2:DEFAULT
  1-10: ??????????
 11-20: ??????????
LCD Line 3:DEFAULT
  1-10: ??????????
 11-20: ??????????
LCD Line 4:DEFAULT
  1-10: ??????????
 11-20: ??????????
SCSI Vndr:????????
SCSI Prod:????????
          ????????
SCSI Revision:????
CLEAR
```

```
P·Configuration·SCSI
PostPlaceDly:ddddd
PrePickRetries:ddd
```

```
P·Display A/D···Left
P·Display A/D··Right
+12V          ddddd
+3.3V         ddddd
+5V           ddddd
CARSPR:       ddddd
CRTPRS:       ddddd
I/O CLEAR:    ddddd
I/O FULL:     ddddd
Internal 0:   ddddd
Internal Mid:ddddd
InternalFull:ddddd
INTERNAL:     ddddd
TPWR:         ddddd
YCLEAR:       ddddd
YCLEARM:      ddddd
```

Continued in Figure 5-2

Figure 5-1   The Private Menu (Part 1)

Continued from Figure 5-1

```
P··Display Locations
 Location:   llllll
 Accessible:  FALSE
 Access.Valid:FALSE
 Barcodeable: FALSE
 Label: ??????????
 Label Error: FALSE
 Label Valid: FALSE
 Occupied:    FALSE
 Occup.Valid: FALSE
 On My Side:  FALSE
 Present:     FALSE
 Pres. Valid: FALSE
 Source Valid:FALSE
 Source Loc.:llllll
 Synchronized:FALSE
 Type:        DRIVE
 Tape Ejected:FALSE
```

```
P··Display Positions
 ·Left
 IS:         ddddd
 X:         ±ddddd
 Y:         ±ddddd
 Period Y:  ±ddddd
 Z:          ddddd
 Period Z:  ±ddddd
```

```
PDP············Left
 IS:        ±ddddd
 X:         ±ddddd
 Y:         ±ddddd
 Z:         ±ddddd
```

```
P····Display Sensors
 ·Left
 !Adapt:        0
 ISHome:        0
 Locked:        0
 !Open:         0
 !ScsiDF:       0
 !Shunt1:       0
 !Shunt2:       0
 XIndex:        0
 YHome:         0
 ZHome:         0
```

```
PDS············Left
 !Adapt
 ISHome:        0
 Locked:        0
 !Open:         0
 !ScsiDF:       0
 !Shunt1:       0
 !Shunt2:       0
 XIndex:        0
 YHome:         0
 ZHome:         0
```

```
Private·····DriveBay
 ·T1
 ·T2
 ·T3
 ·T4
 ·LT1
 ·LT2
 ·LT3
 ·LT4
 ·RT1
 ·RT2
 ·RT3
 ·RT4
 ·Bay
 ·Bay Left
 ·Bay Right
 ·EEPROM
 ·EEPROM Left
 ·EEPROM Right
```

Note that the bold menu items are model dependent. Libraries with single bays have a single SCSI ID sub-menu while libraries with dual bays (58xxx/68xxx/88xxx models), instead have SCSI ID LEFT and SCSI ID RIGHT sub-menus.

```
Private·DriveBay·?T?
 Address:     xx
 Type:    ???????
 Revision:    ddd
 Count Mode:  OFF
 Drive:      NONE
 ·Information
 ·Status
```

```
Private·DriveBay·Bay
P·DriveBay··Bay Left
 Address:     xx
 Type:        xx
 Revision:    ddd
 Count Mode:  OFF
 Temperature: ddd
 12V:         ddd
 5V:          ddd
```

```
P·DriveBay····EEPROM
PD·······EEPROM·Left
 xx: xx xx xx xx
 xx: xx xx xx xx
 xx: xx xx xx xx
```

```
PD·?T?···Information
 Compression:   OFF
 Needs Cleaning: NO
 Write Protect:  NO
 CleanUses:xxxxxxxx
 PwrOnHour:xxxxxxxx
 CleanHour:xxxxxxxx
 TapeRmain:xxxxxxxx
 Temp Inside:   ddd
 Temp Outside:  ddd
 12V:           ddd
 5V:            ddd
 Lost Replies:ddddd
```

```
PD·?T?·········Status
 Updates:dddddddddd
 Cart Present:   NO
 COM Problem:    NO
 Configured:     NO
 Door Open:      NO
 Door Openable:  NO
 Drive Error:    NO
 Fan Problem:    NO
 Hardware Error: NO
 ID Correct:     NO
 In Flux:        NO
 Needs Cleaning: NO
 No ID:          NO
 Ready:          NO
 State:        IDLE
 Temp Problem:   NO
 Unloaded:       NO
 Volt Problem:   NO
```

```
Private····Executive
 ·Left
 Firmware:   ??????
 I2C Address:    xx
 PCB Number: 501??7
 PCB Revision:    ?
```

```
P·Executive·····Left
 Firmware:   ??????
 I2C Address:    xx
 PCB Number: 501??7
 PCB Revision:    ?
```

Figure 5-2 The Private Menu (Part 2)

5.1 Introduction

The \Private menu is the root menu for the protected service menus. It is also a privileged, password-protected menu. This means that a password must be set to gain access to the items in the \Private menu. The password to the \Private menu is cleared before the TLS is shipped from the factory, because the menu is intended for use by field service personnel only.

Passwords are used together with security locks to protect the TLS' configuration against unauthorized or unintentional changes, and unauthorized manual operations. Therefore, the Master security lock must be disabled before a password can be set in the \Private menu.

5.2 Defeating Security Locks

There are four types of security locks: Configuration, Inventory, Master and Door. The \Configuration\Security menu (shown below) is used to set the Configuration, Inventory, and Master security locks to ON or OFF (the default value is OFF). The Door lock is controlled by opening or closing the cabinet's door. Open is OFF.

```
C···········Security
➜Configuration:  ON
 Inventory:      ON
 Master:         ON
```

NOTE

All items in the \Configuration\Security menu are locked by the Door lock.

5.2.1 Door Lock

When the cabinet's door is closed, the Door lock is ON, and the items in the \Configuration\Security menu cannot be changed.

5.2.2 Master Lock

The Master lock provides the maximum system security. When the Master lock is ON, the TLS' control keys cannot be used to change the TLS' configuration, initiate any operations, or execute any commands. Only the host system can control the TLS, which effectively configures the TLS for remote operation only.

5.2.3 Disabling the Master Security Lock

NOTE

See the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450) for details about the TLS Security options.

Follow the instructions below, which assume that all TLS security locks are set to ON, to disable the Master security lock.

1. Open the cabinet door (to disable the Door lock).

2. Press the MENU key to display the Top Menu.

```
Top Menu
➜•Configuration
 •Maintenance
 •Operation
```

3. Press the ENTER key once to enter the \Configuration menu.

```
•••••••Configuration
 •Advanced
 •Drive
 SCSI ID:        dd
➜•Security
 SET TO DEFAULTS
```

4. Use the ▼ (DOWN) key to move the pointer to Security.

5. Press the ENTER key to enter the C\Security menu.

```
C•••••••••••Security
 Configuration:  ON
 Inventory:      ON
➜Master:         ON
```

6. Use the ▼ (DOWN) key to move the pointer to Master.

7. Press the ENTER key once to begin editing the Master value.

8. Use the ▼ (DOWN) key to change the Master value from ON to OFF.

9. Press the MENU key twice to leave the menu system.

10. Close the cabinet door.

5.3   Enabling the Private Menu

NOTE

Not all items shown in the menu illustrations appear at all times.

*Note that the bold menu items are model dependent. Libraries with single bays have a single
SCSI ID sub-menu while libraries with dual bays (58xxx/68xxx/88xxx models), instead have
SCSI ID LEFT and SCSI ID RIGHT sub-menus.*

5.3.1   Access

Access is a text string used to set a password, which will unlock the \Private
menu. It is easy to find out if a password is currently set. Just press the MENU key to
display the Top Menu, then use the ▼ (DOWN) key to scroll down through all of the
menu items. If Private is visible in the menu, then a password exists.

- **Service** is the password used by qualified service personnel to access certain **\Private** menu items while servicing the TLS. Please note that only the first letter is capitalized.

- **Update** is the password used by qualified service personnel to access other **\Private** menu items while upgrading a TLS, adding or removing a Barcode Reader, or replacing the Executive PCBA. Please note that only the first letter is capitalized.

The current password should always be cleared (removed) after the user finishes servicing a unit to prevent unauthorized access to the \Private menu. Clearing a password will also remove the \Private sub-menu from the top menu.

5.3.2   Setting a Password

Once set, a password remains set (even if the power is removed from the TLS), until it is intentionally cleared (removed) by executing the Private menu's CLEAR ACCESS command.

Three things happen when a user sets a password:

- **Private appears at the bottom of the Top Menu.**

- **Access (shown in step 9 below) disappears from the Private menu.**

- **CLEAR ACCESS (shown in Section 5.3.3) appears in the Private menu.**

```
Top Menu
➜•Configuration
 •Maintenance
 •Operation
 •Private
```

NOTE

Passwords are case-sensitive. Be sure to use the correct capital and lower-case letters while setting passwords.

1. Turn the power on.

2. Press the MENU key to display the Top Menu.

```
Top Menu
 •Configuration
➜•Maintenance
 •Operation
```

3. Use the ▼ (DOWN) key to move the pointer to Maintenance.

4. Press the ENTER key to enter the Maintenance menu.

```
•••••••••Maintenance
•Display Log
•Display Prevents
•Display Revision
•Display Stats.
•Display Voltage
•Test Inventory
•Test Keyboard.
➜•Test LC Display
```

5. Use the ▼ (DOWN) key to move the pointer to `Test LC Display`.

6. Press the ENTER key to enter the
   `Maintenance\Test LC Display` menu.

7. Press and release the ▼ (DOWN) key once.

8. This step must be executed quickly (within 1.5 seconds). Sequentially press and
   hold down the ▼ (DOWN), ENTER and MENU control keys, in the order shown
   (Do not press all three control keys at the same time.)

9. Simultaneously release the three control keys. If the `Top Menu` reappears at
   this point, repeat steps 3-8 above to display the Private menu.

10. The Private menu should now be displayed.

```
•••••••••••••Private
➜Access: ??????????
•Blower
•Calibration
•Calibration Left
•Calibration Right
 CALIBRATE
•Carousel
•Configuration
•Display A/D
•Display Locations
•Display Positions
•Display Sensors
•DriveBay
•Executive
 RESET SCSI BUS
```

These do not appear until after a legitimate password is entered.

11. If necessary, use the ▲ (UP) or ▼ (DOWN) key to move the pointer to `Access`.

12. Press the ENTER key to begin editing the `Access` value (entering a password).
    A flashing cursor should appear at the first character's position.

NOTE

If a MASTER SECURITY message appears, instead of a flashing cursor in step 11 above, follow the instructions in Section 5.2.3 to disable the Master Security Lock, then repeat this section to set the desired password.

13. Press the ▲ (UP) or ▼ (DOWN) key repeatedly to select the desired character (be sure to use the correct case letters), then press the ENTER key once to shift the flashing cursor to the next character position.

14. Repeat step 12 to finish entering the password.

15. Press the EXIT key to set the password.

5.3.3 Clearing the Password

Clearing (removing) the current password prevents unauthorized personnel from accessing the `Private` menu and accidentally disabling the TLS. **The current password should always be removed after the service technician finishes using the Private menu.**

Three things happen when a user clears the password:

- **`Private` disappears from the `Top Menu`.**

- **`Access` reappears in the `Private` menu.**

- **`CLEAR ACCESS` (shown in Section 5.3.3) disappears from the `Private` menu.**

1. Press the MENU key to open the `Top Menu`.

2. Use the ▼ (DOWN) key to move the pointer to `Private`.

3. Press the ENTER key to enter the `Private` menu.

```
••••••••••••••Private
•Blower
•Calibration
•Calibration Left
•Calibration Right
 CALIBRATE
•Carousel
➔CLEAR ACCESS
•Configuration
•Display A/D
•Display Locations
•Display Positions
•Display Sensors
•DriveBay
•Executive
 RESET SCSI BUS
```

4. Use the ▼ (DOWN) key to move the pointer to `CLEAR ACCESS`.

5. Press the ENTER key to execute the `CLEAR ACCESS` command.

6. Press the MENU key twice to exit the menu system.

The password is now cleared. Notice that `Private` is no longer visible in the `Top Menu`.

5.4   The Private Menu

5.4.1   Private\CALIBRATE Command

The `CALIBRATE` command should not be executed without a specific reason for doing so, because it involves risk. For example, if the `CALIBRATE` command is used incorrectly, improper Handler operation may result. Therefore, if the Handler is properly picking and placing cartridges, and the user does not have a specific reason for using the `CALIBRATE` command, recalibrating the TLS is not recommended.

Sometimes it is necessary to execute the `CALIBRATE` command. For example, the TLS must be recalibrated after new hardware is installed or if the model number is changed.

The `CALIBRATE` command causes the TLS to:

- **Determine the Vertical (Y-Axis) positions of the magazines.**

- **Calculate the drive positions.**

- **Verify that a Carriage can sense its Vertical (Y-Axis) home position (bottom of vertical travel), using the Vertical Axis Home Sensor.**

- **Verify that a Handler can sense its Insertion (Z-Axis) home position (Gripper fully retracted), using the Insertion Axis Home Sensor.**

- **Verify that a Carousel can sense its home position using the Carousel Position Sensors.**

- **Verify that the I/O port can sense its I/O port axis home position (I/O port slot fully retracted), using the I/O port home sensor.**

- **Verify the full-scale outputs from the I/O port full and I/O port clear optical sensors, while the sensors are in an unobstructed, full-scale state. Determines threshold values for their use based upon the full-scale readings.**

- **Calibrate the Inventory Sentry Beam (Y-Clear) detector by measuring the sensor's full-scale output (sensor unobstructed) and the minimum output (sensor obstructed). Calculates the new threshold value between the full-scale and minimum output readings.**

- **Calibrate the Cartridge Presence Sensor's optical detector by measuring the full scale output (sensor unobstructed) and the minimum output (sensor obstructed). Calculates the new threshold value between the full-scale and minimum output readings.**

All of these calibration steps are checked against acceptance range parameters. Each position or optical output reading must fall within its acceptable range before subsequent positions and thresholds are determined.

CAUTION

> *If the TLS is not properly set up prior to invoking the CALIBRATE command, the calibration process can result in invalid calibration data, which may prevent Handler operation.*

Using the CALIBRATE Command

1. Press the MENU key to open the `Top Menu`.

2. Use the ▼ (DOWN) key to move the pointer in the left column to `Private`, then press the ENTER key to open the `Private` menu.

3. Use the ▼ (DOWN) key to move the pointer to `CALIBRATE`.

```
•••••••••••••Private
•Blower
•Calibration
•Calibration Left
•Calibration Right
➜CALIBRATE
•Carousel
 CLEAR ACCESS
•Configuration
•Display A/D
•Display Locations
•Display Positions
•Display Sensors
•DriveBay
•Executive
 RESET SCSI BUS
```

4. Press the ENTER key to execute the `CALIBRATE` command.

5. Follow the instructions that appear on the LCD display: remove all cartridges, install empty magazines at L1A01 and R1A01, press the ENTER key. Use the ▼ (DOWN) key to read the whole message.

    The calibration process takes about 3 and a half minutes to complete. If the calibration process does not succeed, an Alert message indicating that a fault occurred during calibration is displayed.

The Calibration Left and Right menus display the calibration data. See Section 5.4.4.

5.4.2   Private\CLEAR ACCESS Command

This command is used to clear the Access value (the active password) and defeat Private menu access, as explained in Section 5.3.3.

5.4.3   RESET SCSI BUS Command

This command forces a BUS RESET command on the SCSI bus. It may be used with caution to solve system development problems. However, using this command could prove quite disruptive on a live system.

CAUTION

Executing a RESET SCSI BUS Command could adversely affect another device or host system that is connected to the same SCSI bus. Use this command with great caution!

To Reset the SCSI Bus:

1. Press the MENU key to open the `Top Menu`.

2. Use the ▼ (DOWN) key to move the pointer to `Private`, then press the ENTER key to open the `Private` menu.

3. Use ▼ (DOWN) key to move the pointer to `RESET SCSI BUS`.

4. Press the ENTER key to execute the `RESET SCSI BUS` command.

NOTE

The RESET SCSI BUS command is locked by both the Master Security Lock and the Inventory Lock. If the user gets a SECURITY message, the user must first unlock the security locks before proceeding. Follow the procedure in section 5.2 to enter the Security menu and disable the Master Security Lock. The user can also disable the Inventory Lock while the Security menu is displayed.

5.4.4   The Private\Blower Menu

```
Private·······Blower
 Address:        xx
 Type:          ddd
 Revision:      ddd
 Updates:dddddddddd
 Oper.Properly: YES
 Up To Speed:   YES
 Speed:         ddd
 Volts 24:      ddd
```

The Blower menu displays information about the blower and it's performance.

The Blower menu contains the following values:

- Address
  This address of the blower on the I2C bus.

- Type
  This value describes the type of blower installed in the library. Currently there is only one type of blower available.

- Revision
  Indicates the current revision of the blower firmware.

- Updates
  This number is a tabulation of the amount of times the blowers PCBA has contacted the Executive PCBA to check for updated information about the library.

- Oper. Properly (YES/NO)
  This value shows whether or not the blower is operating properly.

- Up To Speed (YES/NO)
  This value shows whether or not the blower is operating at it's proper speed. When the library is turned on and after tape drives have been added or removed there

will be a few seconds delay for the blower speed to adjust. At these times the Up To Speed value will be NO.

- Speed
  This value represents the blowers current rotational speed.

- Volts 24
  This value is the current amount of volts that the blower is using from the blower power supply.

5.4.5 The Private\Calibration Data Status Screens

```
Private··Calibration
 Calibrated:    YES
 Valid:         YES
 CRTPRS  Thrs:ddddd
 I/OCLR  Thrs:ddddd
 I/OFULL Thrs:ddddd
 YCLEAR  Thrs:ddddd
 YCLEARM Thrs:ddddd
 Y DATA 0:    ±ddddd
 Y DRIVE Ofst0:±ddd
 Y DRIVE Ofst1:±ddd
 Y DRIVE Ofst2:±ddd
 Y DRIVE Ofst3:±ddd
 Y FIXED 0:   ±ddddd
 Y FIXED 1:   ±ddddd
 Y I/O PORT: ±ddddd
 Y PRIVATE:  ±ddddd
 Y SHUTTLE:  ±ddddd
 Y STORY 0:  ±ddddd
```
Single Bay Libraries

```
P··Calibration Left
 Calibrated:    YES
 Valid:         YES
 CRTPRS  Thrs:ddddd
 YCLEAR  Thrs:ddddd
 YCLEARM Thrs:ddddd
 Y DATA 0:    ±ddddd
 Y DRIVE Ofst0:±ddd
 Y DRIVE Ofst1:±ddd
 Y DRIVE Ofst2:±ddd
 Y DRIVE Ofst3:±ddd
 Y FIXED 0:   ±ddddd
 Y FIXED 1:   ±ddddd
 Y SHUTTLE:  ±ddddd
 Y STORY 0:  ±ddddd
```
**Left Side of
Dual Bay Libraries**

```
P··Calibration Right
 Calibrated:    YES
 Valid:         YES
 CRTPRS  Thrs:ddddd
 I/OCLR  Thrs:ddddd
 I/OFULL Thrs:ddddd
 YCLEAR  Thrs:ddddd
 YCLEARM Thrs:ddddd
 Y DATA 0:    ±ddddd
 Y DRIVE Ofst0:±ddd
 Y DRIVE Ofst1:±ddd
 Y DRIVE Ofst2:±ddd
 Y DRIVE Ofst3:±ddd
 Y FIXED 0:   ±ddddd
 Y FIXED 1:   ±ddddd
 Y I/O PORT: ±ddddd
 Y PRIVATE:  ±ddddd
 Y SHUTTLE:  ±ddddd
 Y STORY 0:  ±ddddd
```
**Right Side of
Dual Bay Libraries**

The Calibration Data Status screens display the calibration data determined by the CALIBRATE command. The Calibration Left and Right screens show the data for the respective sides of dual bay libraries. Note that the I/O port data only appears in the Calibration Right screen. If, for example, the user encounters some particularly difficult Handler problem, it may become necessary to relay the data on this screen to a Qualstar Technical Support technician.

The Calibrated values and the Valid values indicate whether or not the calibration data determined by the CALIBRATION command is within acceptable limits. If the calibration data is not valid, the Handler will not operate.

The following calibration data is displayed on the Calibration Data Status screen:

- Calibrated (YES/NO)
  This value shows whether or not the calibration process was successfully completed. The left side always indicates yes.

- Valid (YES/NO)
  This value shows whether or not the calibration data has been initialized. The left side always indicates yes.

- CRTPRS

  This value is the threshold for the Cartridge Presence sensor's optical detector.

- I/OCLR

  This value is the threshold for the I/O port clear sensor's optical detector.

  Appears only in the Calibration Right screen.

- I/OFULL

  This value is the threshold for the I/O port full sensor's optical detector.

  Appears only in the Calibration Right screen.

- YCLEAR

  This value is the threshold for the Inventory Sentry Beam's optical detector. (This sensor is also known as the Y-Clear Sensor).

- YCLEARM

  This item appears in the menu, but it is not used for TLS-5000/6000/8000 libraries.

- Y DATA 0

  This value is the location of the top tape drive.

- Y DRIVE Ofst0 through Y DRIVE Ofst3

  This item appears in the menu, but it is not used for TLS-5000/6000/8000 libraries.

- Y FIXED 0: and Y FIXED 1:

  This item appears in the menu, but it is not used for TLS-5000/6000/8000 libraries.

- Y I/O PORT

  This value is the location of the I/O port slot.

  Appears only in the Calibration Right screen.

- Y PRIVATE

  This value is the location of the Private Slot on library models that contain Private Slots.

- Y SHUTTLE

  This value is the location of the Shuttle.

- Y STORY 0

  This value is the location of the bottom slot, in the bottom magazine, on the first face.

5.4.6   The Private\Carousel Menu

```
Private·····Carousel
 Current Stop:     d
 Demand Stop:      d
 ABORT SLEW
 SLEW
 Current Pos:±ddddd
 Index:     BLOCKED
 STEP DOWN
 STEP UP
```

The Carousel menu allows the user to completely control the Carousel and to display the Carousel's current position.

General Carousel Information

Carousels are moved by a four-phase, DC stepper motor. There are 200 steps per motor shaft revolution. There are 3200 steps per carousel rotation. A pinion gear on the motor shaft drives the carousel gear, which is housed inside the gear guard.

The gear guard contains indexing slots, which are placed in a specific pattern. Since carousels have six faces, the gear guard has indexing slots for each face, including a single, extra-wide indexing slot. These slots are sensed by the Carousel Position sensor.

The Carousel Position sensor is an optical switch pair, mounted on the carousel PCBA (P/N 500617-02-2). As the gear guard rotates, it passes between the sensor's emitter and detector, interrupting the sensor's beam. As each indexing slot in the gear guard passes through the sensor, it allows the sensor's beam to reach the detector. The pattern of indexing slots that the detector sees is used to determine the Carousel's position. The extra-wide indexing slot is used to establish an absolute position reference.

Table 5-1 shows the relationship between the carousel face Stop numbers and the corresponding carousel faces. It also shows the number of motor shaft rotation steps required to move counterclockwise from Stop 0 (the face 1 stop) to each Stop number. Counterclockwise rotation, as viewed from above, is the forward direction of rotation (position step increments).

	Face Number on Model:			
STOP	**6220 8222**	**5433 6430 8433**	**5466 6460 8466**	**Nominal Position**
8	X	X	X	2888
7	X	X	2	2667
6	X	X	X	2400
5	2	3	3	2133
4	X	X	4	1600
3	X	5	5	1067
2	X	X	X	800
1	1	1	6	533
0	X	1	1	0

X = between faces

Table 5-1   Single Bay Carousel Rotation Information

	Face Number on Model:		
STOP	58132 68120 88132	58264 68240 88264	Nominal Position
8	X	X	4332
7	2	2	4000
6	X	X	3600
5	3	3	3200
4	4	4	2400
3	5	5	1600
2	X	X	1200
1	6	6	800
0	1	1	0

X = between faces

Table 5-2   Dual Bay Carousel Rotation Information

The Carousel menu contains the following values:

- Current Stop
  This value is the current Stop number (Table 5-1 or Table 5-2). A value of 255 indicates that the carousel is between Stops, or that the Carousel has been bumped off of a Stop.

- Demand Stop
  Set this value prior to commanding the carousel to rotate. The Carousel rotates to this Stop number when the SLEW command is invoked.

- ABORT SLEW
  This command will immediately stop Carousel rotation.

- SLEW
  This command will start the Carousel rotating to the Demand Stop position. The direction of rotation for the shortest movement will be used. No rotation occurs if the Current Stop number is equal to the Demand Stop number.

- Current Pos:
  This value indicates the Carousel's current position in motor steps (Table 5-1). Normally the number is always positive and wraps around from 3199 to 0. But if the user steps below zero, a negative number is displayed.

- Index:
  This value indicates whether or not the Carousel Position sensor on the carousel PCBA is OPEN (with light passing through an indexing slot), or BLOCKED (by the gear guard). It changes state as the gear guard's slots pass through the sensor's beam.

- STEP DOWN

  Execute this command to rotate the carousel motor one step in the clockwise direction. The Current Pos value will decrease by one. There are 3200 motor steps per carousel revolution.

- STEP UP

  Execute this command to rotate the carousel motor one step in the counterclockwise direction. The Current Pos value will decrease by one. There are 3200 motor steps per carousel revolution.

5.4.7   The Private\Configuration Menu

```
P······Configuration
 ·Defaults
 Demonstrations:YES
 ·SCSI
```

5.4.7.1   Demonstrations

This menu allows for the `Operation\Demonstrations` menu to be hidden.

> **YES**   The `Operation\Demonstrations` menu is visible and allows for the selection of Feature List or Random Moves. The Feature List item is used to display messages about TLS features. The Random Moves causes the changer to make continuous random cartridge moves.

> **NO**   The `Operation\Demonstrations` menu is hidden.

5.4.8   The Private\Configuration\Defaults Menu

```
PC··········Defaults
 LCD Line 1:DEFAULT
   1-10: ??????????
  11-20: ??????????
 LCD Line 2:DEFAULT
   1-10: ??????????
  11-20: ??????????
 LCD Line 3:DEFAULT
   1-10: ??????????
  11-20: ??????????
 LCD Line 4:DEFAULT
   1-10: ??????????
  11-20: ??????????
 SCSI Vndr:????????
 SCSI Prod:????????
           ????????
 SCSI Revision:????
 CLEAR
```

The items in this menu are used to create *custom default data* for various menu system items.

Example 1: The default text used on line 1 of the main operating display for a TLS-8000 is `Qualstar TLS-8466`. However, an operator can enter custom data (e.g., different text) for the main display line 1 over the SCSI bus, or by using the `Configuration\Advanced\Control Panel\Display` menu. If either of these methods is used, and the operator then executes the Configuration menu's

`SET TO DEFAULTS` command, the custom text data is lost and the system's default text (`Qualstar TLS-8466`) is displayed again.

Example 2: The `Private\Defaults\LCD Line 1` menu item, and its sub items `1-10` and `11-20`, can also be used to change the text used on line 1 of the main display. *Unlike Example 1*, text data entered in the `Private\Defaults` menu becomes the new system default data. Therefore, the custom data entered in this menu is also used as the system's default data when an operator executes the Configuration menu's `SET TO DEFAULTS` command.

- SCSI Vndr
  Allows for vendors or resellers name to be entered which will replace the system's default menu display text (Qualstar).

- SCSI Prod
  Allows for vendors or resellers product name to be entered, which will replace the system's default menu display text (TLS-8466).

- SCSI Revision
  Allows for vendors or resellers revision tracking name to be entered which will replace the system's default menu display text (X.XX).

- CLEAR
  Evoking the CLEAR command will eliminate all data entries in the Private/Defaults menu and all the systems menu display text will return to the system defaults.

5.4.9 The Private\Configuration\SCSI Menu

The `Private\SCSI` menu provides a means of fine-tuning the time delay and number of retries used when moving cartridges in and out of tape drives. Adjusting the values in this menu can help to reduce some of the problems associated with inflexible host software. Both decimal values are editable.

```
P•Configuration•SCSI
 PostPlaceDly:ddddd
 PrePickRetries:ddd
```

The `PostPlaceDly` value is a period of time, measured in 250^{ths} of a second. It determines the delay from the physical insertion of a tape cartridge into a tape drive, to the notification to the host computer that the cartridge movement has is completed. A longer value gives the tape drive more time to change its status from "empty" to "loading a tape". The default value is 250 or one second.

Sometimes a tape drive is slow to eject a tape cartridge, after the tape drive notifies the host computer that it has finished the ejection sequence. The `PrePickRetries` value, measured at one retry per second, controls the number of times (and seconds) the Handler will look for the ejected tape cartridge with its Cartridge Presence opto-sensor. The default value is 10 (or ten seconds). If the ejected cartridge is not detected after the specified number of retries (and seconds), the TLS will issue an Alert message.

5.4.10   The Private\Display A/D Status Screen

```
Private···Display A/D
 ·Left
+12V           ddddd
+3.3V          ddddd
+5V            ddddd
CARSPR:        ddddd
CRTPRS:        ddddd
I/O CLEAR:     ddddd
I/O FULL:      ddddd
Internal 0:  ddddd
Internal Mid:ddddd
InternalFull:ddddd
TPWR:          ddddd
YCLEAR:        ddddd
YCLEARM:       ddddd
```

In a dual bay library the Display A/D status screen initially displays the current analog to digital converter output values from the right side Executive board. Select the Left sub-menu to see the output values from the left Executive circuit board. Single bay libraries will simply display the analog to digital converter output values information. All outputs are displayed in millivolts (0 to 5000 mV). The analog inputs are described below in Table 5-3.

Input Signals	Description
+12V	The Handler Power Supply Output
+3.3V	The Executive PCBA +3.3V Regulator Output
+5V	The Executive PCBA +5V Regulator Output
CARSPR	Not used on this model library
CRTPRS	Cartridge Presence Opto-Sensor Output Lower readings indicate a cartridge is present
I/O CLEAR	I/O Port M-Clear Opto-Sensor
I/O FULL	I/O Port M-Full Opto-Sensor
Internal 0	A/D Converter Internal Check Channel Should indicate a value of 0
Internal Mid	A/D Converter Internal Check Channel Should indicate a value of 2502
InternalFull	A/D Converter Internal Check Channel Should indicate a value of 5000
TPWR	Term Power voltage
YCLEAR	Y-Clear (Inventory Sentry Beam) Opto-Sensor
YCLEARM	Not used on this model library

Table 5-3   A/D Converter Inputs

5.4.11 The Private\Display Locations Menu

```
P··Display Locations
 Location:   llllll
 Accessable:  FALSE
 Acess.Valid: FALSE
 Barcodeable: FALSE
 Label:  ??????????
 Label Error: FALSE
 Label Valid: FALSE
 Occupied:    FALSE
 Occup.Valid: FALSE
 On My Side:  FALSE
 Present:     FALSE
 Pres. Valid: FALSE
 Source Valid:FALSE
 Source Loc.:llllll
 Synchronized:FALSE
 Type:        DRIVE
 Tape Ejected:FALSE
```

NOTE

The Tape Ejected item only appears in the menu if the Type menu item is DRIVE.

The Display Locations menu contains data from the library's internal inventory database. The data in this menu differs from the data found in the Operation\ Element Status\Display menu, because it pertains to the library's physical world and does not contain references to SCSI element addresses.

The only editable value in this menu is the Location value, which corresponds to a physical location. Once a Location is selected, all the internal database information for that location is displayed as follows:

Value	Type	Description
Accessible	TRUE/FALSE	A TRUE value indicates that the drive has no cartridge inside and that it is accessible.
Access.Valid	TRUE/FALSE	A TRUE value indicates that the drive is communicating with the library. However this does not verify that the drive ID is working. That can only be done by setting ID's and looking for the drives on the SCSI bus.
Barcodeable	Data	This value indicates whether or not the barcode reader can scan the barcode label at the selected position. If the Barcodeable value is FALSE, the cartridge must be moved to another location before its barcode label can be scanned.
Label	Data	This item is the barcode label data for the selected location, provided barcode information is available.
Label Error	TRUE/FALSE	A TRUE value indicates that an error occurred while reading the barcode label for the selected location.
Label Valid	TRUE/FALSE	A TRUE value indicates that the Label and Label Error data for the selected location are valid.
Occupied	TRUE/FALSE	A TRUE value indicates that the selected location is occupied by a cartridge.
Occup.Valid	TRUE/FALSE	A TRUE value means the Occupied status for the selected location is valid.
On My Side	TRUE/FALSE	A TRUE value means the selected location is on the right side of the library.
Present	TRUE/FALSE	A TRUE value indicates that a drive, holder, or other device is present at the selected location.
Pres. Valid	TRUE/FALSE	A TRUE value means the Present status for the selected location is valid.
Source Valid	TRUE/FALSE	A TRUE value means the Source Location data for the selected location is valid.
Source Loc.	Data	The Source value indicates the prior location of the cartridge that is currently at the selected location. The Item value is an internal number. It is useful only to a Qualstar Technical Support technician.
Synchronized	TRUE/FALSE	When an inventory item is modified on one side of the library, the data is first only in the corresponding sides Executive PCBA. The data will not be transferred to the opposite sides Executive PCBA until a synchronization occurs.
Type	Data	This value indicates the type of element that is at the selected location: DRIVE, HANDLER, I/O PORT, or magazine SLOT.
Tape Ejected	TRUE/FALSE	When the Type value is set to DRIVE, this value is displayed for the drive at the selected location. The default value is FALSE. However, if the most recent inventory scan found a tape ejected from the drive, this value will be TRUE.

Table 5-4   Private\Display Locations Data

5.4.12 The Private\Display Positions Status Screen

```
P··Display Positions
·Left
IS:          ±ddddd
X:           ±ddddd
Y:           ±ddddd
Period Y:     ddddd
Z:           ±ddddd
Period Z:     ddddd
```

In a dual bay library the Display Positions status screen initially displays the current position of the four motor-driven positioners for the right side. The left side Positions are visible by selecting ·LEFT and pressing the ENTER key. Single bay libraries will simply display the Positions information.

The positions are given in motor steps, counted from the home position of each axis. There are 24 steps per revolution for the Vertical (Y) Axis and Insertion (Z) Axis motors. There are 200 steps per revolution for the I/O port axis and carousel (X) axis motors.

- IS (I/O Port or Shuttle)
  On the right side, this value indicates the current I/O port carrier position. A value of zero means that the I/O port slot is at its home position (fully retracted). On the left side, it indicates the value of the Shuttle position. The Shuttle position will be negative when at its left, home position.

- X
  This value indicates the current Carousel position. A value of 0 means that the Carousel is at its home position (face 1).

- Y
  This value indicates the current vertical position of the Carriage. A value of 0 means that the Carriage is at its home position (at the bottom of its travel range).

- Period Y
  Used primarily for diagnostics, this value represents the period of time that it takes for the Hall-Effect sensors in the Y-axis brushless DC motor to move between two points. The maximum value of 65,535 will be shown when the motor is not moving.

- Z
  This value indicates the current position of the Handler's Gripper. A value of 0 means that the Handler's Gripper is in its home position (fully retracted).

- Period Z
  Used primarily for diagnostics, this value represents the period of time that it takes for the Hall-Effect sensors in the Z-axis brushless DC motor to move between two points. The maximum value of 65,535 will be shown when the motor is not moving.

5.4.13 The Private\Display Sensors Status Screen

```
P····Display Sensors
·Left
!Adapt:          0
ISHome:          0
Locked:          0
!Open:           0
!ScsiDF:         0
!Shunt1:         0
!Shunt2:         0
XIndex:          0
YHome:           0
ZHome:           0
```

In a dual bay library the Display Sensors status screen initially displays the current
logical state (1 or 0) of the control inputs for the right side. The left side logical states
are visible by selecting·LEFT and pressing the ENTER key. Single bay libraries will
simply display the logical states information.

- !Adapt
  A 0 indicates that a adapter is installed on the Executive PCBA.

- ISHome (I/O Port or Shuttle Home)
  On the right side, a 1 indicates the I/O port carrier is fully retracted. On the left
  side, a 1 indicates the Shuttle is home, left position.

- Locked
  A 1 indicates that the front door is locked (an optional feature).

- !Open
  A 1 indicates that the front door is closed.

- !ScsiDF
  A 0 indicates that a SCSI HVD differential adapter is installed on the Executive
  PCBA.

- !Shunt1
  The !Shunt1 value is not currently used on TLS-5000/6000/8000 libraries.

- !Shunt2
  The !Shunt2 value is not currently used on TLS-5000/6000/8000 libraries.

- XIndex
  A 1 indicates that the Carousel Position sensor sees an indexing slot in the gear
  guard skirt.

- YHome
  A 1 indicates that the Carriage is at its home position (bottom of its travel range).

- ZHome
  A 1 indicates that the Handler's Gripper is at its home position (fully retracted).

5.4.14 The Private\DriveBay Menu

```
Private·····DriveBay
·T1
·T2
·T3
·T4
·LT1
·LT2
·LT3
·LT4
·RT1
·RT2
·RT3
·RT4
·Bay
·Bay Left
·Bay Right
·EEPROM
·EEPROM Left
·EEPROM Right
```

The `Private\DriveBay` menus show the status of installed tape drives, the Drive
Bay circuit boards and the EEPROMs on the circuit boards. In dual bay libraries the
`LT1` through `LT4` sub-menus refer to tape drives installed on the left side and `RT1`
through `RT4` refer to tape drives installed on the right side (as viewed from the front).
The `Bay Left` and `Bay Right` sub-menus refer to the left side and right side Drive
Bay boards respectively. `EEPROM Left` and `EEPROM Right` refer to the contents of
the EEPROMs found on the left and right Drive Bay boards respectively. The mean-
ing of the EEPROM data is beyond the scope of this document. Single bay libraries
will simply display sub-menus `T1` through `T4`, `Bay` and `EEPROM.`

5.4.14.1 The Private\DriveBay\?T? Menu

```
Private·DriveBay·?T?
Type:      ???????
Revision:      ddd
Count Mode:      OFF
Drive:        NONE
·Information
·Status
```

- Type
  The Type value describes what type of drive carrier is installed in the libraries
  drive bay: DLT, LTO-HP or LTO-IBM.

- Revision
  This value is the current revision of the Drive Bay PCBA firmware.

- Count Mode
  The Count Mode value is used for diagnostic purposes. When on it sends I2C mes-
  sages to the Drive Bay.

- Drive
  The Drive value describes what type of tape drive is installed in the drive carrier.
  Examples: DLT2000, DLT4000 or DLT7000.

5.4.14.2 The Private\DriveBay\?T?\Information Menu

```
PD ?T?···Information
 Compression    OFF
 Needs Cleaning: NO
 Write Protect:  NO
 CleanUses:xxxxxxxx
 PwrOnHour:xxxxxxxx
 CleanHour:xxxxxxxx
 TapeRmain:xxxxxxxx
 Temp Inside:   ddd
 Temp Outside:  ddd
 12V:           ddd
 5V:            ddd
 Lost Replies:ddddd
```

- Compression (ON/OFF)
  When the Compression value is ON, data is being written to the tape drive using a
  compression algorithm or utility.

- Needs Cleaning (YES/NO)
  When the Needs Cleaning value is YES, the tape drive needs to have a cleaning op-
  eration performed. Refer to the TLS-5000/6000/800 Installation and Operation
  Manual (Qualstar document number 501450) for more information on tape drive
  cleaning procedures.

- Write Protect (YES/NO)
  When the Write Protect value is YES, the tape cartridge in the tape drive is write-
  protected, which will protect the data from being altered or overwritten.

- CleanUses
  The CleanUses value represents the number of times that the tape drive has been
  cleaned using a cleaning cartridge.

- PwrOnHour
  The PwrOnHour value represents the amount of time that the tape drive has been
  powered on.

- CleanHour
  The CleanHour value represents the amount of time that a cleaning cartridge has
  been used to clean the tape drive.

- TapeRmain
  The TapeRmain value represents the amount of tape that is left on the cartridge
  that is in the tape drive.

- Temp Inside
  The Temp Inside value represents the temperature inside of the drive carrier.

- Temp Outside
  The Temp Outside value represents the temperature outside of the drive carrier.

- 12V

  Divide this value by 17.1 to determine the approximate value of the 12V power supply for the tape drives.

- 5V

  Divide this value by 34.1 to determine the approximate value of the 5V power supply for the tape drives.

- Lost Replies

  Indicates the number of unanswered messages from the Drive Bay processor to the Executive board via the I2C bus.

5.4.14.3 The Private\DriveBay\?T?\Status Menu

```
PD ?T?········Status
 Updates:dddddddddd
 Cart Present:    NO
 COM Problem:     NO
 Configured:      NO
 Door Open:       NO
 Door Openable:   NO
 Fan Problem:     NO
 Hardware Error: NO
 ID Correct:      NO
 In Flux:         NO
 Needs Cleaning: NO
 No ID:           NO
 Ready:           NO
 State:         IDLE
 Temp Problem:    NO
 Unloaded:        NO
 Volt Problem:    NO
```

Not all of the above menu items will appear all of the time. Some will only appear when certain tape drive models are installed. Refer to Table 5-5.

Menu Item	Tape Drive Models			
	SAIT	DLT	LTO-HP	LTO-IBM
Updates	X	X	X	X
Cart Present		X		
COM Problem	X	X	X	X
Configured	X		X	X
Door Open		X		
Door Openable		X		
Drive Error			X	
Fan Problem		X		
Hardware Error		X		
ID Correct		X		
In Flux		X		
Needs Cleaning			X	X
No ID		X		
Ready				X
State		X		
Temp Problem	X	X	X	X
Unloaded	X		X	X
Volt Problem	X	X	X	X

Table 5-5   The Private\DriveBay\?T?\Status Menu Items and Tape Drives

- Updates
  The Updates value indicates the amount of times that the drive carrier has sent a packet of information to the Executive PCBA.

- Cart Present (YES/NO)
  When the Cart Present value is YES, the DLT tape drive has a cartridge present in it.

- COM Problem (YES/NO)
  When the COM Problem value is YES, there is a problem with the communications between the tape drive and the drive carrier.

- Configured (YES/NO)
  When the Configured value is YES, the tape drive has been configured and has had it's SCSI ID set.

- Door Open (YES/NO)
  When the Door Open value is YES, the tape cartridge door is open on the DLT tape drive.

- Door Openable (YES/NO)
  When the Door Openable value is YES, the tape cartridge door on the DLT tape drive is ready to be opened.

- Fan Problem (YES/NO)
  When the Fan Problem value is YES, the cooling fan on the DLT tape drive is not functioning or not operating correctly.

- Hardware Error (YES/NO)
  When the Hardware Error value is YES, a hardware fault has occurred in the DLT tape drive.

- ID Correct (YES/NO)
  When the ID Correct value is YES, the tape drive has reported it's SCSI ID as being the same one that it was assigned. This feature is used primarily for diagnostics.

- In Flux (YES/NO)
  When the In Flux value is YES, the DLT tape drive can not ensure that the returned status values are valid except for the Hardware Error value. This will remain after initialization until the tape drive determines it has either no cartridge present or the format of the currently loaded cartridge has been determined.

- Needs Cleaning (YES/NO)
  When the Needs Cleaning value is YES, the LTO tape drive needs to have it's tape heads cleaned using a cleaning cartridge.

- No ID (YES/NO)
  When the No ID value is YES, the DLT tape drive does not have a valid SCSI ID set for it. A SCSI ID must be set before in the tape drive before it is able to communicate on the SCSI bus.

- Ready (YES/NO)
  When the Ready value is YES, the IBM-LTO tape drive is ready to operate.

- States (YES/IDLE)
  When the States value is YES, the DLT tape cartridge is currently in motion in the tape drive. When the value is IDLE, there is no tape motion with the loaded cartridge.

- Temp Problem
  The Temp Problem value will display a message if the tape drive is operating out of it's normal temperature range. The messages indicate at what point the temperature problem is occurring in the drives operation. The following messages may be displayed: CALIBRATING, CLEANING, CODE UPDATE, ERASING, LOADING, RDY CODE, READING, REWINDING, SEEKING, UNLOADING or WRITING.

- Unloaded (YES/NO)
  When the Unloaded value is YES, the tape drive currently does not have a tape cartridge loaded.

- Volt Problem (YES/NO)
  When the Volt Problem value is YES, the tape drive is not having it's normal voltage range being supplied to it.

5.4.14.4 The Private\DriveBay\Bay Menu

```
Private·DriveBay·Bay
P·DriveBay··Bay·Left
 Address:        xx
 Type:           xx
 Revision:      ddd
 Temperature    ddd
 12V:           ddd
 5V:            ddd
```

- Address
  This value indicates the I2C bus address. On dual bay libraries, 0 is for the left side and 1 for the right side.

- Type
  This value indicates the type of communications protocol used by the DriveBay board. The current value is 01.

- Revision
  This value indicates the revision of the DriveBay firmware and ranges from 1 to 255.

- Temperature
  This feature is not implemented.

- 12V
  Divide this value by 17.1 to determine the approximate value of the 12V power supply for the tape drives.

- 5V
  Divide this value by 34.1 to determine the approximate value of the 5V power supply for the tape drives.

5.4.15   The Private\Executive Menu

```
Private····Executive
 ·Left
 Firmware:   ??????
 I2C Address:    xx
 PCB Number: 501??7
 PCB Revision:    ?
```

In a dual bay library this menu initially displays information for the right side executive board. The left side menu is visible by selecting ·LEFT and pressing the ENTER key. Single bay libraries will simply display the information for the single executive board.

- Firmware
  Indicates the current revision of the Executive firmware.

- I2C Address
  The address of the Executive PCBA on the I2C bus.

- PCB Number
  The part number of the Executive PCBA.

- PCB Revision
  The major revision letter of the Executive PCBA. A, B, C, etc.

6. Troubleshooting

After a Tape Library System (TLS) is serviced in the field, there are three types of failures that might occur when power is reapplied: Power Up and Initialization, Operation, or Calibration. This chapter lists the possible failures that might occur in each category and also the possible causes for each type of problem. Should a problem occur after the TLS is serviced, use this chapter to quickly identify and remedy the problem.

NOTE

Important: Some problems will result in an alert message on the LCD display, followed by a ten-digit number. Our technical support department will need this number to diagnose the problem if you contact them. So always, record this number, along with the general context of the problem.

Troubleshooting Index

6.1　Power Up and Initialization Failures

When the library's power is first turned on, it does a Power-On Sequence Test and then scans the inventory. The errors in this section occur during the power-on/inventory-taking process.

6.1.1　When the power is turned on, no motion occurs, the control panel display does not light up and the machine makes a regular, clicking sound.

The power supply modules are equipped with a feature that shuts them off if a short on the output is detected, and a moment later they attempt to restart. They will repeat this until the problem is cleared or the power is turn off. This sequence causes and audible click, which can be an aid in finding the problem.

Possible causes:

1. A Handler power supply module has failed.

2. There is a short in an Executive PCBA's +12V circuits.

6.1.2　When the power is turned on, no motion occurs, the control panel display does not light up and the machine is quiet.

Possible causes:

1. The unit is not connected to an AC power source.

2. The AC power source is not active.

3. The fuse is blown.

4. The AC power is not connected properly internally.

5. The fuse is blown due to a short in the internal wiring.

6. The fuse is blown due to a failed power supply module.

7. A Handler power supply module is not connected to an Executive PCBA.

8. A Handler power supply module has failed.

9. There is a short in an Executive PCBA's +12 volt circuits.

6.1.3　When the power is turned on, the control panel display lights up but does not show text and nothing moves.

Possible causes:

1. An Executive PCBA has failed.

2. An Executive PCBA has never been factory-initialized.

3. The firmware on an Executive PCBA was destroyed because the power was interrupted while uploading new code. If this happens, you must replace the executive PCBA, or replace the DIP Flash-Memory chip on the Executive PCBA.

6.1.4 When the power is turned on, the control panel display lights up and shows text, no errors are displayed, but nothing moves.

Possible causes:

1. The door is ajar.

2. The door is not completely closed. (The door appears to be closed, but is not completely shut.)

3. The Door Sensor is not working properly.

4. The library is configured to be a model "None".

5. The Control Panel Assembly has failed, or the cable to the Executive PCBA is damaged, or the plug on the cable is improperly seated.

6.1.5 When the power is turned on, the Handler(s) moves normally, but the control panel display remains dark and shows no text.

Possible causes:

1. The Control Panel Assembly has failed or the cable to the Executive PCBA is disconnected or damaged.

2. The LCD display has failed, or the cable is disconnected or damaged.

6.1.6 When the power is turned on, the Handler(s) moves normally, the control panel display shows text, but the control panel display remains dark.

Possible causes:

1. The Control Panel Display's backlight value is set to OFF in the library's Configuration menu, or it is set to turn itself off in five minutes, and the time has elapsed.

2. The Control Panel Assembly has failed, or the cable to the Executive PCBA is disconnected or damaged.

3. The LCD display has failed, or the LCD display cable is disconnected or damaged.

6.1.7 When the power is turned on, the Handler(s) moves normally and the control panel display illuminates, but it does not show text.

Possible causes:

1. The LCD display cable is not properly connected, or the cable is damaged.

2. The LCD display has failed.

6.1.8 When the power is turned on, the alert Bcr Failure appears in the control panel display.

On power up, the library attempts to communicate with the bar code reader module(s). If the library is configured for a bar code reader, but this communication fails, this error results.

Possible causes:

1. A Barcode Reader is not plugged into the Carriage PCBA.

2. The unit is configured for a Barcode Reader, but a Barcode Reader is not installed.

3. The cable connecting an Executive PCBA to the Carriage PCBA is damaged, or not properly connected.

4. A Barcode Reader has failed.

5. A Carriage PCBA has failed

6. An Executive PCBA has failed.

6.1.9 When the power is turned on, the alert Yhome Fail appears on the control panel display, and a Carriage does not reach the bottom of its vertical travel.

When the power is turned on, the library attempts to drive the carriage(s) to the bottom of the machine, then verifies that the Y home sensors detect the carriage(s). This error results if this process fails.

Possible causes:

1. An object is preventing a Carriage from reaching the bottom of its travel.

2. The Vertical Axis is jammed, or not running freely.

3. A Carriage cable is damaged, or not properly connected.

4. A Vertical Axis motor is not plugged into the Carriage PCBA, or has failed.

6.1.10 When the power is turned on, the alert YHome Fail appears on the control panel display, after the Carriage(s) reach the bottom of their vertical travel.

When the power is turned on, the library attempts to drive the carriage(s) to the bottom of the machine, then verifies that the Y home sensor detect the carriage(s). This error results if this process fails.

Possible causes:

1. A Vertical Axis Home Sensor has failed.

2. A Carriage cable is damaged, or not properly connected.

3. A Vertical Axis Home Sensor Probe (see Figure 2-4) is missing or damaged.

4. A Vertical Axis motor is not properly connected.

5. A Vertical Axis motor has failed.

6.1.11 When the power is turned on, the alert Ioport Jammed appears on the control panel display, and you do not hear a whining sound for several seconds before the alert occurs.

During the power up sequence, the I/O port is driven back to its home position. If the motor is operating but the I/O port is not moving, it will make a loud buzzing sound. Failure to make this noise indicates one of the following causes:

1. The cable from the Executive PCBA to the I/O port PCBA is damaged or disconnected.

2. The I/O port motor cable is damaged or disconnected.

3. The unit is configured for an I/O port, but no I/O port is installed.

4. The I/O port motor has failed.

5. The Executive PCBA is damaged.

6.1.12 When the power is turned on, the alert Ioport Jammed appears on the control panel display, and you do hear a whining sound for several seconds before the alert occurs.

During the power up sequence, the I/O port is driven back to its home position. If the motor is operating but the I/O port is not moving, it will make a loud buzzing sound. This condition indicates one of the following causes:

1. The I/O port mechanism is binding, due to misalignment of the guides.

2. The Carriage is parked in front of the I/O port, with a cartridge that is still in the I/O port slot engaging the grippers on the Handler.

3. The metal vane on the I/O port carriage is not obstructing the light beam of the I/O port home sensor.

4. The I/O port home sensor opto-interrupter pair is bent or damaged.

5. The I/O port mechanism is jammed, due to a mechanical obstruction, or it is binding against a stop.

6. The I/O port mechanism is binding, because the leadscrew shaft coupling was set with too much compression.

7. The Shaft Coupling between the I/O port motor and the leadscrew is not clamped properly. This case makes a quieter buzzing sound than the others.

6.1.13 When the power is turned on, the message Needs Calibration appears on the control panel display.

Possible cause:

The unit needs to be calibrated, due to an Executive PCBA replacement, Configuration change, or a failed calibration attempt.

6.1.14 When the power is turned on, the alert Carousel Jammed appears on the control panel display, and a Carousel motor does not rotate or make any noise.

When the power is turned on in a library, one of the things that happen is that carousels attempt to home themselves. This means that carousels attempt to find the small slots in their gear guard using the opto sensors on the carousel PCBA, and align themselves with one of these slots. They count the number of stepper motor steps between the slots, to verify proper operation. Any problem in this process results in this alert. If the library makes no noise during this process, this indicates that a Carousel motor is not being driven.

Possible causes:

1. The cable from an Executive PCBA to the Carousel PCBA is damaged or disconnected.

2. A Carousel motor cable is damaged or disconnected.

3. The unit is configured to be a carousel model and no carousel is installed.

4. An Executive PCBA has failed.

5. A Carousel motor has failed.

6.1.15 When the power is turned on, the alert Carousel Jammed appears on the control panel display. Also, a Carousel motor makes a loud noise and does not turn, or the carousel turns, then stops and makes a loud noise.

When the power is turned on in a library, one of the things that happen is that carousels attempt to home themselves. This means that carousels attempt to find the small slots in their gear guard using the opto sensors on the carousel PCBA, and align themselves with one of these slots. They count the number of stepper motor steps between the slots, to verify proper operation. Any problem in this process results in this alert. If the library makes a loud buzzing noise during this process, this indicates that a Carousel motor is being driven, but the carousel is not free to rotate, or the motor is not operating properly.

Possible causes:

1. A Carousel is jammed, or binding and does not turn freely, generally caused by a cartridge not fully inserted in a magazine or storage slot. Also may be caused by a magazine not properly installed on its mount.

2. The Cable from an Executive PCBA to the Carousel PCBA is damaged, or not properly seated.

3. A Carousel motor cable is not properly seated in the Carousel PCBA.

4. The internal SCSI cable is caught on a Carousel.

5. A Carousels drive gears are damaged or binding on debris.

6.1.16 When the power is turned on, the Carousel turns for awhile, then the alert XHome Fail appears on the control panel display.

When the power is turned on in a library, one of the things that happen is that carousels attempt to home themselves. This means that carousels attempt to find the small slots in their gear guard using the opto sensors on the carousel PCBA, and align themselves with one of these slots. They count the number of stepper motor steps between the slots, to verify proper operation. Any problem in this process results in this alert. If the carousel turns for a while then stops with this alert, this indicates that the library was unable to find all the slots on the gear guard.

Possible causes:

1. The Carousel Position Sensor pair on the Carousel PCBA is bent or damaged.

2. The slots in the Carousel's gear guard are damaged, or blocked by a foreign object, like a label.

3. The cable from an Executive PCBA to the Carousel PCBA is damaged or disconnected.

4. An Executive PCBA has failed.

6.1.17 When the power is turned on, the alert ZHome Fail appears on the control panel display, and the Insertion Axis is all the way back (nearest the cabinet door).

When the power is turned on, the library attempts to drive the grippers (Z Axis) all the way toward the door, then it verifies that the Z home sensor detects the gripper assemblies. This error results if this process fails.

Possible causes:

1. One of the Z Axis Home Sensor pair is bent or damaged.

2. A Carriage cable is damaged.

6.1.18 When the power is turned on, the alert ZHome Fail appears on the control panel display, and the Insertion Axis is not all the way back (nearest the cabinet door).

When the power is turned on, the library attempts to drive the grippers (Z Axis) all the way toward the door, then it verifies that the Z home sensor detects the gripper assemblies. This error results if this process fails. If one or both grippers are not all the way against the stop nearest the front door, then the library was unable to completely drive the gripper motor or transmission.

Possible causes:

1. An Insertion Axis (Z Axis) is jammed or binding.

2. An Insertion Axis motor is not turning freely

3. An Insertion Axis motor is not properly connected to the I/O port carriage PCBA.

4. The I/O port carriage cable is damaged.

6.1.19 When the power is turned on, the alert Not Clear appears on the control panel display.

This indicates that a Sentry Beam (also known as the "Y Clear") is unexpectedly obstructed. A Sentry beam is an invisible light beam, which travels from an emitter at the bottom of the library to a sensor at the top, between the carriages and the cartridges. Its function is to detect possible collisions between the carriages and other objects in the library.

Possible causes:

1. A cartridge is not fully inserted into a magazine storage slot, or is hanging off of a Handler.

2. A magazine is not fully seated.

3. A tape is inserted in a magazine or storage slot backwards or inverted.

4. A tape is protruding excessively from a tape drive.

5. An object is blocking a Y–Clear Sensor's (Inventory Sentry Beam's) optical path. Possibly a cartridge lying in the bottom of the library.

6. A Y–Clear Sensor's (Inventory Sentry Beam's) detector or emitter is dirty or obscured.

7. The unit is configured for no I/O port, but one is installed and it is not positioned all the way against the back stop.

8. The unit requires calibration, due to a component or FRU change.

6.2 Operation Failures

The problems in this section occur during normal operation.

6.2.1 During operation, a key on the key pad works intermittently, or completely fails to operate.

Possible cause:

A switch on the Control Panel PCBA has failed. It is possible to pry the cap off the switch and clean the contacts. If you try this, pry the cap off using a thin knife blade and be careful not to lose the "X" shaped contact spring inside. Clean the contact spring and the two contacts inside the switch by wiping with a plastic safe contact cleaner or with isopropyl alcohol. If this fails, replace the entire front panel FRU.

6.2.2 The library tries to insert a tape into a tape drive that is already occupied.

When the library attempts to put a tape into an occupied drive, it is not a failure. For example, if the library takes an inventory after a tape is inserted into a drive, then the library does not know if a tape is in the drive. If commanded to do so, the library will attempt to put a tape into the occupied drive. After it fails to insert the tape into the occupied drive, the library will put the tape back where it came from, and update the inventory information to show that the drive is occupied.

6.2.3 A Barcode Reader does not read any bar code labels.

The library uses the Code 3 of 9 (also known as code 39) barcode format for the cartridge labels. In the default configuration, a check character is expected. This can be altered in the configuration. If the library is configured for a check character, and none is present on the labels, then the library will be unable to read the labels. If the library is configured for no check character, and there are check characters on the label, the library will interpret the check character as an additional character, and you will see one extra character in the element label reported on the SCSI bus or in the menus.

Possible causes:

1. The barcode labels are printed in a code that the library configuration does not understand.

2. The configuration is set to the wrong type of barcode reader.

3. The Configuration\Advanced\Changer\LabelCheckChar (label check character) option is not set correctly.

4. The lens on the face of a bar code reader is not clean.

5. The barcode labels are not of a high enough quality for reliable reading.

6. The bar code reader has failed.

7. The barcode labels are dirty or damaged.

6.2.4   A Barcode Reader does not read bar code labels reliably.

The library uses the Code 3 of 9 (also know as code 39) barcode format for the cartridge labels. In the default configuration, a check character is expected. This can be altered in the configuration. If the library is configured for a check character, and none is present on the labels, then the library will be unable to read the labels. If the library is configured for no check character, and there are check characters on the label, the library will interpret the check character as an additional character, and you will see one extra character in the element label reported on the SCSI bus or in the menus.

Possible causes:

1. The barcode labels are not of a high enough quality for reliable reading.

2. The barcode labels are dirty or damaged.

3. The barcode labels are printed in a code that the library configuration does not understand.

4. The lens on the face of a barcode reader is not clean.

5. The configuration is set to the wrong type of barcode reader.

6. The barcode reader has failed.

7. The Configuration\Advanced\Changer\LabelCheckChar (label check character) option is not set correctly.

6.2.5   When the library takes an inventory and reads the barcode labels, it scans the tapes without barcode labels repeatedly.

The library can be configured to make several attempts to read a label with the barcode reader(s), if it cannot read the label the first attempt. If the library is configured this way, and no label is on the cartridge, it will be scanned several times before the library abandons the effort.

Possible causes:

1. The Mag. Labels value in the Configuration\Advanced\Changer\Inventory menu is set to ALL, and some of the magazine cartridges do not have bar code labels. Change the Mag. Labels value to SOME, or put barcode labels on all of the magazine cartridges.

2. The Seq.Labels value in the Configuration\Advanced\Changer\Inventory menu is set to ALL, and some of the sequential cartridges do not have bar code labels. Change the Seq.Labels value to SOME, or put bar code labels on all of the sequential cartridges.

6.2.6 During operation, the alert Cart Jammed appears on the control panel display, and there is no cartridge in a Handler's gripper.

This is typically the result of a gripper attempting to remove a cartridge from a storage location or tape drive, and it fails.

Possible causes:

1. The target magazine is not fully seated.

2. The target cartridge is installed in the magazine upside-down.

3. The target cartridge is stuck in the magazine.

4. The library is configured for the wrong TLS model.

5. If the location is a tape drive, the drive is configured to the wrong type.

6. A Handler's gripper solenoid mechanism has malfunctioned.

7. A Handler's gripper solenoid is out of adjustment.

8. A Handler's gripper spring has failed.

9. The calibration data is corrupt and the library needs to be recalibrated.

10. A Cartridge Presence sensor is obscured, by a foreign object, or by dust on the optics.

11. A Cartridge Presence sensor has malfunctioned.

12. If the target is a tape drive, the cartridge is stuck in the drive.

6.2.7 During operation, the alert Handler Jammed appears on the control panel display, and a cartridge is in a gripper.

This is typically the result of the library attempting to insert a cartridge into a storage location or tape drive, and failing.

Possible causes:

1. The target magazine is not fully seated.

2. The target magazine is damaged.

3. The target is a tape drive, which has a tape in it already.

4. A cartridge present sensor has become dirty or failed.

5. The retaining spring in the I/O port has broken off.

6. The library is configured for the wrong TLS model.

7. If the location is a tape drive, the drive is configured to the wrong type.

8. The calibration data is corrupt and the library needs to be recalibrated.

9. The Insertion Axis is binding near the magazine end of its travel.

6.2.8 During operation, the alert Handler Jammed appears on the control panel display.

Possible causes:

1. An Insertion Axis is binding.

2. An Insertion Axis is jammed against a stop.

3. An Insertion Axis motor is unplugged.

4. If the location is a tape drive, the drive is configured to the wrong type.

5. The right Insertion Axis has a tape jammed against the I/O Slot.

6. An Insertion Axis motor system has malfunctioned.

6.2.9 During operation, the alert Vertcl Axis Jammed appears on the control panel display.

This occurs when a carriage attempts to move vertically but is unable.

Possible causes:

1. A carriage is jammed by a cartridge and unable to move freely up or down.

2. A magazine is not seated properly and is colliding with a carriage.

3. A cartridge is hanging off a carriage and is colliding with a magazine or tape drive.

4. The I/O port is interfering with a carriage.

5. A Vertical Axis motor system has failed.

6. A Vertical (Y) Axis leadscrew is binding.

7. A Vertical Axis leadscrew is not attached properly at both ends.

8. The library is configured to the wrong model, and the carriage is colliding with the top of the library.

6.2.10 During operation, the alert Not Clear appears on the control panel display.

This indicates that a Sentry Beam (also known as the "Y Clear") is unexpectedly obstructed. A Sentry beam is an invisible light beam, which travels from an emitter at the bottom of the library to a sensor at the top, between the carriage(s) and the cartridges. Its function is to detect possible collisions between the carriage(s) and other objects in the library.

Possible causes:

1. A cartridge is not fully inserted into a magazine storage slot, or is hanging off of a Handler.

2. A magazine is not fully seated.

3. A tape is inserted in a magazine or storage slot backwards or inverted.

4. A tape is protruding excessively from a tape drive.

5. An object is blocking a Y-Clear Sensor's (Inventory Sentry Beam's) optical path. Possibly a cartridge lying in the bottom of the library.

6. A Y-Clear Sensor's (Inventory Sentry Beam's) detector or emitter is dirty or obscured.

7. The unit is configured for no I/O port, but one is installed and it is not positioned all the way against the back stop.

8. The unit requires calibration, due to a component or FRU change.

6.2.11 During operation, the alert Ioport Jammed appears on the control panel display.

Possible causes:

1. The Carriage is parked in front of the I/O port, with a cartridge that is still in the I/O port slot engaging the grippers on the Handler.

2. The I/O port mechanism is jammed, due to a mechanical obstruction, or it is binding against a stop.

3. The I/O port door is bent and the I/O port slot or a cartridge in the slot is colliding with the door.

4. The Shaft Coupling between the I/O port motor and the lead screw is not clamped properly.

6.3 Calibration Failures

These are problems that occur when a calibration command was issued, but did not execute successfully. Occasionally a spurious calibration failure can be corrected by repeating the calibration procedure.

IMPORTANT:

Refer to section 6.1 (Power Up and Initialization Failures) for problems not listed in this section.

6.3.1 During Calibration, the alert YClear Fail appears on the control panel display.

The calibration sequence blocks and unblocks the path of the Y clear light beams, and reads the sensor output level to determine proper operation, and to calculate a threshold for detecting a blocked condition. This fault indicates that a sensor or emitter is not functioning correctly.

Possible causes:

1. An emitter assembly at the bottom of the cabinet is not properly connected to the Drive Bay PCBA.

2. A Drive Bay PCBA is not properly connected to the Executive PCBA.

3. The sensor gain select jumpers on the I/O port PCBA are in the wrong position. Most models have a jumper you can set on the I/O port PCBA to set the sensitivity of the sensor. On some models without I/O ports, or on the left side of some dual bay models, there may be a special sensor PCBA under the top cover of the machine, or in place of the I/O port PCBA. Typically, libraries with one story of magazines should be set on "S", and libraries with more than one should be set on "T". If a library is set correctly to the "S" position and stills fails calibration with this problem, try moving the jumper to the "T" position and recalibrating.

4. Something is blocking a Y-Clear Sensor's (Inventory Sentry Beam's) optical path.

5. A Y-Clear Sensor's (Inventory Sentry Beam's) emitters do not work.

6. A Y-Clear Sensor's (Inventory Sentry Beam's) detector circuit on the I/O port PCBA has failed.

7. The emitters or detectors have dust or debris on their lenses.

8. The unit is not configured for an I/O port (`I/O Port` in the `Configuration\Handler\Mechanics` menu is set to `NONE`). However, an I/O port is installed and the I/O port slot is not fully retracted, which blocks the Inventory Sensor beam. Solution: Manually turn the I/O port's leadscrew to position the I/O port slot at its back stop.

6.3.2 During Calibration, the alert Crtprs Sensor Fail appears on the control panel display.

The calibration sequence blocks and unblocks the path of the CRTPRS light beams, and reads the sensor output level to determine proper operation, and to calculate a threshold for detecting a blocked condition. This fault indicates that a sensor or emitter is not functioning correctly.

Possible causes:

1. A Cartridge Presence Sensor's emitter or detector is not properly connected. There are small connectors on the PCBA on the bottom of each carriage that carry the signals to the emitter and detector. These may come unplugged during service or other activities.

2. A Cartridge Presence Sensor's emitter or detector has failed.

3. There is an object blocking a Cartridge Presence Sensor's optical path.

4. A Cartridge Presence Sensor's emitter or detector has dust or debris on its lens.

5. An optical emitter and detector may have become misaligned. Normally any alignment possible within the adjustment should work. However, you could try to loosen the screws holding the emitter and detector, and while looking at the CRTPRS value in the Private/Display A/D Left or Right menu, try to maximize the signal. Retighten the screws and retry calibration.

6.3.3 During Calibration, the alert IClear Sensor Fail appears on the control panel display.

The I/O port clear sensor is located in the mouth of the I/O port, and detects when a cartridge is partially inserted in the opening.

Possible causes:

1. The bracket holding the LED for the I/O port clear sensor is bent.

2. The cable connecting the I/O port PCBA to the I/O port emitter PCBA is disconnected or damaged.

3. The I/O port emitter PCBA has failed.

4. The I/O port PCBA has failed.

6.3.4 During Calibration, the alert IFull Sensor Fail appears on the control panel display.

The I/O port full sensor is located about 4 cm inside the mouth of the I/O port, and detects when a cartridge is fully inserted in the opening.

Possible causes:

1. The bracket holding the LED for the I/O port full sensor is bent.

2. The cable connecting the I/O port PCBA to the I/O port emitter PCBA is disconnected or damaged.

3. The I/O port emitter PCBA has failed.

4. The I/O port PCBA has failed.

6.3.5 During Calibration, the alert Calibration Failed appears on the control panel display.

During calibration, the library "feels" for the height of some of the storage slots to compensate for mechanical variations. This fault indicates that the library was unable to calibrate one of the slots. Observe which slot the carriage is sitting in front of. This is the calibration location referred to below.

Possible causes:

1. There is no magazine present in the calibration location, and it is a magazine location. Place a magazine in this position and try again.

2. There is a cartridge in the magazine in the calibration location. Remove the cartridge and try again.

3. The magazine in the calibration location is not properly seated.

4. An Insertion Axis (Z Axis) is not free to travel to its forward stop. Turn the lead screw with your fingers and insure it is free to travel stop to stop.

5. An Insertion Axis does not run smoothly.

6. The machine is not assembled correctly. If the unit was just expanded or upgraded, double check that the new features are mounted in the correct holes.

7. The machine is configured as the wrong model. Check that the model and other configuration information is set correctly. You can freely add and remove tape drives from the configuration with no affect on the calibration.

7.   Field–Replaceable Units (FRUs)

7.1   Introduction

Many of the major components in the TLS are available from Qualstar as separate
Field-Replaceable Units (FRUs). Each FRU can be removed and replaced on-site by
qualified personnel. Some of the FRUs are mechanical assemblies while others are
Printed Circuit Board Assemblies (PCBAs) or Integrated Circuits.

This chapter lists all of the available FRUs, their Qualstar part numbers and provides
detailed removal and replacement instructions.

7.2 Field-Replaceable Units (FRUs)

Table 7-1 lists all of the FRUs available from Qualstar for the TLS-5000, TLS-6000 and TLS-8000 libraries.

Field Replaceable Unit Description	FRU Part Number	Section	Page	Time Min.
Carriage Assembly	501196-01-8	7.5	7-8	30
Carriage PCBA	501147-01-1	7.6	7-20	40
Barcode Reader Assembly (TLS-5000/58xxx)	500983-05-1	7.7	7-22	10
Barcode Reader Assembly (TLS-6000/68xxx)	500983-04-4	7.7	7-22	10
Barcode Reader Assembly (TLS-8000/88xxx)	500983-05-1	7.7	7-22	10
Air Filter (Single Fan)	500584-02-4	7.8	7-24	5
Air Filter (Dual Fan)	500584-01-6	7.8	7-24	5
Fan Assembly	604-0013-2	7.8.2	7-26	30
Blower Air Filters	500584-01-6	7.9	7-34	30
Blower Assembly	500469-01-0	7.9	7-34	30
I/O Port Assembly (TLS-5000/58xxx)	501195-02-8 (Rev. B or later)	7.10	7-38	20
I/O Port Assembly (TLS-6000/68xxx)	501195-01-0	7.10	7-38	20
I/O Port Assembly (TLS-8000/88xxx)	501195-02-8	7.10	7-38	20
I/O Port PCBA (TLS-5000/58xxx)	501227-02-9	7.11	7-41	30
I/O Port PCBA (TLS-6000/68xxx)	501227-01-1	7.11	7-41	30
I/O Port PCBA (TLS-8000/88xxx)	501227-02-9	7.11	7-41	30
Switch Bracket Assembly (Front Panel / Display)	500815-01-4	7.12	7-43	15
Handler Power Supply	Please contact technical support.	7.13	7-46	15
Blower Power Supply 65W	500826-08-6	7.14	7-55	15
Tape Drive Power Supply	Please contact technical support.	7.15	7-57	20
Executive II PCBA	501137-01-2	7.16	7-60	10
Executive III PCBA	501387-01-3	7.16	7-60	10
Executive IV PCBA	501447-01-5	7.16	7-60	10
Drive Bay PCBA (1-Drive Libraries)	501297-01-4	7.17	7-69	30
Drive Bay PCBA (2-Drive Libraries and the top 2 drive positions in 4 Drive models)	501257-01-8	7.17.3	7-72	30
Drive Bay PCBA (The bottom 2 drive positions in 4 & 8 Drive Libraries)	501257-02-6	7.17.5	7-76	30
Drive Bay PCBA (The top 2 drive positions in 8 Drive models)	501257-03-4	7.17.5	7-76	30
Carousel PCBA	500617-02-2	7.18	7-87	10
Carousel Motor (TLS-62xx & TLS-82xx)	500822-76-2	7.19.1	7-90	30
Carousel Motor (TLS-54xx, 64xx & 84xx)	500822-68-9	7.19.1	7-90	30
Carousel Motor (TLS-58xxx, 68xxx & 88xxx)	500822-53-1	7.19.3	7-94	30
SCSI HVD Adapter PCBA	501407-01-9	7.20	7-99	10

Field Replaceable Unit Description	FRU Part Number	Section	Page	Time Min.
Q-Link	501657-01-9	7.21	7-102	10
Shuttle Assembly (TLS-58xxx)	500189-03-0 (Rev. B or later)	7.22	7-104	20
Shuttle Assembly (TLS-68xxx)	500189-02-2	7.22	7-104	20
Shuttle Assembly (TLS-88xxx)	500189-03-0	7.22	7-104	20
Shuttle PCBAs	501317-01-2 & 501427-01-7	7.23	7-107	10
Y-Clear Detector PCBA	501307-01-1	7.24	7-109	10

Table 7-1   Field-Replaceable Units (FRUs)

The times in the Time Min. column are the maximum estimated times (in minutes) required for an experienced technician to replace the corresponding FRU.

7.3   Required Tools and Materials

Table 7-2 is a complete list of the tools that are required for all FRU replacement/installation procedures.

Tools List
3/32-inch Allen (Hex) Wrench
7/64-inch Allen (Hex) Wrench Both short arm and long arm L-shape wrenches required. Ball-point style preferable.
1/8-inch Allen (Hex) Wrench L-shape wrench required.
1/4-inch Hex Nutdriver or open-end Wrench Standard and Stubby/Short length nutdrivers are required.
Number 1 Phillips Screwdriver
Number 2 Phillips Screwdriver Standard and Long Blade screwdrivers are required.
Flat Blade Screwdriver
Torque Wrench capable of at least 50 in-pounds
Tape Measure or 12-inch Scale
Diagonal Wire Cutters
Wire Strippers (24 AWG capable)
Wire Crimpers (24 AWG capable)
Small Mirror (optional)
Small Flashlight (optional)

Table 7-2   Required Tools

The materials listed in Table 7-3 may be required when replacing some FRUs.

3-inch X 3/32-inch Replacement Cable Ties   Qualstar P/N 669-1001-9
Loctite 242 Threadlocker
Piece of Twine
Leadscrew Lubricant   Qualstar P/N 732-0003-2 Latex Glove **IMPORTANT:** Leadscrew lubricant and a latex glove are required during Carriage Assembly replacement.

Table 7-3   Replacement Materials

7.4   Top and Side Panels

Tools Required:

- **Number 2 Phillips Screwdriver**

- **1/4-inch Hex Nutdriver or Wrench**
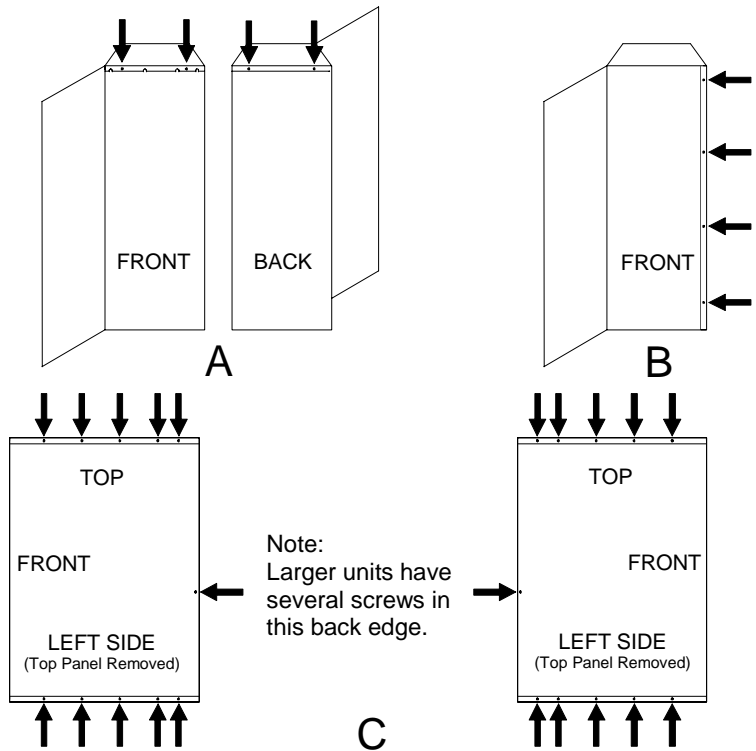
Figure 7-1   Top and Side Panels – Single Bay Model Shown

Field–Replaceable Units (FRUs)
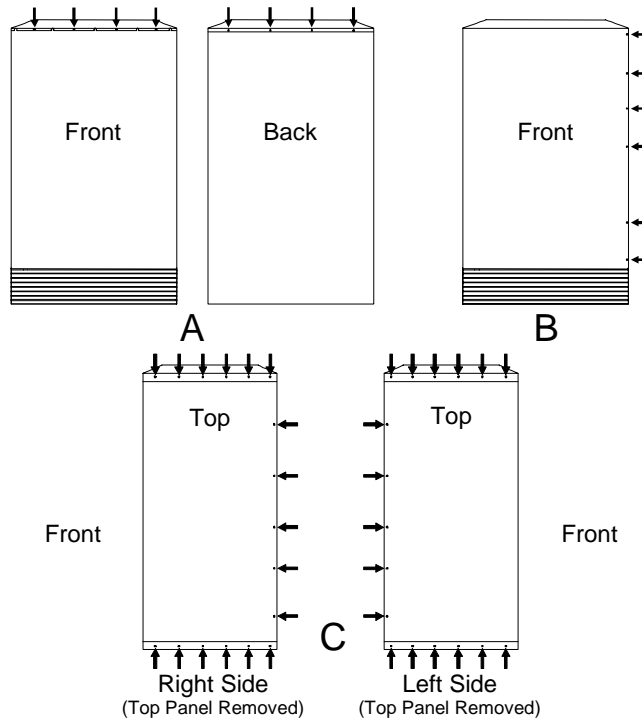
Figure 7-2   Top and Side Panels – Dual Bay Model Shown

7.4.1   Top Panel Removal

1.   Turn off the TLS power and remove the power cord.

2.   Open the cabinet door.

3.   Remove the screws from the front of the Top Panel (Figure 7-1A and Figure 7-2A).

4.   Remove the screws from the back of the Top Panel (Figure 7-1A and Figure 7-2A).

5.   Lift the Top Panel off of the TLS.

7.4.2   Top Panel Replacement

1.   Turn off the TLS power and remove the power cord.

2.   Open the cabinet door.

3.   Place the Top Panel on the TLS with the scalloped edge facing the front (Figure 7-1A and Figure 7-2A).

4.   Reinstall the screws removed in Section 7.4.1, step 3.

5.   Reinstall the screws removed in Section 7.4.1, step 4.

6.   Close the cabinet door.

7.4.3   Side Panel Removal (Left or Right)

1.   Turn off the TLS power and remove the power cord.

2.   Open the cabinet door.

3.   Remove the Top Panel (Section 7.4.1).

4.   When removing the right Side Panel, remove the screws from the front of the Side Panel (Figure 7-1B and Figure 7-2B).

NOTE

The left Side Panel does not have front mounting screws, as shown for the right Side Panel in Figure 7-1B and Figure 7-2B.

5.   If your TLS has 1/4-inch nuts inside the left Side Panel (Figure 7-3), remove them.

6.   For either Side Panel, remove the screws from the top, bottom and back edges of the Side Panel Figure 7-1C and Figure 7-2C.

7.   Lift the Side Panel off of the TLS.

Front
(58xxx/68xxx/88xxx shown)
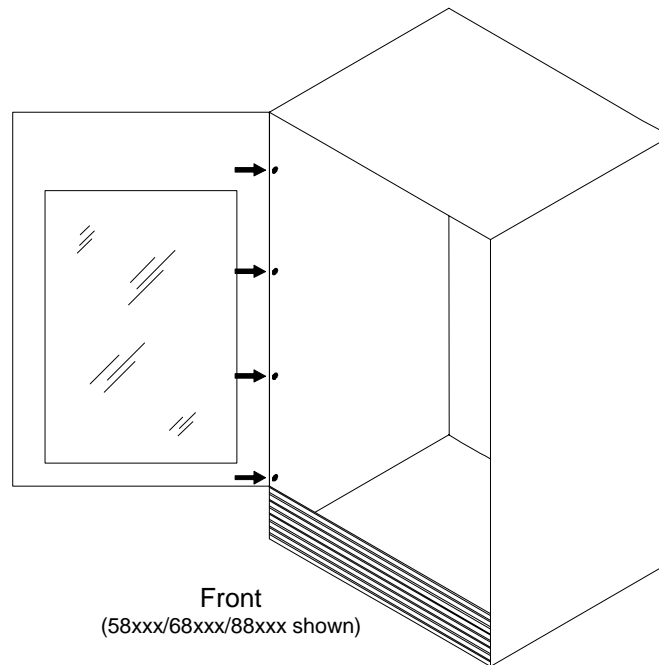
Figure 7-3   Left Side Panel Nuts (Some single bay models do not have these nuts.)

7.4.4   Side Panel Replacement (Left or Right)

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. For either Side Panel, place the Side Panel (left or right side) on the TLS.

4. If you are replacing the right Side Panel, replace the screws removed in Section 7.4.3, step 4.

5. If you are replacing the left Side Panel, and any 1/4-inch nuts were removed in Section 7.4.3, step 5, replace them now.

6. For either Side Panel, replace the screws removed in Section 7.4.3, step 6.

7. Replace the Top Panel (Section 7.4.2).

8. Close the cabinet door.

7.5   Carriage Assemblies

P/N 501196-01-8

A Carriage Assembly contains a Gripper assembly (for grasping the tape cartridges), a Carriage PCBA, a Cartridge Presence Sensor, a Vertical Axis Home Sensor and a Barcode Reader. (A barcode reader is optional on some models). Because the Carriage Assembly is used to move tape cartridges, it is referred to as the Changer in all of the TLS menus.

Single bay libraries contain one Carriage Assembly and TLS-58xxx/68xxx/88xxx (dual bay) models contain two identical Carriage Assemblies referred to as the left and right Carriage Assemblies when viewed from the front of the TLS. Note that dual bay carriage assemblies have three guide shafts and the single bay models contain two. The replacement procedure that follows will apply to replacing Carriage Assemblies from either single or dual bay models, making note of specific operations when required.

This section includes FRU information for the entire Carriage Assembly and lubricating instructions for the Insertion (Z) Axis Leadscrew and the Vertical (Y) Axis Leadscrew.

CAUTION

Be very careful not to damage a Vertical (Y) Axis Home sensor while removing a Carriage Assembly. There is very little clearance between the sensors (underneath and to the rear of the Carriage Assemblies) and the Vertical (Y) Axis Home Sensor Probes (Figure 7-4 and Figure 7-5), which are mounted on the floor of the cabinet.

Tools Required:

- **Number 2 Phillips Screwdriver**

- **7/64-inch Allen (Hex) Wrench**

- **1/8-inch Allen (Hex) Wrench**
  L-shape wrench required

- **Torque Wrench**
  (Capable of at least 50 in-pounds)

- **Small Mirror (optional)**

- **Small Flashlight (optional)**

Material Required:

- **Loctite 242 Threadlocker**

Y-Clear Detector PCBA

Y-Clear Detector

Spring Cup Assembly
with Plastic Washer
and Upper Leadscrew
Retaining Screw

Control Panel

Front Guide Shaft

Carriage,
Handler, Gripper and
Barcode Reader

Vertical (Y) Axis
Lead Screw

Rear Guide Shaft

Private Slot

Cooling Fans

Tape Drives

Front

Vertical (Y) Axis
Home Sensor Probe

Y-Clear Emitter Assembly

I/O Port Assembly

Handler Power Supply

Carousel

Executive PCBA

Carousel PCBA

Carousel Motor

SCSI Connectors

Power Switch

Drive Bay PCBA

AC Power
Receptacle

Rear

Tape Drive Power Supply

Figure 7-4   Single Bay TLS Side View
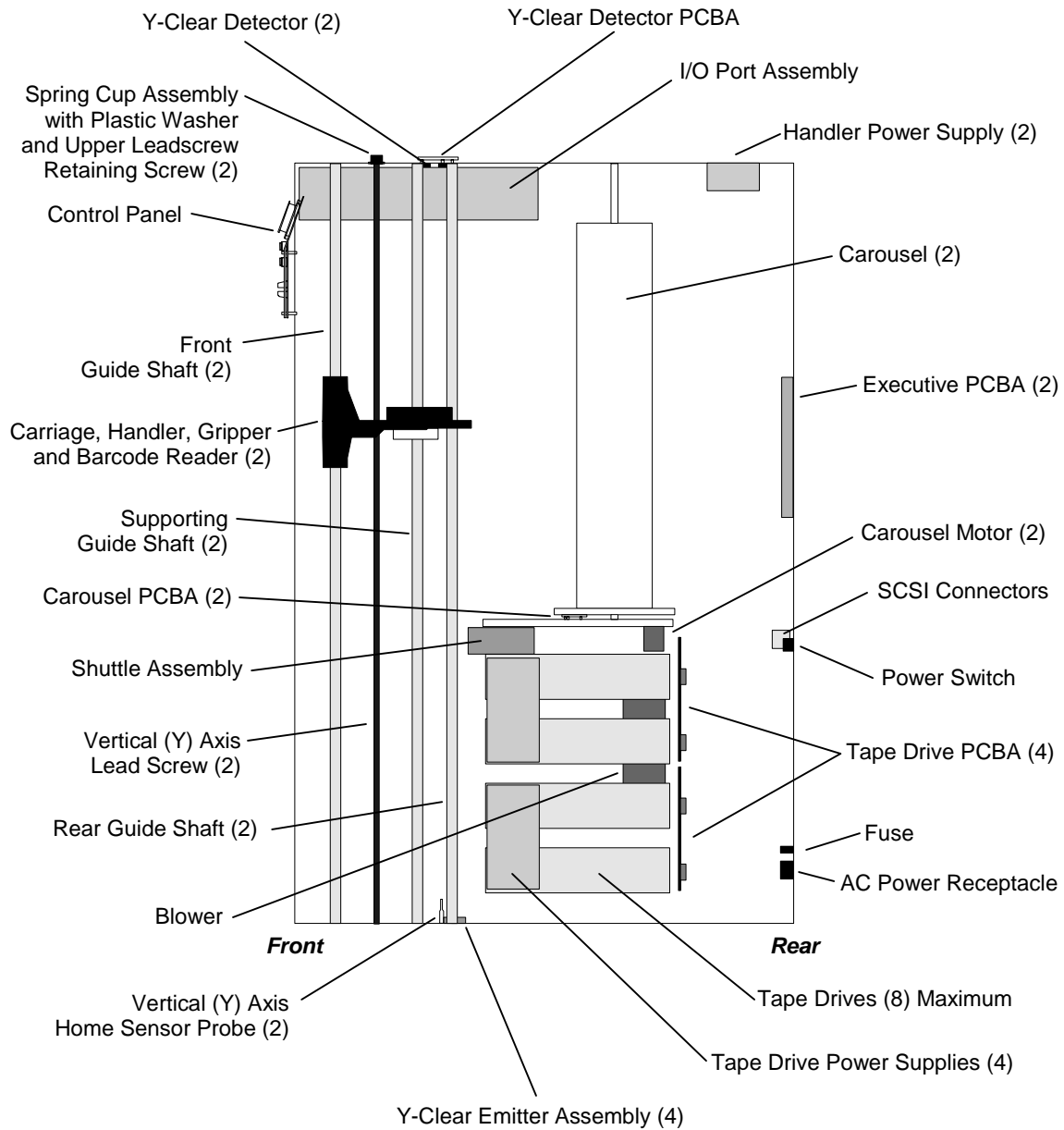
Figure 7-5   Dual Bay TLS Side View

7.5.1   Carriage Assembly Removal

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel as described in Section 7.4.1.

3. Use a 7/64-inch Allen wrench to remove both socket-head Carriage Cable Clamp mounting screws (Figure 7-6).

4. Manually raise the Carriage Assembly up sufficiently to expose the ribbon cable connector on the underside.

5. Disconnect the Carriage Assembly's double ribbon cable connector by pushing outwards on both ejectors (located on the end of the connector). Set the cable to the right.

6. Lower the carriage to the bottom of the TLS.

7. Use a 1/8-inch Allen wrench to loosen the upper Leadscrew retaining screw.

Carriage Cable Clamp Mounting Screws
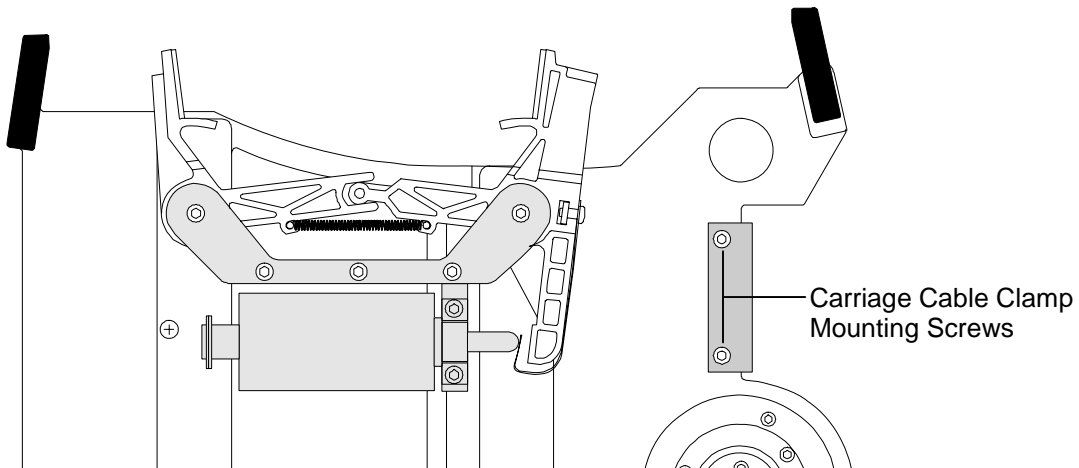
Figure 7-6   The Carriage Assembly – Top View

Leadscrew Retaining Screw

Cabinet Foot
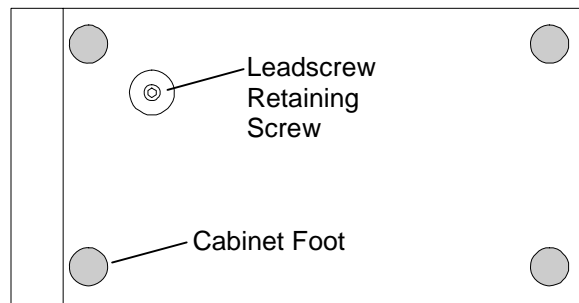
Figure 7-7   Single Bay TLS Cabinet – Bottom View

Steps 8 and 9 apply to single bay libraries only.

8. Lay the TLS on its left side (as seen from the front) to gain access to the bottom Leadscrew retaining screw (Figure 7-7).

9. Use a 1/8-inch Allen wrench to remove the Leadscrew retaining screw (Figure 7-7), then stand the TLS upright on its feet. Proceed to step 11.

Steps 10 and 11 apply to dual bay libraries only.

10. Using a small mirror and a small flashlight if needed, locate the bottom Leadscrew retaining screw, corresponding to the carriage you wish to remove, on the bottom of the TLS (Figure 7-8).

11. Use a 1/8-inch L-shaped Allen wrench to remove the Leadscrew retaining screw (Figure 7-8).

Casters (6)

Viewed from above.

Leadscrew Retaining Screw
for right side Carriage Assembly

Leadscrew Retaining Screw
for left side Carriage Assembly
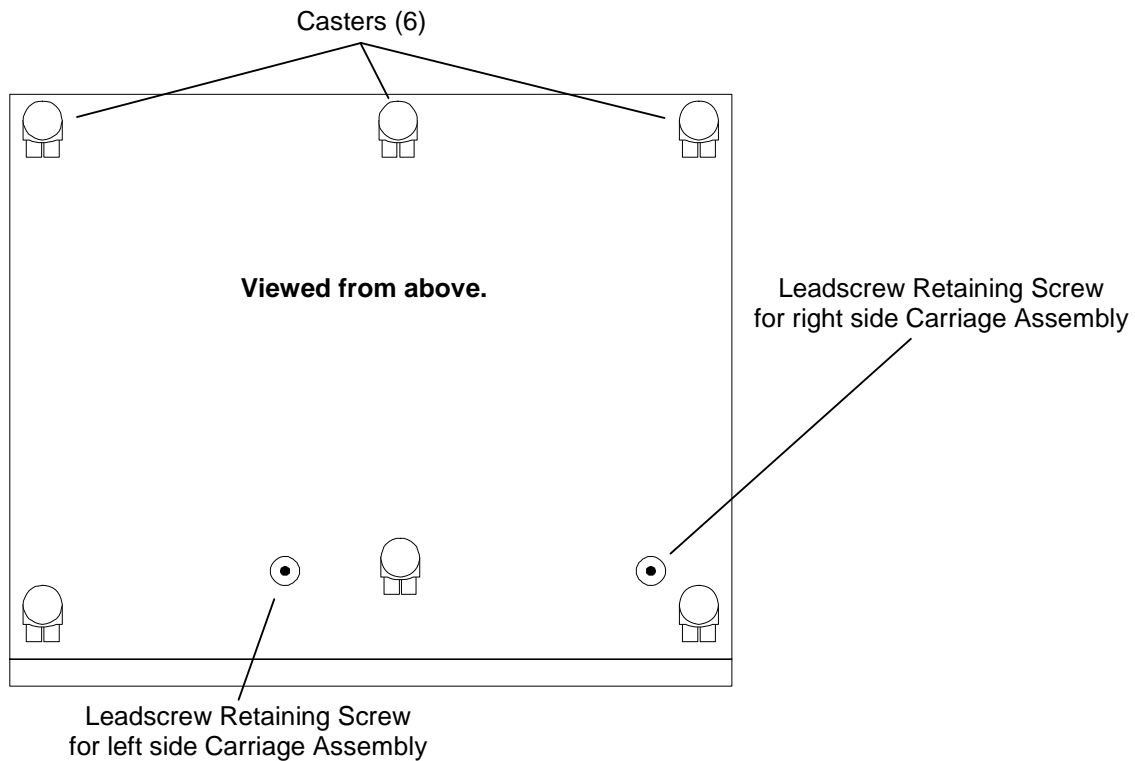
Figure 7-8   Dual Bay TLS Cabinet – Bottom View

NOTE

The Teflon® coating on the Leadscrew is easily scratched. Please handle the Leadscrew with care. The Leadscrew and Spring Cup Assembly will be removed as a subassembly (Figure 7-4 or Figure 7-5).

12. Remove the Leadscrew/Spring Cup subassembly through the top plate by gently raising the Carriage Assembly all the way to the top of the Vertical (Y) Axis range of motion.

NOTE

In the next step, a thin metal spacer may come loose from the bottom of the Leadscrew.

13. While holding the Carriage Assembly at the top of its vertical range of motion, rotate the Leadscrew counter-clockwise to disengage it from the Vertical (Y) Axis Leadscrew Motor/Nut (Figure 7-9). This may require holding the (Y) Axis nut to prevent it from rotating. Finally lift the Leadscrew out of the top plate and set it in a safe place. Locate the thin metal spacer and place it in a safe location.

14. Carefully lower the Carriage Assembly back down onto the bottom plate.

15. There are two Guide Shaft Strike Plates mounted on the top plate on single bay libraries and there are three for each Carriage Assembly on dual bay models. Gently move the Switch Bracket ribbon cable out of the way on all single bay models and when removing the right carriage assembly on dual bay models. Remove all the appropriate Guide Shaft Strike Plate mounting screws, then remove the Guide Shaft Strike Plates. See Figure 7-10 or Figure 7-11.

16. Slowly lift the rear Guide Shaft up and out of the TLS. For dual bay models only, slowly lift the supporting Guide Shaft up and out of the TLS (Figure 7-9).

CAUTION

Be very careful not to damage the Vertical (Y) Axis Home Sensor on the Vertical Axis Home Sensor Probe (Figure 7-4) when you move the Carriage Assembly.

17. Hold the Carriage Assembly with the left hand. Failure to do so will cause the Carriage Assembly to tip over after the shaft is removed, possibly damaging the Vertical (Y) Axis Home Sensor. Lift the front Guide Shaft far enough to clear the Carriage Assembly. Gently lift the Carriage Assembly and remove it from the cabinet, then lower the front Guide Shaft down onto the bottom plate.

18. Slowly lift the front Guide Shaft up and out of the TLS. Be sure to put the orange rubber bushing (located at the bottom of the Guide Shaft) in a safe place. It must be reinstalled before the Guide Shaft is reinstalled.

19. For dual bay models only, use a Phillips screwdriver to remove the Supporting Guide Shaft Bearing Assembly Screws. Remove the Supporting Guide Shaft Bearing Assembly from the Carriage Assembly and place it in a safe location. It will need to be installed on the new Carriage Assembly.
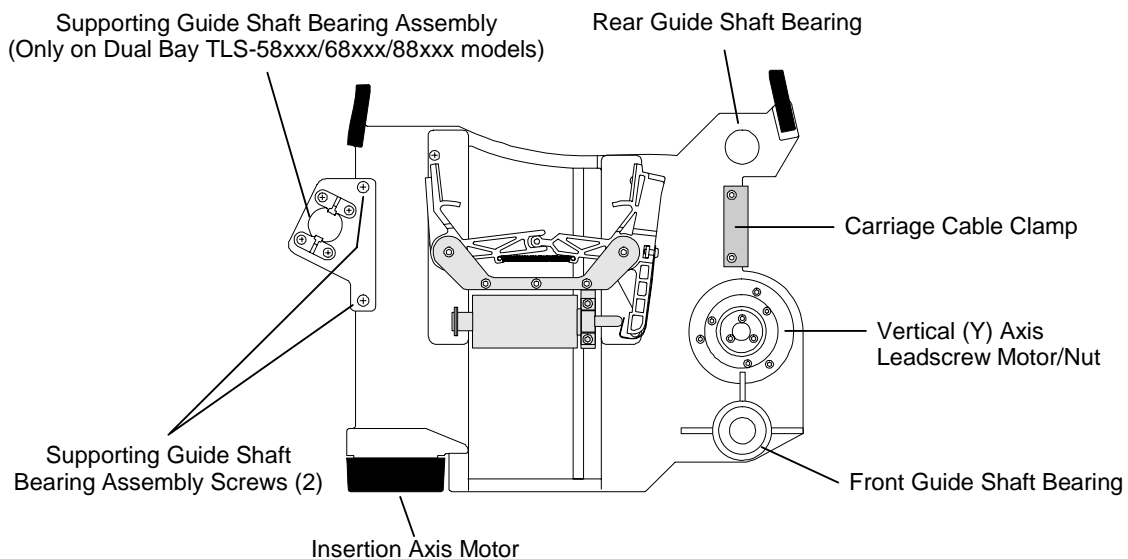
Figure 7-9   TLS Carriage Assembly P/N 501196-01-8
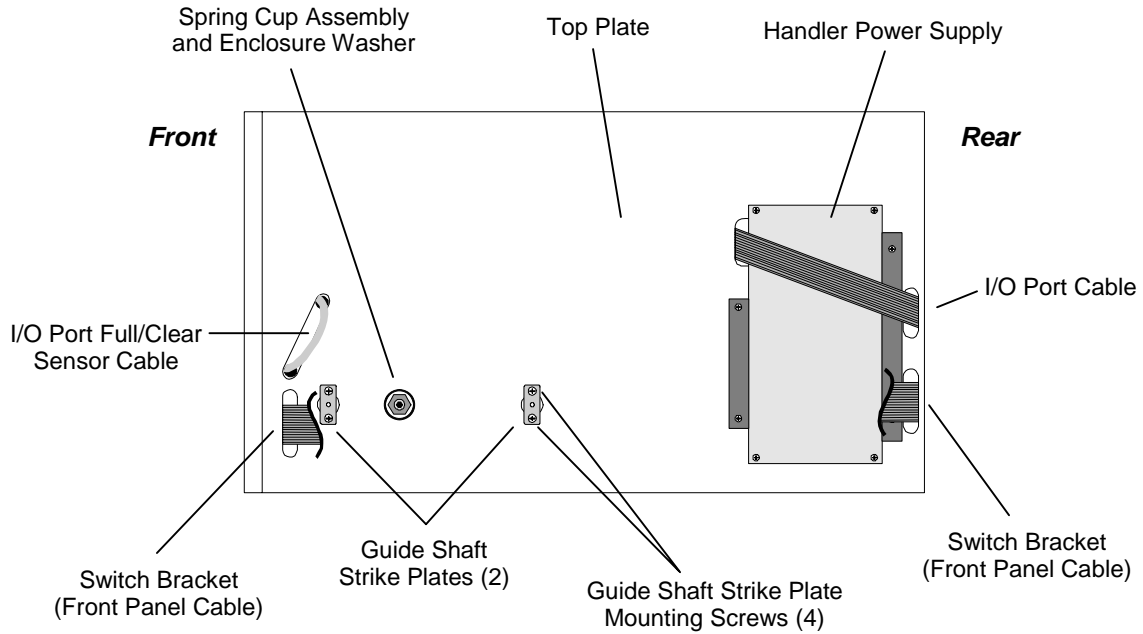
Figure 7-10   Single Bay TLS Cabinet – Top View (Top Panel Removed)
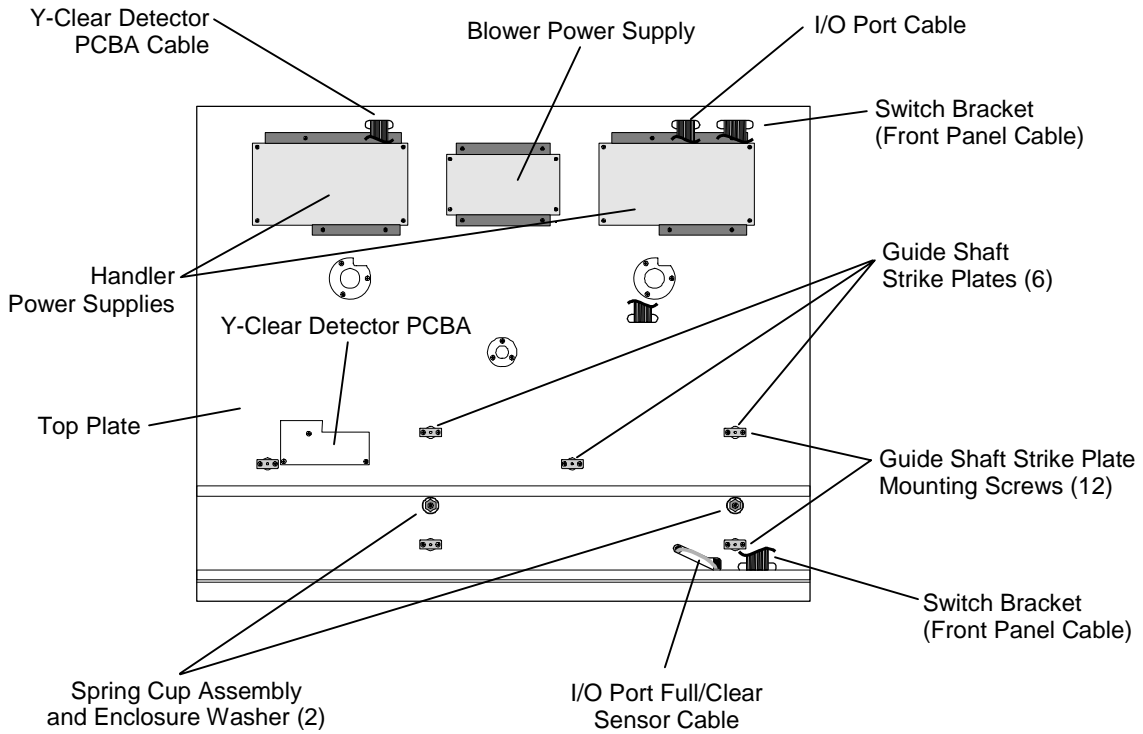
Figure 7-11   Dual Bay TLS Cabinet – Top View (Top Panel Removed)

7.5.2   Carriage Assembly Replacement

This procedure assumes that a Carriage Assembly was removed in Section 7.5.1.

CAUTION

Recalibrate the TLS after replacing a Carriage Assembly.

Be very careful not to damage a Vertical Axis Home sensor while removing a Carriage Assembly. There is very little clearance between the sensors (underneath and to the rear of the Carriage Assemblies) and the Vertical Axis Home Sensor Probes (Figure 7-4 and Figure 7-5), which are mounted on the floor of the cabinet.

1.   Locate the Guide Shafts. The Guide Shafts are identical. Note that the top end of each Guide Shaft has a white spacer applied to it, while the bottom end of each Guide Shaft is bare metal.

2.   Place the orange rubber bushing (removed in Section 7.5.1) over the front Guide Shaft hole in the bottom plate.

3.   Insert the bottom end of one Guide Shaft (the end without the white spacer) into the front Guide Shaft hole in the top plate (Figure 7-4 or Figure 7-5), then gently lower the Guide Shaft down through the hole. This is best accomplished by resting the hand holding the shaft on the top plate, and then guiding the shaft from inside the TLS with the other hand.

4.   Hold the front Guide Shaft about 10 inches above the bottom plate with the left hand. Insert the Carriage Assembly into the cabinet and slide the front Guide Shaft through the front Guide Shaft Bearing. Lower the front Guide Shaft down through the orange rubber bushing and into the hole in the bottom plate.

NOTE

In the next step a small mirror may be helpful to view the hole in the Carriage PCBA as it approaches the Vertical (Y) Axis Home Sensor Probe.

5.   Slowly lower the Carriage Assembly, while using a gentle rocking motion, until the Vertical (Y) Axis Home Sensor Probe (Figure 7-4 or Figure 7-5) fits into the hole in the Carriage PCBA (Figure 7-14), and the Carriage Assembly rests on the orange rubber bushing on the bottom plate.

6.   Insert the bottom end of the second or final (model dependent) Guide Shaft (the end without the white spacer) into the rear Guide Shaft hole in the top plate, then gently lower the rear Guide Shaft down through the hole. This is best accomplished by resting the hand holding the shaft on the top plate, and then guiding the shaft from inside the TLS with the other hand.

7. Lower the Rear Guide Shaft down through the Rear Guide Shaft bearing in the Carriage Assembly (Figure 7-4 or Figure 7-5) and into the hole in the bottom plate.

8. For dual bay models only, insert the bottom end of the last Guide Shaft (the end without the white spacer) into the supporting Guide Shaft hole in the top plate, then gently lower the supporting Guide Shaft down through the hole. This is best accomplished by resting the hand holding the shaft on the top plate, and then guiding the shaft from inside the TLS with the other hand.

CAUTION

To prevent scratching the Leadscrew's delicate Teflon® coating, carefully follow the instructions below.

9. To install the Leadscrew/Spring Cup subassembly, lift the Carriage Assembly all the way up to the top of the Vertical (Y) Axis range of motion and hold it there.

10. Insert the bottom end of the Leadscrew (Figure 7-12) into its hole in the top plate, then lower the Leadscrew down into the threaded hole in the Vertical (Y) Axis Leadscrew Motor/Nut (Figure 7-9).

Thin metal spacer on end of Leadscrew.

Lower this end into the cabinet.
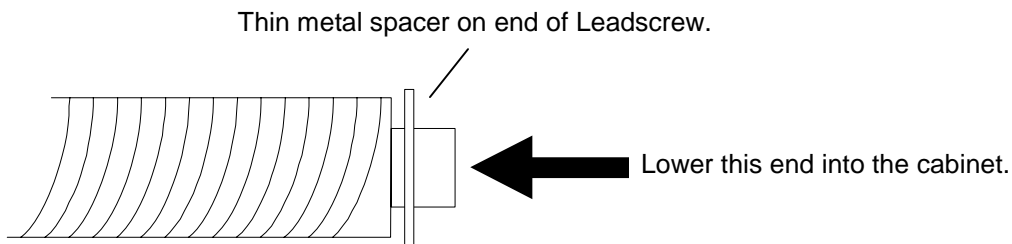
Figure 7-12   The Carriage Assembly Leadscrew

11. Make sure that the thin metal spacer is positioned on the end of the Leadscrew. See Figure 7-12.

12. Gently lower the Carriage Assembly back down onto the bottom plate.

13. Manually rotate the Leadscrew clockwise (as seen from the top of the TLS) until you feel resistance to further rotation. This resistance indicates that the Leadscrew is fully inserted into the hole in the bottom plate.

Steps 14 and 15 apply to single bay libraries only.

14. Lay the TLS on its left side (as seen from the front) to gain access to the bottom Leadscrew retaining screw.

15. Apply one drop of Loctite 242 to the threads on the Leadscrew retaining screw (a 10-32 x 3/8-inch Button Head Socket Cap screw), then insert the screw through the bottom plate and into the threaded end of the Leadscrew. Firmly tighten the

screw with a 1/8-inch Allen wrench. Stand the TLS upright on its feet and proceed to step 18.

Steps 16 and 17 apply to dual bay libraries only.

16.   Using a small mirror and a small flashlight if needed, locate the bottom Leadscrew retaining screw hole on the bottom of the TLS (Figure 7-8).

17.   Apply one drop of Loctite 242 to the threads on the Leadscrew retaining screw (a 10-32 x 3/8-inch Button Head Socket Cap screw), then insert the screw through the bottom plate and into the threaded end of the Leadscrew. Firmly tighten the screw with a 1/8-inch L-shaped Allen wrench.

NOTE

If you do not apply Loctite 242 to the leadscrew retaining screw before reinstalling it, the leadscrew may vibrate loose during operation.

Though the Leadscrew may rotate slightly while you tighten the retaining screw. It should become firmly locked to the bottom plate when the retaining screw is fully tightened.

NOTE

__Make sure that the white spacer on the top end of each Guide Shaft is visible__. *If one of the white spacers is not visible, the corresponding Guide Shaft may be upside down.*

18.   Place a Guide Shaft strike plate over each of the Guide Shaft holes on the top plate (Figure 7-10).

19.   On all single bay models and when replacing the right side Carriage Assembly on dual bay models, gently move the Switch Bracket ribbon cable out of the way. Insert all necessary Guide Shaft Strike Plate mounting screws (6-32 x 3/8 pan head screws with integral lockwashers) into the Guide Shaft Strike Plate mounting holes (Figure 7-10). Use a number 2 Phillips screwdriver to firmly tighten the screws.

If the Spring Cup *was not* removed from the Leadscrew during disassembly, go to step 27. If the Spring Cup *was* removed from the Leadscrew during disassembly, go to step 20.

Refer to Figure 7-13 for the remaining steps of this procedure.

20.   Place the Polyurethane Enclosure Spacer over the Leadscrew mounting hole in the top plate.

21.   If the Belleville spring washer stack *is* still inside the Spring Cup, go to step 20. If the spring washer stack *is not* inside the Spring Cup, use 12 Belleville spring washers to assemble the spring washer stack as follows:

a) Remove all of the spring washers from the Spring Cup.

b) First, place two Belleville spring washers into the Spring Cup with their **concave** sides facing up. Then, place two more Belleville spring washers into the cup with their **convex** sides facing up.

c) Repeat step **b)** two more times, until the spring washer stack looks like the one shown in Figure 7-13.

Belleville Spring Washer Stack
– 3 sets of 4 washers each.
– Each washer set has two washers facing up, and two washers facing down.

Spring Cup

Polyurethane Enclosure Spacer

Upper Leadscrew Retaining Screw
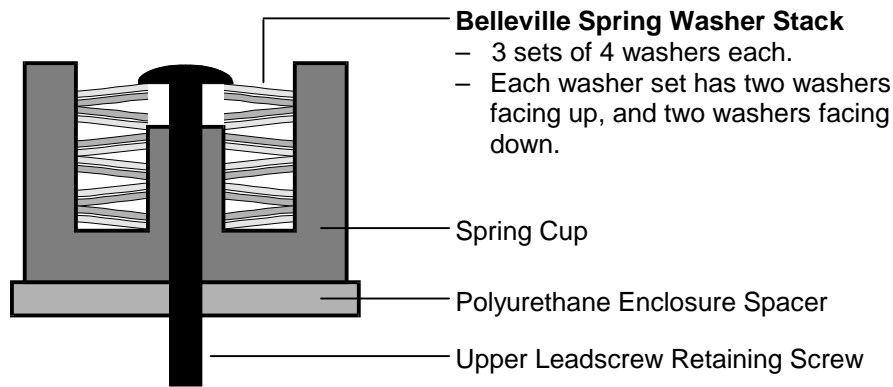
Figure 7-13   The Spring Cup Assembly and Enclosure Spacer

22.   Place the Spring Cup (with 12 Belleville washers) over the Enclosure Spacer. Insert the Upper Leadscrew Retaining Screw (a 10-32 x 5/8-inch Button Head Socket Cap screw) into the threaded end of the Leadscrew.

NOTE

If the Spring Cup was removed from the top of the Leadscrew during dismantling:

When you reinstall the Spring Cup, you will need to press down on the upper Leadscrew retaining screw at first, to compress the Belleville spring washers enough to engage the threads in the top of the Leadscrew.

23.   Use a 1/8-inch Allen wrench to install the upper Leadscrew retaining screw.

24.   Use a 1/8-inch Allen wrench to back the upper Leadscrew retaining screw out until the top Belleville washer is flush with the top of the Spring Cup.

25.   Retighten the upper Leadscrew retaining screw using a torque wrench set to 40 in-lbs. At this point, the top Belleville spring washer should be about a 1/16–inch below the top of the Spring Cup.

26.   Finally, loosen the upper Leadscrew retaining screw exactly one complete turn (360°). No Carriage Assembly adjustments are necessary.

27.   Manually raise the Carriage Assembly up far enough to expose the ribbon cable connector on the underside. Verify that the ejectors on the connector are in the open position.

28. Connect the Carriage Assembly's double ribbon cable connector by pressing inwards until both ejectors (located on the ends of the connector) lock over the mating connector on the cable.

29. Insert the Carriage Cable Clamp into the mating recess on the upper surface of the Carriage casting (Figure 7-6).

30. Insert both Carriage Cable Clamp mounting screws (6-32 x 1/4-inch Socket Head Cap screws) into the mounting holes in the Carriage Cable Clamp (Figure 7-6), then firmly tighten the screws with a 7/64-inch Allen wrench.

31. Continue with Section 7.5.3 to lubricate the Leadscrew and recalibrate the unit.

7.5.3   Lubricating the Vertical (Y) Axis Leadscrew

The Vertical (Y) Axis Leadscrew requires re-lubrication every two years, or after approximately 200,000 Y-Axis moves (whichever comes first), or whenever the Carriage Assembly (P/N 501196-01-8) is changed. The number of Y-Axis moves is displayed in the Maintenance\Display Stats. status screen (see Section 4.6).

IMPORTANT:
Use only Qualstar Leadscrew Lubricant, part number **732-0003-2**, for this procedure.

NOTE

The white lubricant used for this procedure is non-toxic (it is used in food processing equipment), but it is still wise to use a latex glove on the hand that applies the lubricant. If the lubricant contacts your skin, wash with soap and water.

1. Use a single, 0.3–inch cube of Qualstar Leadscrew Lubricant.

   Apply the lubricant to the tip of your index finger, then rub your thumb and index finger together to spread the lubricant evenly on your fingertips.

2. Run your thumb and index finger over the length of the Leadscrew several times, at different angles, to apply the grease to as much of the Leadscrew's surface as possible. Each thread should receive a small amount of grease.

3. Remove the latex glove. If you did not use a latex glove, wash you hands thoroughly with soap and water.

4. Lift the Carriage Assembly up to the top of the Vertical (Y) Axis range of motion, then push it back down to the bottom stop. Repeat this process five more times.

5. If the Carriage Assembly has been removed or replaced, recalibrate the unit (Section 5.3.2).

7.6   Carriage PCBA

P/N 501147-01-1

Tools and Material Required:

- **Number 1 Phillips Screwdriver**

- **Piece of Twine**

The Carriage Assembly must be removed before replacing the Carriage PCBA.
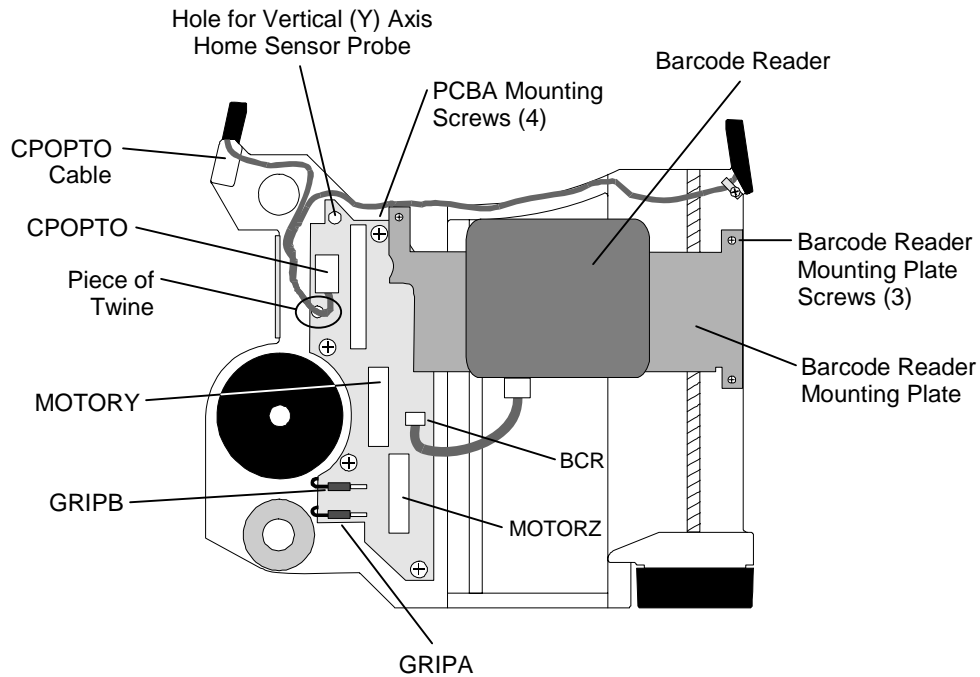
Figure 7-14   Carriage PCBA (Single Bay Handler Bottom View)

7.6.1   Carriage PCBA Removal

Refer to Figure 7-14.

1.   Remove the Carriage Assembly (see Section 7.5.1 for details).

2.   If the Carriage Assembly is equipped with a Barcode Reader, unplug the cable at the BCR connector on the Carriage PCBA.

3.   Remove all three Barcode Reader mounting plate screws using a number 1 Phillips screwdriver.

4.   Remove the Barcode Reader Mounting Plate. (It is not necessary to remove the Barcode Reader before removing the Barcode Reader Mounting Plate.)

5.   Unplug the motor cables from the MOTORY and MOTORZ connectors.

6. Untie or cut the piece of twine that is holding the CPOPTO cable to the circuit board.

7. Unplug the cable from the CPOPTO connector.

8. Unplug the two gripper solenoid wires from the GRIPA and GRIPB terminals.

9. Use a number 1 Phillips Screwdriver to remove all four PCBA mounting screws.

7.6.2   Carriage PCBA Replacement

Refer to Figure 7-14.

This procedure assumes the Carriage PCBA was removed in Section 7.6.1.

CAUTION

After replacing the Carriage Assembly PCBA, the TLS must be recalibrated after the Carriage Assembly is reinstalled.

1. Align all four mounting screw holes in the new Carriage PCBA with the mounting screw holes in the Carriage Assembly, then install all four PCBA mounting screws. Securely tighten the mounting screws with a number 1 Phillips Screwdriver.

2. Plug the CPOPTO cable into the CPOPTO connector. Note that the connector is keyed.

3. With a piece of twine reattach the CPOPTO cable to the circuit board.

4. Plug the two gripper solenoid wires onto the GRIPA and GRIPB terminals. Either wire can be connected to either terminal.

5. Plug the Y-Axis motor cable into the MOTORY connector. (The Y motor is immediately adjacent to the MOTORY connector). Note that the connector is polarized.

6. Plug the Z-Axis motor cable into the MOTORZ connector. The Z-Axis motor moves the gripper mechanism. Note that the connector is polarized.

7. If the carriage is equipped with a Barcode Reader, align all three mounting screw holes in the Barcode Reader Mounting Plate with the mounting screw holes in the Carriage Assembly. Then install all three Barcode Reader Mounting Plate mounting screws. Use a number 1 Phillips screwdriver to securely tighten the screws.

8. If the carriage is equipped with a Barcode Reader, plug the BCR cable into the BCR connector on the Carriage PCBA.

9. Replace the Carriage Assembly, then recalibrate the TLS (See Section 7.5.2 for details.)

7.7   Barcode Reader

TLS-5000 and 58xxx (SAIT)   P/N 500983-05-1
TLS-6000 and 68xxx (DLT)   P/N 500983-04-4
TLS-8000 and 88xxx (LTO)   P/N 500983-05-1

A single barcode reader is standard on models 54xx, 64xx and 84xx. Two barcode readers are standard on 58xxx, 68xxx and 88xxx models. For all other models barcode readers are optional. The instructions in this section assume that a barcode reader exists in the unit, and that it will be removed and then replaced.

If you are installing a new barcode reader for the first time, or permanently removing the currently-installed barcode reader, follow the instructions in Chapter 9, Section 9.3.

Tools Required:

- **Number 1 Phillips Screwdriver**
- **Number 2 Phillips Screwdriver**

NOTE

It is not necessary to remove the Carriage Assembly from the TLS for Barcode Reader installation or removal.
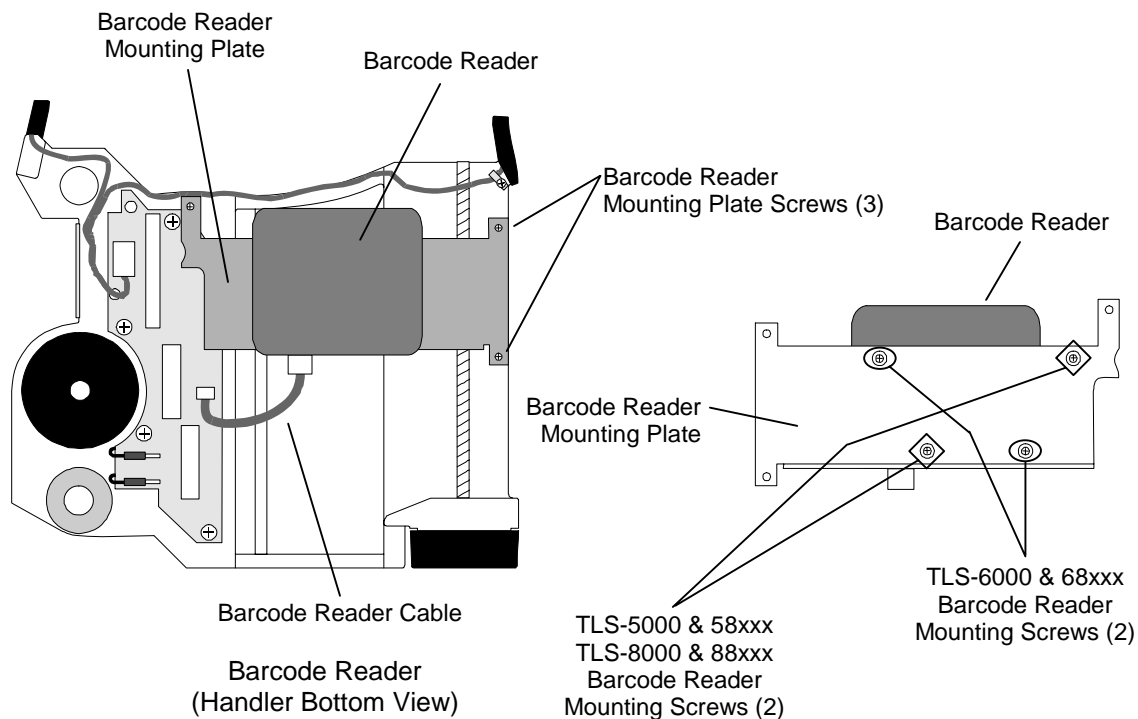
Figure 7-15   Barcode Reader

7.7.1   Barcode Reader Removal

Refer to Figure 7-15.

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. It may be necessary to manually lower or raise the Carriage Assembly, so that it is approximately in the middle of its vertical range of motion. Grasp the Carriage Assembly and gently lift it up, or push it down.

4. Unplug the Barcode Reader Cable from the back of the Barcode Reader.

5. Place your hand under the Barcode Reader. Remove all three Barcode Reader mounting plate screws using a number 1 Phillips screwdriver.

6. Remove the Barcode Reader and its mounting plate from the TLS.

7. From the top side of the Barcode Reader mounting plate use a number 2 Phillips screwdriver to remove both Barcode Reader mounting screws, than separate the Barcode Reader from the mounting plate.

7.7.2   Barcode Reader Replacement

Refer to Figure 7-15.

This procedure assumes that the barcode reader was removed in Section 7.7.1.

1. Align the Barcode Reader mounting plate over the Barcode Reader, with the mounting screw holes in the Barcode Reader facing up.

2. Install both BCR mounting screws (6-32 x 1/4-inch Flathead screws). Use a number 2 Phillips screwdriver to securely tighten both BCR mounting screws.

3. Align the mounting screw holes in the Barcode Reader Mounting Plate with the mounting screw holes in the Carriage Assembly.

4. Install all three Barcode Reader Mounting Plate screws. Use a number 1 Phillips screwdriver to securely tighten the mounting screws.

5. Connect the Barcode Reader Cable to the jack in the back of the Barcode Reader.

6. Close the cabinet door.

7.8   Air Filter and Fan Assembly

Single Fan Air Filter	**P/N 500584-02-4**
Dual Fan Air Filter	**P/N 500584-01-6**
Fan Assembly	**P/N 604-0013-2**

TLS models 6110 and 8111 contain a single Fan Assembly while models 62xx and 82xx contain two Fan Assemblies. These Fan Assemblies are located in the front panel and are accessible when the cabinet door is open. Models 54xx, 64xx and 84xx contain four Fan Assemblies in the front panel and an additional two Fan Assemblies in the rear of the unit. The dual bay 58xxx, 68xxx and 88xxx models contain a Blower Assembly and filters, which are discussed in Section 7.8.4.2.

Tools Required:

- **Flat-blade Screwdriver**

- **Number 2 Phillips Screwdriver**

- **Tape Measure or 12-inch Scale**

- **Diagonal Wire Cutters**

- **Wire Strippers (24 AWG Capable)**

- **Wire Crimpers (24 AWG Capable)**

Material Required:

- **3-inch x 3/32-inch Cable Ties**

7.8.1   Air Filter Removal/Replacement

DANGER

> **TO PREVENT THE POSSIBILITY OF PERSONAL INJURY, DO NOT REPLACE AN AIR FILTER ELEMENT WHILE THE TLS' POWER IS ON. ONCE AN AIR FILTER ELEMENT IS REMOVED, THERE IS NOTHING TO PREVENT ACCIDENTAL CONTACT WITH THE MOVING FAN BLADES.**

GEFAHR

> **UM EVENTUELLE PERSÖNLICHE VERLETZUNGEN ZU VERMEIDEN, WECHSELN SIE KEINEN LUFTFILTER WÄHREND DER STROM DES TLS EINGESCHALTET IST. SOBALD DER LUFTFILTER ENTFERNT WURDE, IST NICHTS MEHR VORHANDEN, DAS VOR DEM VERSEHENTLICHEN KONTAKT MIT DEN VENTILATORENBLÄTTERN SCHÜTZT.**

Carriage Assembly

Quarter-turn Fastener
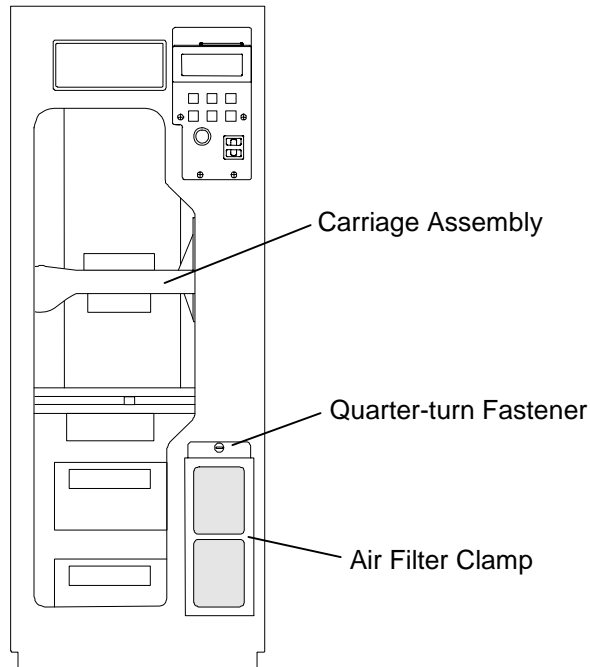
Air Filter Clamp

Figure 7-16   TLS Front View – 8222 Model Shown

Refer to Figure 7-16.

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. Use a flat-blade screwdriver to turn the single quarter-turn fastener at the top of the Air Filter Clamp counter-clockwise (Figure 7-16).

4. Remove the Air Filter Clamp from the TLS.

5. Remove the air filter.

    a) If you only want to replace the Air Filter at this time, replace the old Air Filter with a new one, then reinstall the Air Filter Clamp.

    IMPORTANT

    Never try to clean and reuse an old Air Filter. If an old Air Filter is not yet dirty enough to be replaced and is being reinstalled, make sure that the side that was facing the inside of the library is placed in the same direction as it was when it was removed. Reversing the direction of an old Air Filter may cause dirt to be transferred into the library.

    b) If you want to remove the Fan Assembly, leave the Air Filter and Air Filter Clamp off of the TLS and continue on to Section 7.8.2.

6. Replace the Air Filter Clamp and secure it by turning the single quarter-turn fastener clockwise. See Figure 7-16.

7.8.2   Fan Assembly Removal for 6110, 62xx, 8111 and 82xx Models

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. Use a flat-blade screwdriver to turn the single quarter-turn fastener at the top of the Air Filter Clamp counter-clockwise.

4. Remove the Air Filter Clamp and air filter from the TLS.

5. Remove the Top Panel (Section 7.4.1), then remove the right Side Panel (Section 7.4.3). The openings in the right side of the TLS' frame give access to the nuts on the back of the Fan Assembly's mounting screws.

NOTE

In the next step, the nuts on the back of the mounting screws come loose when the screws are removed.

6. Remove all the Fan Assembly mounting screws (Figure 7-17).

6110 & 8111   62xx & 82xx
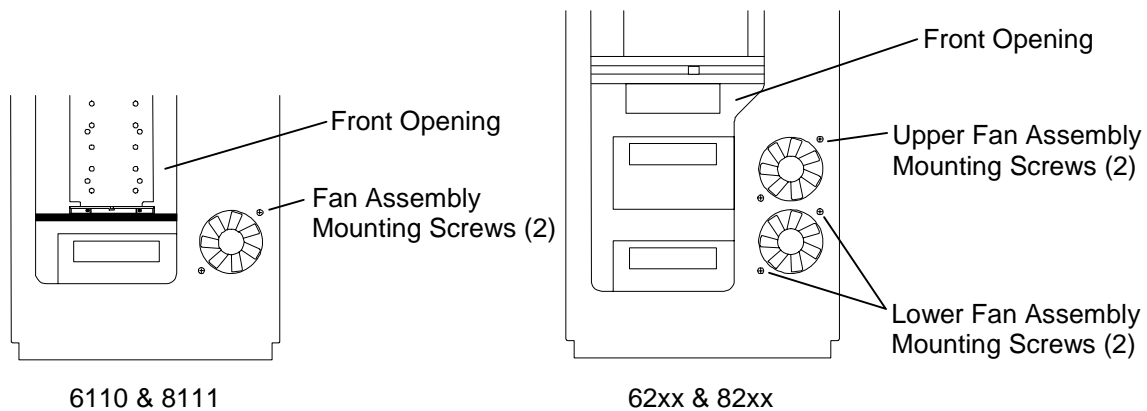
Figure 7-17   Fan Assembly Mounting Screws

7. Remove any cable ties and/or cable wraps to expose six to eight inches of the red and black, 24 AWG wires attached to the Fan Assembly.

8. Carefully cut the red and black wires six to eight inches away from the Fan Assembly (Figure 7-18) and then remove the Fan Assembly from the TLS.
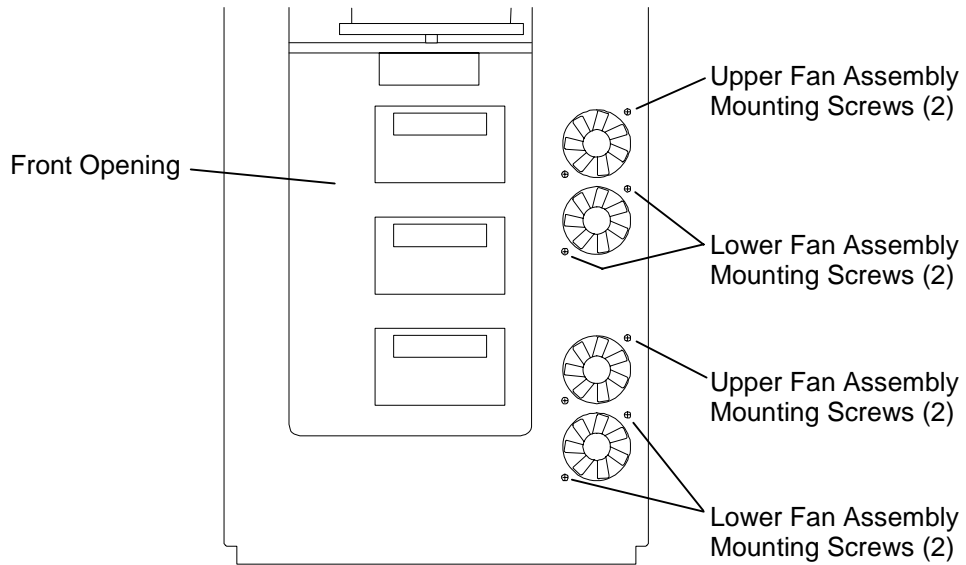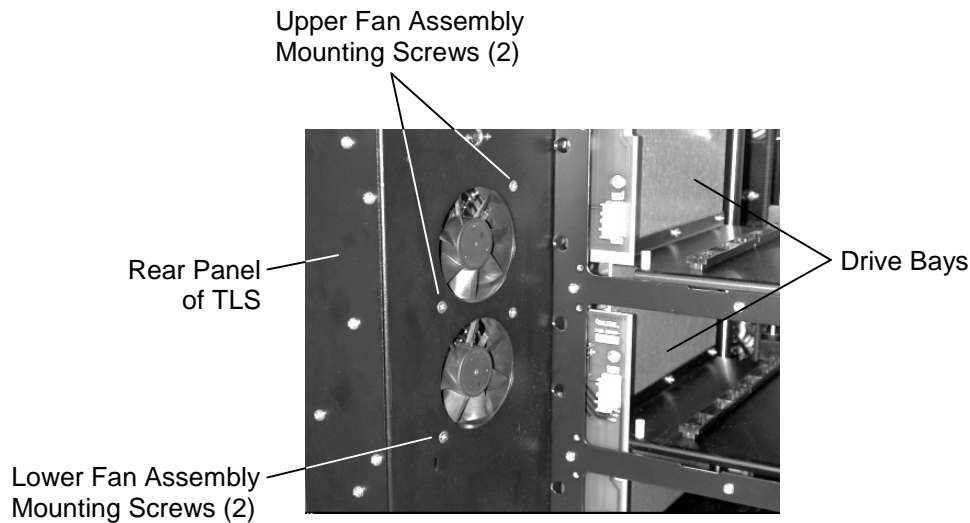
Fan Assembly

Red and Black 24 AWG Wires

Wire Cutters

Cut the wires 6 to 8 inches
from the Fan Assembly.
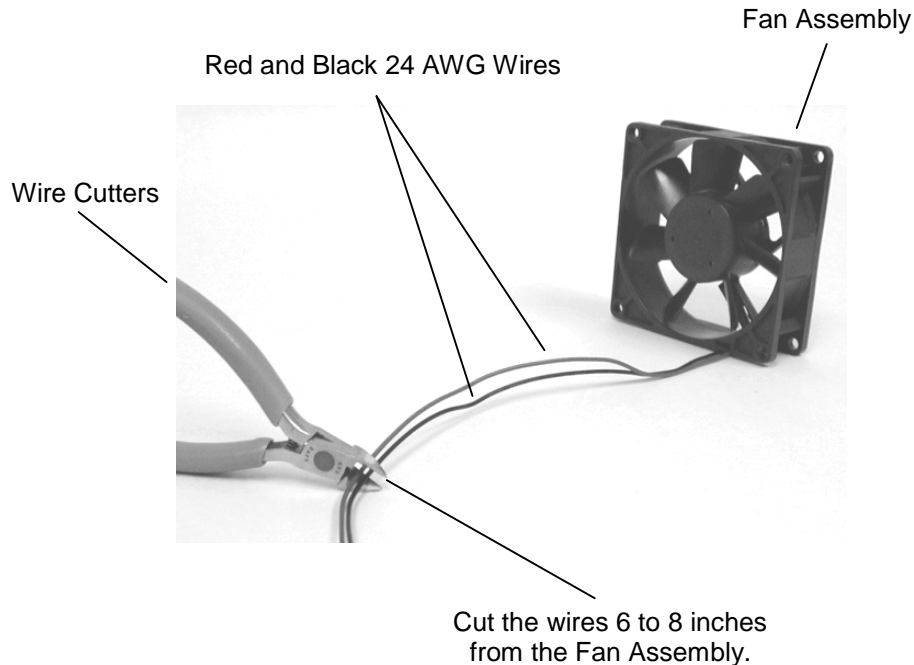
Figure 7-18   Cutting the wires on the defective fan

7.8.3   Fan Assembly Replacement for 6110, 62xx, 8111 and 82xx Models

1.   Measure the length of the red and black wires that are attached to the Fan Assembly that was removed in Section 7.8.2.

2.   Add a minimum of one inch to the length measured in Step 1. This is the length that the red and black wires will be cut to on the replacement Fan Assembly.

3.   Carefully cut the red and black wires on the replacement Fan Assembly to the length determined in Step 2 (Length of old Fan Assemblies wires + a minimum of one inch).

4.   Using a wire striper, remove 1/4" of the insulation from the end of the red wire.

5.   Fully insert the end of the red wire into a Butt Splice (Panduit Part Number BSN22-C or equivalent) and use a wire crimper to securely attach the Butt Splice to the wire. See Figure 7-19.

6.   Repeat steps 4 and 5 for the black wire.

7.   Using a wire striper, remove 1/4" of the insulation from the ends of the red and black wires in the library that were cut in Step 8 of Section 7.8.2.

8.   Insert the Fan Assembly into the TLS through the front opening, with the red and black wires pointing down.

9. Fully insert the end of the red wire into the Butt Splice that is attached to the red wire of the Fan Assembly. Use a wire crimper to secure the wire in the Butt Splice. See Figure 7-19.

10. Repeat step 9 for the black wire.

11. Align the Fan Assembly's mounting screw holes with the mounting screw holes in the TLS and then install the Fan Assembly mounting screws. Thread the nuts on to the mounting screws and then tighten the Fan Assembly mounting screws. See Figure 7-17.

12. Replace any cable ties and/or cable wraps that were removed when accessing the Fan Assemblies wires.

13. Reinstall the air filter (or install a new one). If an old air filter is being reinstalled, make sure that the side that was facing the inside of the library is placed in the same direction as it was when it was removed. Reversing the direction of an old air filter may cause dirt to be transferred into the library.

14. Replace the Air Filter Clamp and secure it by turning the quarter-turn fastener clockwise (Figure 7-16).

15. Reinstall the right Side Panel (Section 7.4.4), then reinstall the Top Panel (Section 7.4.2).
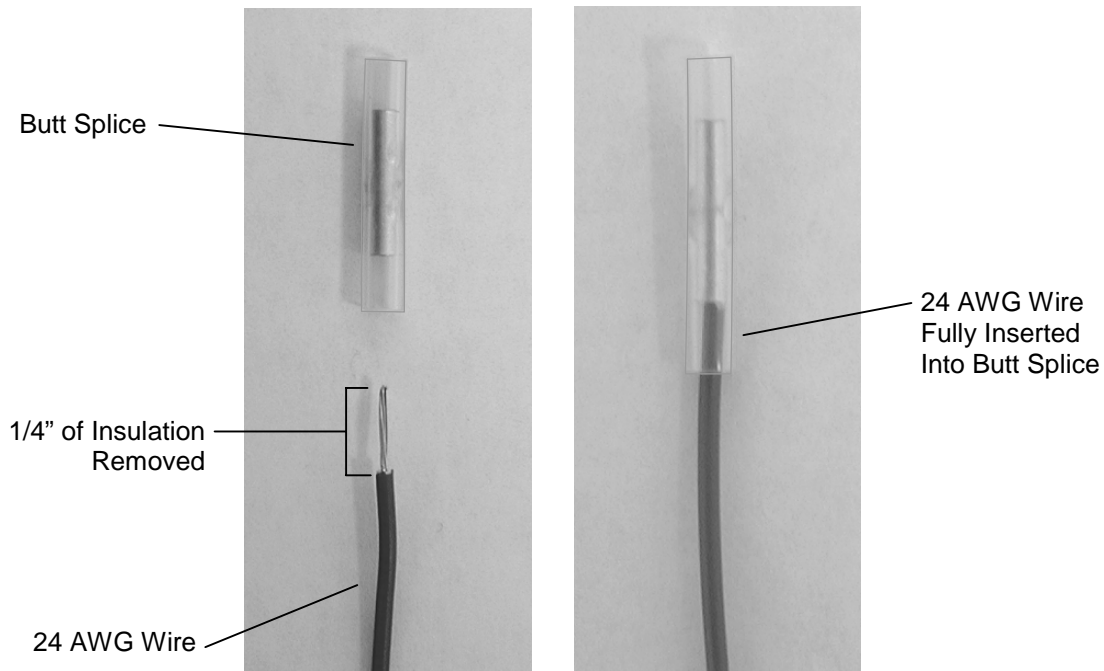
Figure 7-19   Fan Wire and Butt Splice

7.8.4   Fan Assembly Removal for 54xx, 64xx and 84xx Models

Carriage
Assembly

Quarter-turn
Fasteners

Drive Bay
PCBA

Air Filter
Clamps

Front View
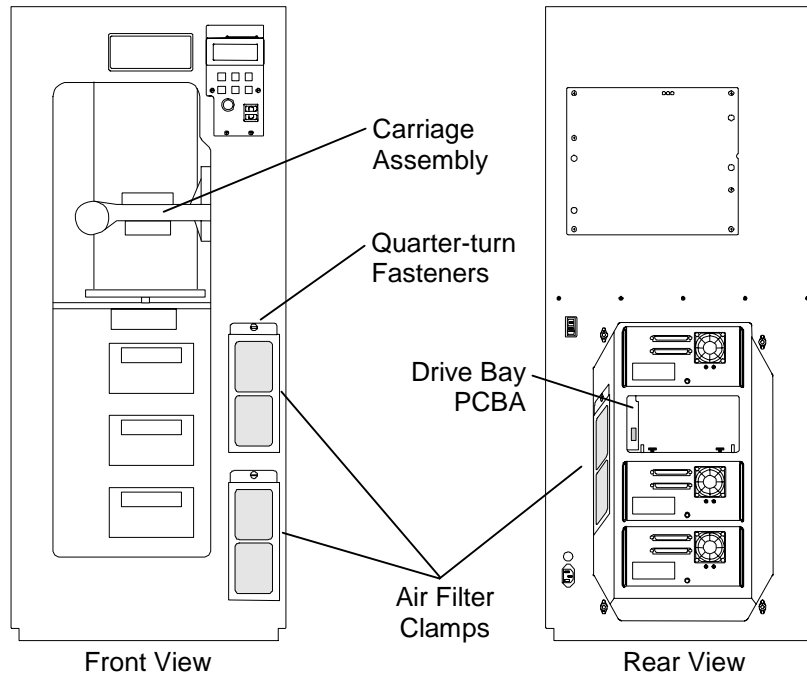
Rear View

Figure 7-20   TLS Front and Rear Views - 6460 Model Shown with Rear Access Cover Removed

7.8.4.1   Front Panel Fans

Refer to Figure 7-20

1.   Turn off the TLS power and remove the power cord.

2.   Open the cabinet door.

3.   Use a flat-blade screwdriver to turn the single quarter-turn fastener at the top of the Air Filter Clamp counter-clockwise.

4.   Remove the Air Filter Clamp and air filter from the TLS.

5.   Remove the Top Panel (Section 7.4.1), then remove the right Side Panel (Section 7.4.3). The openings in the right side of the TLS' frame give access to the nuts on the back of the Fan Assembly's mounting screws.

NOTE

In the next step, the nuts on the back of the mounting screws come loose when the screws are re-moved.

6.   Remove the two Fan Assembly mounting screws (See Figure 7-21).

7.   Remove any cable ties and/or cable wraps to expose six to eight inches of the red and black, 24 AWG wires attached to the Fan Assembly.

8. Carefully cut the red and black wires six to eight inches away from the Fan Assembly (Figure 7-18) and then remove the Fan Assembly from the TLS.

Figure 7-21   Fan Assembly Mounting Screws

7.8.4.2   Rear Fan

Refer to Figure 7-20.

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1), then remove the right Side Panel (Section 7.4.3). The openings in the right side of the TLS' frame give access to the nuts on the back of the Fan Assembly's mounting screws.
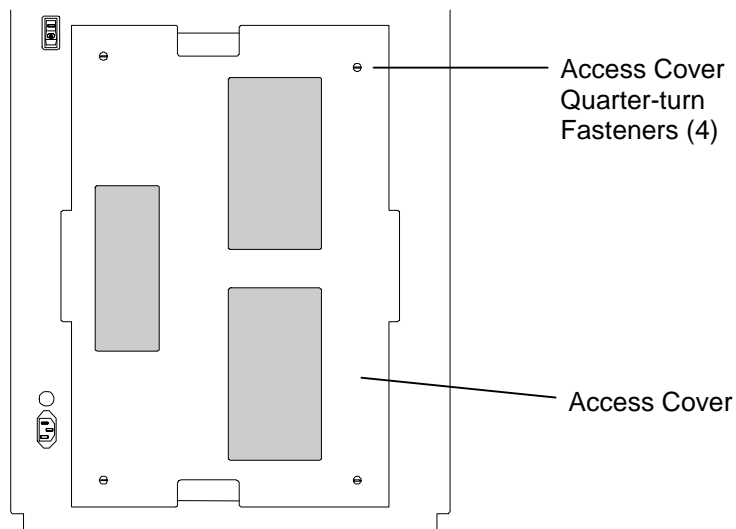
Figure 7-22   Access Cover on Rear of TLS

3. Use a flat blade screwdriver to loosen all four of the quarter-turn fasteners and carefully remove the access cover on the rear of the TLS (Figure 7-22).

4. Use a flat-blade screwdriver to turn the single quarter-turn fastener at the top of the Air Filter Clamp counter-clockwise.

5. Remove the Air Filter Clamp and air filter from the TLS.

NOTE

In the next step, the nuts on the back of the mounting screws come loose when the screws are removed.

6. Remove the two Fan Assembly mounting screws (Figure 7-23).

Figure 7-23   Fan Assembly Mounting Screws

7. Remove any cable ties and/or cable wraps to expose six to eight inches of the red and black, 24 AWG wires attached to the Fan Assembly.

8. Carefully cut the red and black wires six to eight inches away from the Fan Assembly (Figure 7-18) and then remove the Fan Assembly from the TLS.

7.8.5   Fan Assembly Replacement for 54xx, 64xx and 84xx Models

Refer to Figure 7-20.

7.8.5.1   Front Panel Fans

1. Measure the length of the red and black wires that are attached to the Fan Assembly that was removed in Section 7.8.4.1.

2. Add a minimum of one inch to the length measured in Step 1. This is the length that the red and black wires will be cut to on the replacement Fan Assembly.

3. Carefully cut the red and black wires on the replacement Fan Assembly to the length determined in Step 2 (Length of old Fan Assemblies wires + a minimum of one inch).

4. Using a wire striper, remove 1/4" of the insulation from the end of the red wire.

5. Fully insert the end of the red wire into a Butt Splice (Panduit Part Number BSN22-C or equivalent) and use a wire crimper to securely attach the Butt Splice to the wire. See Figure 7-19.

6. Repeat steps 4 and 5 for the black wire.

7. Using a wire striper, remove 1/4" of the insulation from the ends of the red and black wires in the library that were cut in Step 8 of Section 7.8.4.1.

8. Insert the Fan Assembly into the TLS through the front opening, with the red and black wires pointing down.

9. Fully insert the end of the red wire into the Butt Splice that is attached to the red wire of the Fan Assembly. Use a wire crimper to secure the wire in the Butt Splice. See Figure 7-19.

10. Repeat step 9 for the black wire.

11. Align the Fan Assembly's mounting screw holes with the mounting screw holes in the TLS and then install the Fan Assembly mounting screws. Thread the nuts on to the mounting screws and then tighten the Fan Assembly mounting screws. See Figure 7-21.

12. Replace any cable ties and/or cable wraps that were removed when accessing the Fan Assemblies wires.

13. Reinstall the air filter (or install a new one). If an old air filter is being reinstalled, make sure that the side that was facing the inside of the library is placed in the same direction as it was when it was removed. Reversing the direction of an old air filter may cause dirt to be transferred into the library.

14. Replace the Air Filter Clamp and secure it by turning the quarter-turn fastener clockwise (Figure 7-16).

15. Reinstall the right Side Panel (Section 7.4.4), then reinstall the Top Panel (Section 7.4.2).

7.8.5.2 Rear Fan

1. Measure the length of the red and black wires that are attached to the Fan Assembly that was removed in Section 7.8.4.2.

2. Add a minimum of one inch to the length measured in Step 1. This is the length that the red and black wires will be cut to on the replacement Fan Assembly.

3. Carefully cut the red and black wires on the replacement Fan Assembly to the length determined in Step 2 (Length of old Fan Assemblies wires + a minimum of one inch).

4. Using a wire striper, remove 1/4" of the insulation from the end of the red wire.

5. Fully insert the end of the red wire into a Butt Splice (Panduit Part Number BSN22-C or equivalent) and use a wire crimper to securely attach the Butt Splice to the wire. See Figure 7-19.

6. Repeat steps 4 and 5 for the black wire.

7. Using a wire striper, remove 1/4" of the insulation from the ends of the red and black wires in the library that were cut in Step 8 of Section 7.8.4.2.

8. Insert the Fan Assembly into the TLS through the front opening, with the red and black wires pointing down.

9. Fully insert the end of the red wire into the Butt Splice that is attached to the red wire of the Fan Assembly. Use a wire crimper to secure the wire in the Butt Splice. See Figure 7-19.

10. Repeat step 9 for the black wire.

11. Align the Fan Assembly's mounting screw holes with the mounting screw holes in the TLS and then install the Fan Assembly mounting screws. Thread the nuts on to the mounting screws and then tighten the Fan Assembly mounting screws. See Figure 7-23.

12. Replace any cable ties and/or cable wraps that were removed when accessing the Fan Assemblies wires.

13. Reinstall the air filter (or install a new one). If an old air filter is being reinstalled, make sure that the side that was facing the inside of the library is placed in the same direction as it was when it was removed. Reversing the direction of an old air filter may cause dirt to be transferred into the library.

14. Replace the Air Filter Clamp and secure it by turning the quarter-turn fastener clockwise (Figure 7-16 and Figure 7-20).

15. Reinstall the right Side Panel (Section 7.4.4), then reinstall the Top Panel (Section 7.4.2).

16. Align the access covers four quarter-turn fasteners with corresponding receptacles on the rear of the TLS and then using a flat blade screwdriver, tighten the fasteners to secure the cover. See Figure 7-22.

## 7.9 Air Filters and Blower Assembly

Air Filter   **P/N 500584-01-6**
Blower Assembly   **P/N 500469-01-0**

Dual bay models are cooled and pressurized by a Blower Assembly located between the drive bays.

Tools Required:

- **Flat-blade Screwdriver**

- **Number 2 Phillips Screwdriver**

7.9.1   Air Filter Removal/Replacement

DANGER

TO PREVENT THE POSSIBILITY OF PERSONAL INJURY, DO NOT REPLACE AN AIR FILTER ELEMENT WHILE THE TLS' POWER IS ON. ONCE AN AIR FILTER ELEMENT IS REMOVED, THERE IS NOTHING TO PREVENT ACCIDENTAL CONTACT WITH THE MOVING FAN BLADES.

GEFAHR

UM EVENTUELLE PERSÖNLICHE VERLETZUNGEN ZU VERMEIDEN, WECHSELN SIE KEINEN LUFTFILTER WÄHREND DER STROM DES TLS EINGESCHALTET IST. SOBALD DER LUFTFILTER ENTFERNT WURDE, IST NICHTS MEHR VORHANDEN, DAS VOR DEM VERSEHENTLICHEN KONTAKT MIT DEN VENTILATORENBLÄTTERN SCHÜTZT.

NOTICE

Never try to clean and reuse an old air filter. When you install new air filters, or reinstall ones that are not yet dirty enough to be replaced, be sure to install them with the arrows on the edge of the filter's frame pointing **into** the cabinet.

Refer to Figure 7-24.

1.   Turn off the TLS power and remove the power cord.

2.   Use a flat blade screwdriver to turn the four quarter-turn fasteners on the large Air Filter Clamp counter-clockwise.

3.   Remove the large Air Filter Clamp from the TLS.
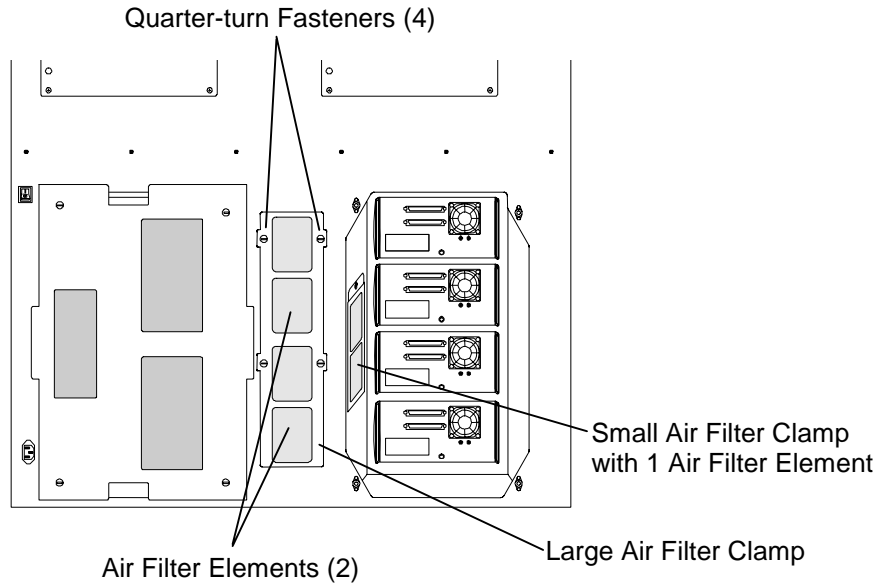
Figure 7-24   TLS Rear View – Dual Bay Model

4. Remove the two air filters.

5. Replace the old air filters with new ones or reinstall the old ones if they are not yet dirty enough to be replaced. Never try to clean and reuse an old air filter. If old air filters are being reinstalled, make sure that the side that was facing the inside of the library is placed in the same direction as they were when they were removed. Reversing the direction of an old air filter may cause dirt to be transferred into the library.

6. Replace the large Air Filter Clamp and secure it by turning the four quarter-turn fasteners clockwise.

7. Use a flat blade screwdriver to loosen all four of the quarter-turn fasteners and carefully remove the right side access cover on the rear of the TLS (as viewed from the rear). See Figure 7-24.

8. Use a flat blade screwdriver to turn the single quarter-turn fastener at the top of the small Air Filter Clamp counter-clockwise.

9. Remove the small Air Filter Clamp from the TLS.

10. Remove the air filter.

11. Replace the old air filter with a new one or reinstall the old one if it is not yet dirty enough to be replaced. Never try to clean and reuse an old air filter. If an old air filter is being reinstalled, make sure that the side that was facing the inside of the library is placed in the same direction as it was when it was removed. Reversing the direction of an old air filter may cause dirt to be transferred into the library.

12. Replace the small Air Filter Clamp and secure it by turning the single quarter-turn fastener clockwise.

13. When filter replacement is complete, align the access covers four fasteners with the corresponding receptacles on the rear panel of the TLS, then using a flat blade screwdriver tighten the fasteners to secure the cover.

7.9.2   Blower Assembly Removal

Blower Guard Screen Screws (6)

Blower Guard Screen
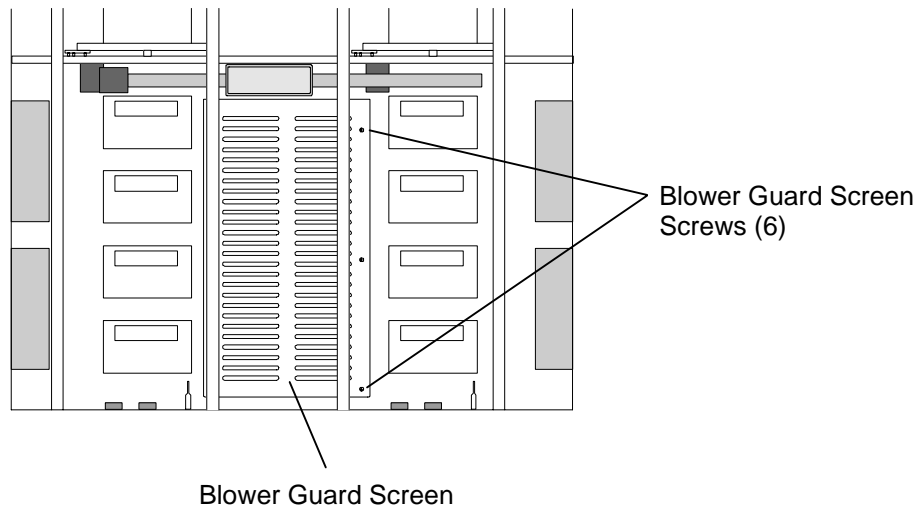
Figure 7-25   Blower Guard Screen in Dual Bay Model

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. Remove all six Phillips screws from the Blower Guard Screen. See Figure 7-25.

4. Remove the Blower Guard Screen through the front opening of the TLS.

5. Disconnect the Power cable from the POWER connector on the Blower PCBA. See Figure 7-26.

6. Disconnect the Blower ribbon cable from the D-BAY 0 connector on the lower Drive Bay PCBA. See Figure 7-26.

7. Using a long bladed Phillips screwdriver, remove all five of the Blower mounting screws. Make sure to support the Blower Assembly with your free hand to prevent it from falling. See Figure 7-26.

8. Carefully guide the Blower Assembly between the right side Supporting Guide Shaft and the center. See Figure 7-27. After the Blower Assembly has cleared the shaft and the center support remove it through the front opening.

Upper Drive Bay PCBA

Power Cable

POWER Connector

Lower Drive Bay PCBA

Blower PCBA

D-BAY 0 Connector

Blower Mounting Screws (5)

Blower Ribbon Cable
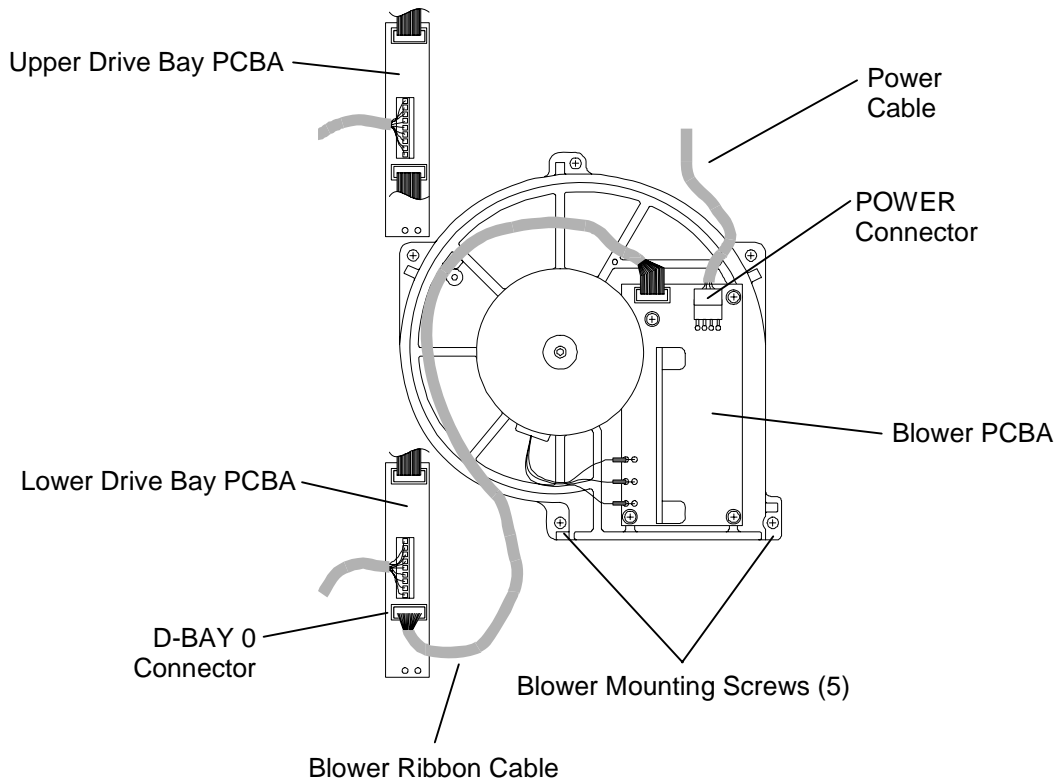
Figure 7-26   Blower Assembly

7.9.3   Blower Assembly Replacement

1. Insert the Blower Assembly through the front opening on the right side of the library. Carefully maneuver the Blower Assembly between the right side Supporting Guide Shaft and the center support. See Figure 7-27.

2. Align the five Blower Assembly's mounting screw holes with the corresponding holes in the library.

3. Using a long bladed Phillips screwdriver, reinstall the five Blower mounting screws that were removed earlier.

4. Plug the Blower ribbon cable into the D-BAY 0 connector on the lower Drive Bay PCBA. See Figure 7-26. Note that the connector is keyed.

5. Plug the Power cable into the POWER connector on the Blower PCBA. See Figure 7-26.

6. Insert the Blower Guard Screen through the front opening of the library and align it's six mounting screw holes with the six mounting tabs located between the drive bays.

7. Use a Phillips screwdriver to reinstall all six screws that were removed earlier.

Right Side Opening

Guide Blower Assembly
through here.

Center Support

Right Side Supporting Guide Shaft
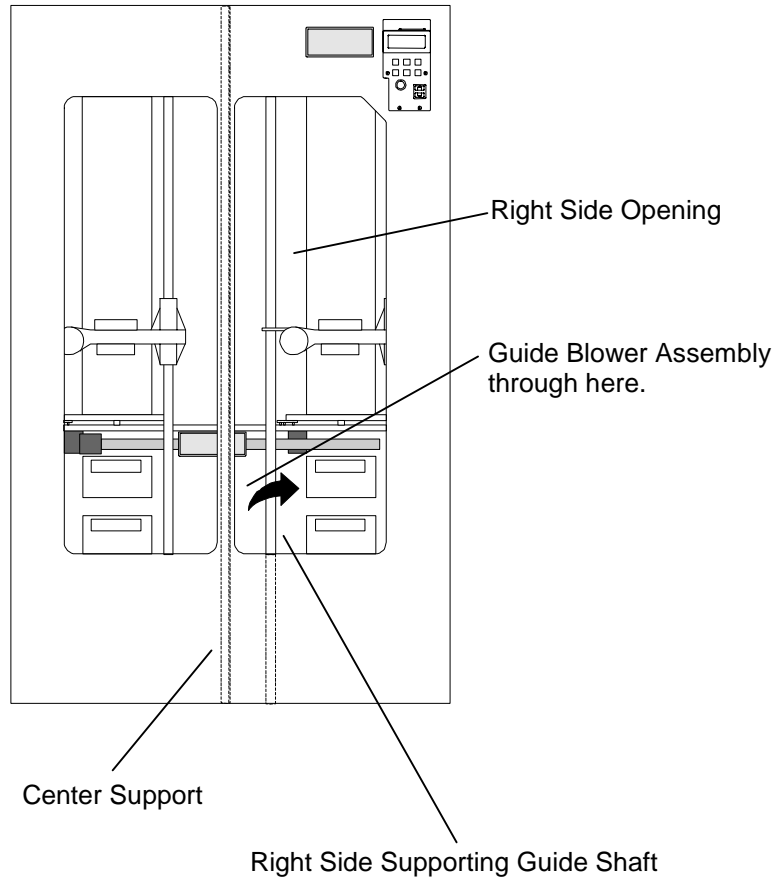
Figure 7-27   Path for Blower Assembly Removal/Replacement

7.10   I/O Port Assembly

TLS-5000 and 58xxx (SAIT)   P/N 501195-02-8 (Revision B or later)
TLS-6000 and 68xxx (DLT)   P/N 501195-01-0
TLS-8000 and 88xxx (LTO)   P/N 501195-02-8

Tools Required:

- **Number 2 Phillips Screwdriver**

I/O Port
Mounting Screws (6)

Front   **Rear**

LED Cable

I/O Port Cable
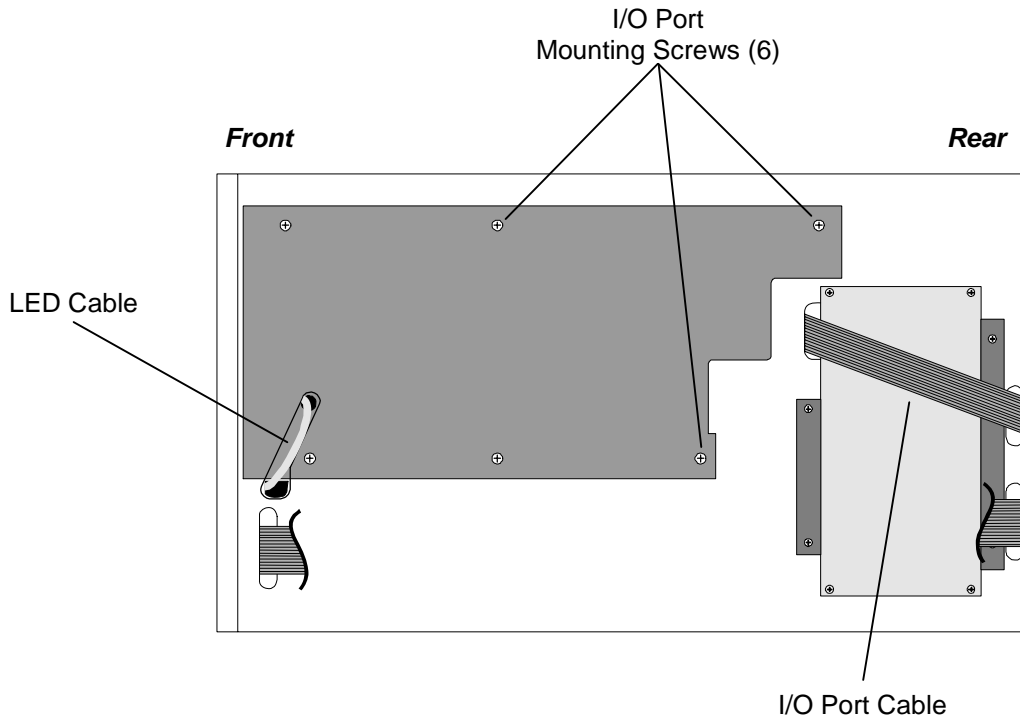
Figure 7-28   Single Bay TLS Cabinet – Top View

Rear

I/O Port Cable

I/O Port
Mounting Screws (6)

Front

LED Cable
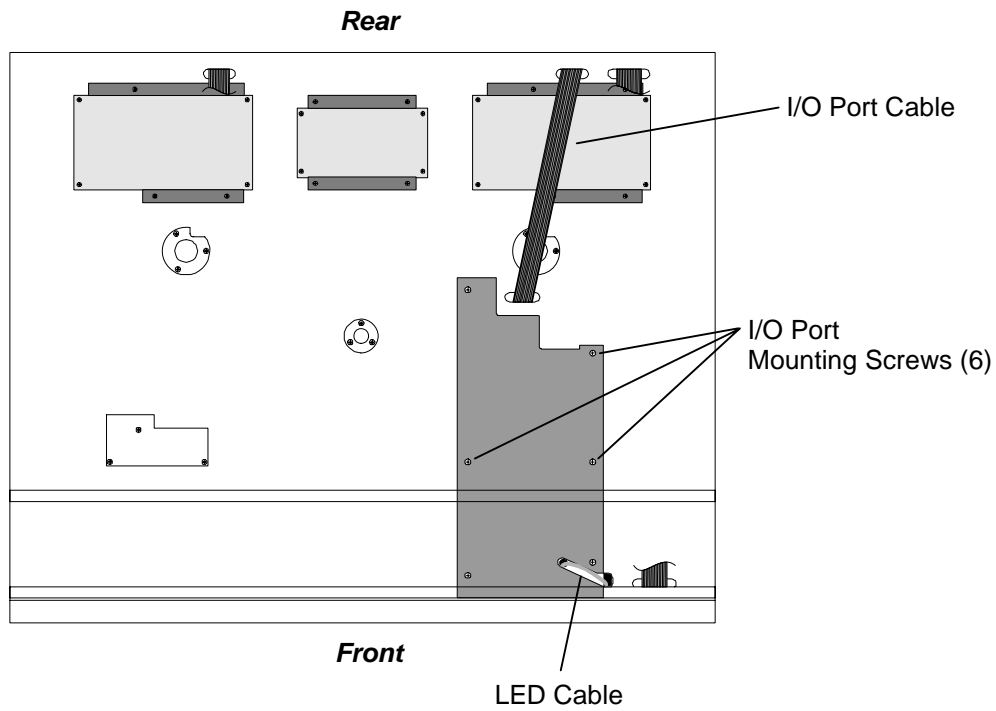
Figure 7-29   Dual Bay TLS Cabinet – Top View

7.10.1   I/O Port Assembly Removal

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. Remove the Top Panel (Section 7.4.1).

NOTE

If you remove the Right side Panel (Section 7.4.3), the holes in the side of the TLS' frame give easy access to the I/O port cable's plug.

On dual bay models, removing any magazines that are mounted on the top row of the right side carousel will also allow for easier access to the I/O port Assembly.

---

4. Gently turn the I/O port leadscrew by hand to move the I/O port slot forward (towards the cabinet door) to gain access to the IOPORT ribbon cable connector. Do not extend the I/O port slot all the way forward.

5. Unplug the I/O port ribbon cable from the I/O port PCBA (Figure 2-10).

6. Support the I/O port assembly from the inside of the TLS with one hand, then remove all six I/O port mounting screws from the top of the TLS using a number 2 Phillips screwdriver (Figure 7-28).

7. Gently move the I/O port assembly back about one inch toward the rear of the TLS, until the Call switch clears the TLS' frame, then lower the I/O port assembly and remove it through the front of the TLS.

7.10.2   I/O Port Assembly Replacement

CAUTION

The unit must be recalibrated after the I/O port assembly is replaced in the TLS.

NOTE

TLS-5000 and 58xxx models will only function correctly with 501195-02-8 Revision B (or later) I/O port assemblies. Read the I/O port assembly label (see Figure 7-30) and look for the text: "I/O Port: B" or later.

If you remove the Right side Panel (Section 7.4.3), the holes in the side of the TLS' frame give easy access to the I/O port cable's plug.

On dual bay models, removing any magazines that are mounted on the top row of the right side carousel will also allow for easier access to the I/O port assembly.

---

1. Turn off the TLS power and remove the power cord.

2. Gently turn the I/O port leadscrew by hand to position the I/O port slot in the middle of the I/O port assembly, so that it will clear the Magazine when the assembly is installed in the library (Figure 2-10).

3. Insert the I/O port assembly through the open cabinet door.

4. Make sure that the LEDs cable is positioned in the center of the cutout in the TLS' frame (Figure 7-28).

5. Support the I/O port assembly with one hand from inside the TLS, while installing all six mounting screws from above using a number 2 Phillips screwdriver (Figure 7-28).

6. Plug the I/O port ribbon cable into the IOPORT connector on the PCBA (Figure 2-10).

7. If you removed the Right side Panel, reinstall it (Section 7.4.4).

8. Recalibrate the TLS. (See Section 5.3.2 for details.)

7.11   I/O Port PCBA

TLS-5000 and 58xxx (SAIT)   P/N 501227-02-9
TLS-6000 and 68xxx (DLT)   P/N 501227-01-1
TLS-8000 and 88xxx (LTO)   P/N 501227-02-9

CAUTION

After the I/O port PCBA is replaced in the I/O port assembly, the unit must be recalibrated after the I/O port assembly is replaced in the TLS.

The I/O port assembly must be removed from the TLS before the I/O port PCBA can be replaced.

Tools Required:

*   **1/4-inch Hex Nutdriver or Wrench**

7.11.1   I/O Port PCBA Removal

1. Remove the I/O port assembly from the TLS (Section 7.10.1).

2. Gently turn the I/O port leadscrew by hand, to move the I/O port slot away from the eight PCBA mounting nuts (Figure 7-30).

3. Disconnect the MOTOR cable from the I/O port PCBA.

4. Turn the I/O port assembly over and unplug the LEDs cable.

5. Remove all eight PCBA mounting nuts using a 1/4-inch nutdriver (Figure 7-30).

6.   Lift the I/O port PCBA out of the I/O port assembly.

I/O Port Axis Motor

I/O Port Lead Screw

I/O Port Slot

Note: The LED's Cable Plug
is located under the
I/O Port PCBA.

I/O Port
Assembly Label

Motor Cable Plug

I/O Port Door

I/O Port Cable Plug

8 PCBA
Mounting Nuts

I/O Port PCBA

Bottom View
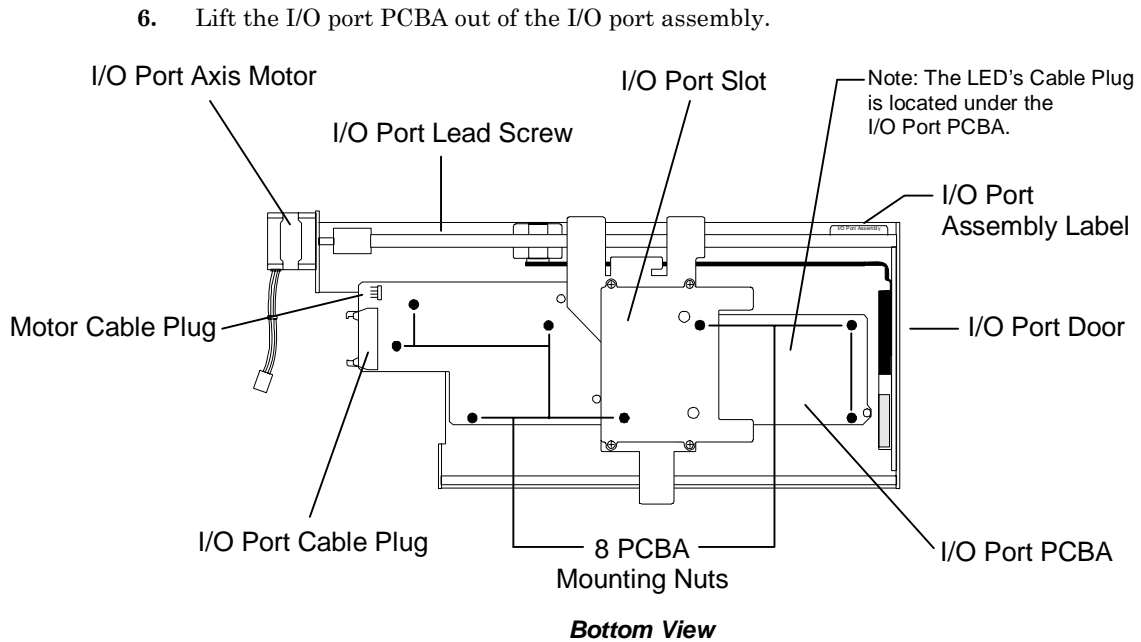
Figure 7-30   I/O Port Assembly

7.11.2   I/O Port PCBA Replacement

This procedure assumes that the I/O port PCBA was removed in Section 7.11.1

1.   If necessary, gently turn the I/O port leadscrew by hand, to move the I/O port
slot away from the eight PCBA mounting screws holes in the I/O port assembly's
frame (Figure 7-30).

2.   Lower the I/O port PCBA into the I/O port assembly and install all eight PCBA
mounting nuts (Figure 7-30).

3.   Connect the MOTOR cable to the I/O port PCBA (Figure 7-30). Note that the
connector is keyed for correct orientation.

4.   Turn the I/O port assembly over and connect the LEDs cable. Note that the con-
nector is keyed for correct orientation.

5.   Reinstall the I/O port assembly (Section 7.10.2).

6.   Recalibrate the TLS. (See Section 5.3.2 for details.)

7.12   Switch Bracket Assembly (Front Panel)

P/N 500815-01-4

Tools and Material Required:

- **1/4-inch Hex Nutdriver or Wrench**
- **3-inch x 3/32-inch Cable Ties**
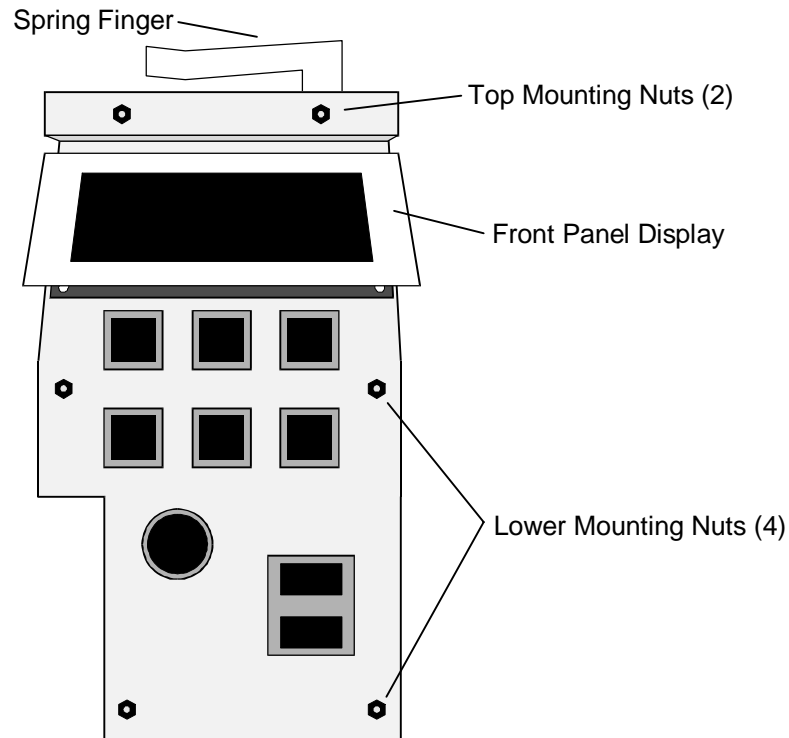
Figure 7-31   The Switch Bracket Assembly (Front Panel)

7.12.1   Switch Bracket Assembly Removal

1.   Turn off the TLS power and remove the power cord.

2.   Open the cabinet door.

NOTE

In the next step, the spacers behind the Switch Bracket Assembly come loose when the mounting nuts are removed.

3.   Remove all six mounting nuts from the Switch Bracket Assembly mounting studs using a 1/4–inch nutdriver (Figure 7-31).

4. Lift the Switch Bracket Assembly off of the mounting studs. Be careful not to drop the spacers.

5. Reinstall all six mounting nuts onto the mounting studs to retain the spacers.

6. Clip the Nylon Cable Ties (3 pairs of ties) mounted around the ribbon cable (Figure 7-32), then remove them completely.

7. Unplug the ribbon cable from the FRONT connector on the Front Panel PCBA (Figure 7-32).
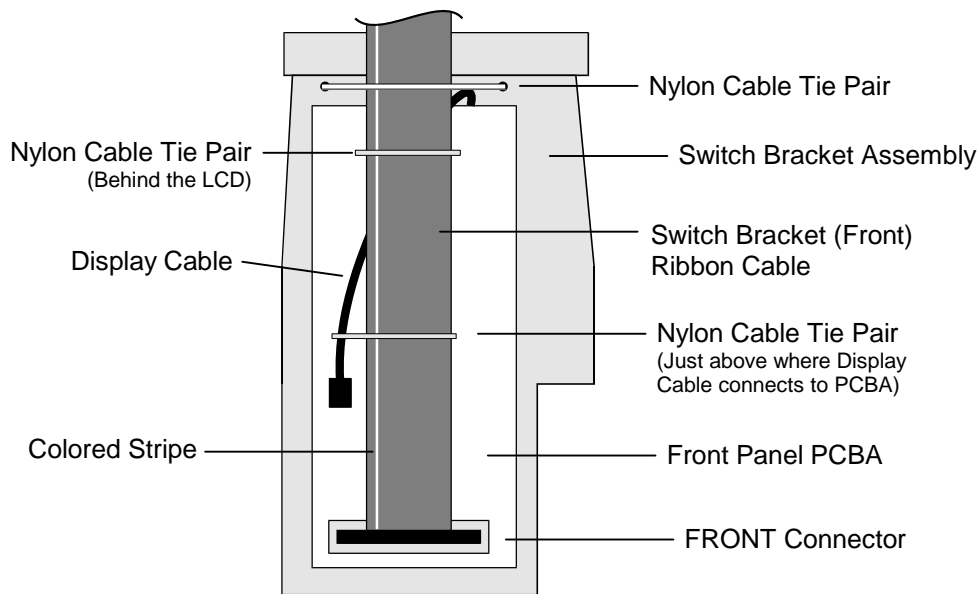
Figure 7-32   Switch Bracket Assembly (Rear View)

7.12.2   Switch Bracket Assembly Replacement

1. Plug the Switch Bracket Ribbon Cable into the FRONT connector on the Front Panel PCBA (Figure 7-32). Make sure that the cable is not twisted, and that the colored stripe aligns with the right side of the TLS when viewed from the front. Press the connector in firmly, until both locking tabs on the FRONT connector close over the Switch Bracket Ribbon Cable's connector.

2. Insert a Nylon Cable Tie in through both holes in the Switch Bracket Assembly, just above the LCD (Figure 7-32).

3. Position a second Nylon Cable Tie over the Switch Bracket Ribbon Cable, then attach it to both ends of the Nylon Cable Tie in the Switch Bracket Assembly (Figure 7-32).

4. Tighten the Nylon Cable Ties, *without crimping the cable,* until they secure the Switch Bracket Ribbon Cable to the Switch Bracket Assembly.

5. Trim off the excess length of plastic from each Nylon Cable Tie.

6. Starting behind the LCD, position one Nylon Cable Tie behind the Switch Bracket Ribbon Cable and the Display Cable, then position a second Nylon Cable Tie over the both cables, and attach the cable ties to each other (Figure 7-32).

7. Tighten the cable ties, *without crimping the cables*, until they secure the Switch Bracket Ribbon Cable to the Display Cable.

8. Trim off the excess length of plastic from each Nylon Cable Tie.

9. Starting above where the Display Cable connects to the PCBA, position one Nylon Cable Tie behind the Switch Bracket Ribbon Cable and the Display Cable. Next position a second Nylon Cable Tie over the both cables, and attach the cable ties to each other (Figure 7-32).

10. Tighten the cable ties, *without crimping the cables*, until they secure the Switch Bracket Ribbon Cable to the Display Cable.

11. Trim off the excess length of plastic from each Nylon Cable Tie.

12. Remove all six mounting nuts from the Switch Bracket Assembly mounting studs (Figure 7-31).

13. If the spacers and the Spring Finger were removed, mount the Spring Finger onto the top two mounting studs, then place two spacers onto the top two mounting studs. Place the four remaining spacers onto the four lower mounting Studs (Figure 7-31).

14. Slide the Switch Bracket Assembly onto the mounting studs (Figure 7-31).

15. Thread all six mounting nuts onto the mounting studs, then use a 1/4–inch nutdriver to tighten the mounting nuts until they are snug (Figure 7-31).

16. Remove the slack in the ribbon cable, so that it doesn't interfere with the carriage movement, by gently feeding any excess cable up through the opening in the top plate.

7.13   Handler Power Supplies

NOTE

*To determine which model of Handler Power Supply is installed in the library, remove the top
and right side panels then read the Handler Power Supply Label located on the power supply.
See Figure 7-33, Figure 7-35 or Figure 7-38. The label will read 500826-xx-x. Make sure that the
replacement power supply has the same part number (or its equivalent) as the one that is to be
removed.*

Please contact Technical Support for Handler Power Supply part numbers

Tools Required:

- **Number 2 Phillips Screwdriver**

Single bay libraries contain one Handler Power Supply. The 6110 and 8111 models
supply is mounted on the right side of the TLS while the 54xx, 62xx, 64xx, 82xx and
84xx models supplies are mounted on the top of the TLS.

The 58xxx, 68xxx and 88xxx (dual bay) models contain two Handler Power Supplies
referred to as the left and right Handler Power Supplies when viewed from the front
of the TLS. The replacement procedure that begins at Section 7.13.5 will apply to re-
placing either Handler Power Supply, making note of specific left or right side opera-
tions when required.

7.13.1 Single Bay Handler Power Supply Removal - 6110 and 8111 Models

NOTE

To determine which model of Handler Power Supply is installed in the library, remove the top and right side panels then read the Handler Power Supply Label located on the power supply. See Figure 7-33. The label will read 500826-xx-x. Make sure that the replacement power supply has the same part number (or its equivalent) as the one that is to be removed.

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. Remove the right Side Panel, as seen from the front of the TLS (Section 7.4.3).

4. Remove all four protective Screen mounting screws (Figure 7-33).

5. Disconnect the Power Cable and the 2-Wire Cable connectors from the Power Supply PCBA (Figure 7-33).

6. Remove all four Power Supply mounting screws (Figure 7-33).

7. Lift the Power Supply out of the TLS.
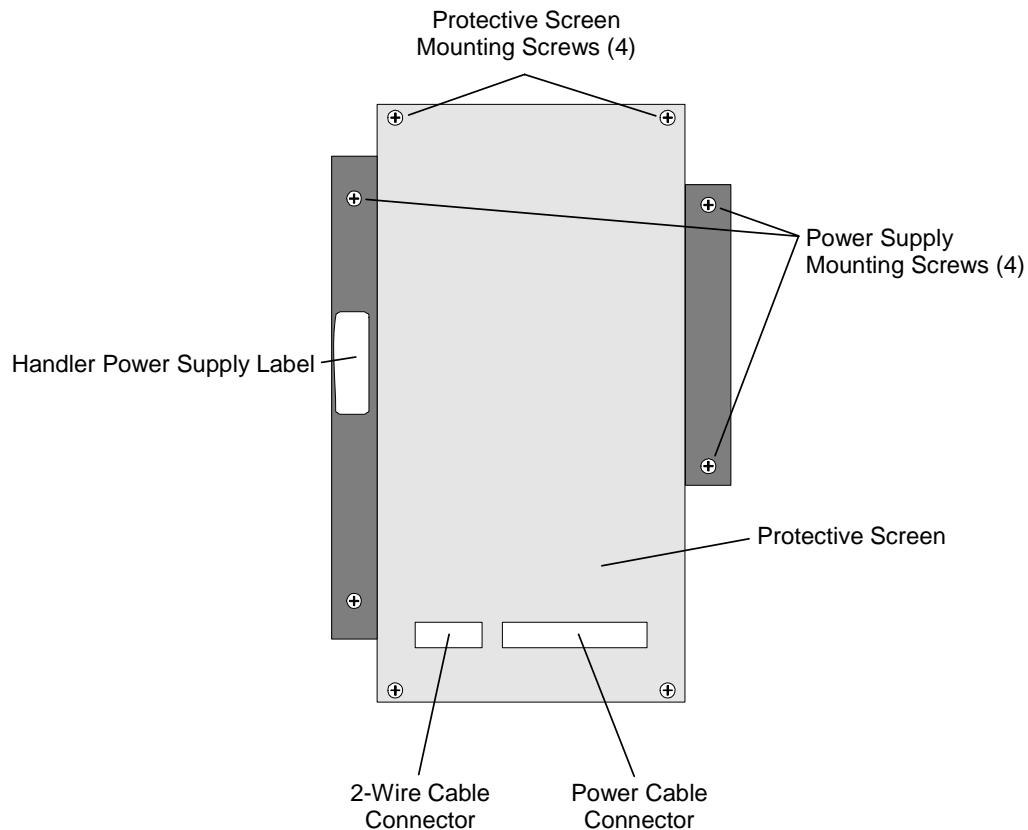
Figure 7-33   The Handler Power Supply - 6110 and 8111 Models

7.13.2 Single Bay Handler Power Supply Replacement - 6110 and 8111 Models

1. Insert the Power Supply into place in the side of the TLS with its connectors towards the bottom of the TLS.

2. Install all four Power Supply mounting screws (Figure 7-33).

3. Reconnect the Power Cable and 2-Wire Cable connectors to the Power Supply PCBA (Figure 7-33).

4. Place the protective Screen on top of the Power Supply and install all four Screen mounting screws (Figure 7-33).

5. Replace the right Side Panel (Section 7.4.4).

6. Replace the Top Panel (Section 7.4.2).

7.13.3 Single Bay Handler Power Supply Removal - 54xx, 62xx, 64xx, 82xx and 84xx Models

NOTE

To determine which model of Handler power supply is installed in the library, remove the top panel then read the Handler Power Supply Label located on the power supply. See Figure 7-35. The label will read 500826-xx-x. Make sure that the replacement power supply has the same part number (or its equivalent) as the one that is to be removed.

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. Use a Number 2 Phillips screwdriver to remove all six Rear Service Panel mounting screws (Figure 7-34), then remove the Rear Service Panel.

4. Disconnect the Switch Bracket (Front) Cable and the I/O port cable from the Executive PCBA (Figure 7-34) then lift the cables out through the openings in the top of the TLS (Figure 7-35).

5. Remove all four Protective Screen mounting screws, then lift the Protective Screen off of the TLS (Figure 7-35).

6. Disconnect the Power Cable and the 2-Wire Cable connectors from the Power Supply PCBA (Figure 7-35). For 500826-05-2 models only use a Phillips or flat screwdriver to remove the two power cable ring lug screws and lift the wires clear of the power cable connector's terminals.

7. Remove all four Power Supply mounting screws (Figure 7-35).

8. Lift the Power Supply up and out of the TLS.

Mounting
Screws (6)

Rear Service Panel

IOPORT Connector

FRONT Connector

Executive PCBA

Figure 7-34   TLS Rear View

I/O Port Cable

Handler Power Supply

Rear

Handler Power Supply Label

Switch Bracket
(FRONT) Cable

Protective Screen
Mounting Screws (4)

2-Wire Cable
Connector

Protective
Screen

Switch Bracket
(FRONT) Cable

Power Cable
Connector

Front

Power Supply
Mounting Screws (4)

I/O Port Cable

Potential Cable Connector Locations

Power Cable
Connector

2-Wire Cable
Connector

Power Cable
Connector

2-Wire Cable
Connector

Power Cable
Connector

2-Wire Cable
Connector

Power Cable
Connector Screws (2)

2-Wire Cable
Connector

Yellow Wires

Brown Wires

2-Wire Cable
Connector

Power Cable
Connector

Figure 7-35   The Handler Power Supply – 54xx, 62xx, 64xx, 82xx and 84xx Series

7.13.4   Single Bay Handler Power Supply Replacement -
54xx, 62xx, 64xx, 82xx and 84xx Models

   1.   Lower the Power Supply down into place on top of the TLS.

Make sure that the Power Supply is turned so that the connectors on its PCBA are facing the right side of the library (on the 62xx and 82xx series libraries), or facing the left side of the library (on the 54xx, 64xx and 84xx series libraries), as seen from the rear of the TLS (Figure 7-35).

2. Install all four Power Supply mounting screws (Figure 7-35).

3. Reconnect the Power Cable and 2-Wire Cable connectors to the Power Supply PCBA (Figure 7-35). For 500826-05-2 models only position the power cable ring lugs wires over the terminals with the yellow wires at the top position and the brown wires at the bottom. Use a Phillips or flat screwdriver to replace the two screws removed earlier.

4. Place the Protective Screen on top of the Power Supply, then install all four Protective Screen mounting screws (Figure 7-35). Make sure that neither power cable is pinched by the Screen.

5. Guide the Switch Bracket (FRONT) Cable and the I/O port cable through the openings in the top of the TLS and reconnect them to the Executive PCBA (Figure 7-34). Make sure that the connectors are fully inserted, until the locking tabs of the mating connectors are fully closed.

6. Place the Rear Service Panel onto the TLS, then use a number 2 Phillips screwdriver to reinstall all six Rear Service Panel mounting screws (Figure 7-34).

7. Replace the Top Panel (Section 7.4.2).

7.13.5   Dual Bay Handler Power Supply Removal

NOTE

To determine which model of Handler power supply is installed in the library, remove the top and/or right side panels then read the Handler Power Supply Label located on the power supply. See Figure 7-38. The label will read 500826-xx-x. Make sure that the replacement power supply has the same part number (or its equivalent) as the one that is to be removed.

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1). If removing the right side Handler Power Supply, remove the right side Panel (Section 7.4.3) to gain access to the cables at the rear of the TLS.

3. This step only applies when removing the right side Handler Power Supply. Use a number 2 Phillips screwdriver to remove all six Rear Service Panel mounting screws (Figure 7-37), then remove the Rear Service Panel on the left side of the TLS when viewed from the rear.

4. This step only applies when removing the right side Handler Power Supply. Disconnect the Switch Bracket (Front) Cable and the IOPORT Cable from the Executive PCBA (Figure 7-42). Slide the cables out from under the three clips on

the rear of the TLS and then lift the cables up through the openings in the top of the TLS to provide enough slack to remove the power supply.

5. This step only applies when removing the left side Handler Power Supply. Use a number 2 Phillips screwdriver to loosen the two screws attached to the clips holding the Y-Clear Detector Cable in place on top of the TLS. Move the cable out of the way of the power supply. See (Figure 7-37).

6. Remove all four Protective Screen mounting screws, then lift the Protective Screen off of the TLS (Figure 7-38).

7. Disconnect the Power Cable and 2-Wire Cable connector from the Power Supply PCBA (Figure 7-38). For 500826-05-2 models only use a Phillips or flat screwdriver to remove the two power cable ring lug screws and lift the wires clear of the Power Cable connector's terminals.

8. Remove all four power supply mounting screws (Figure 7-38). When removing the left side screws, take care not to lose the cable clips.

9. Lift the power supply up and out of the TLS.
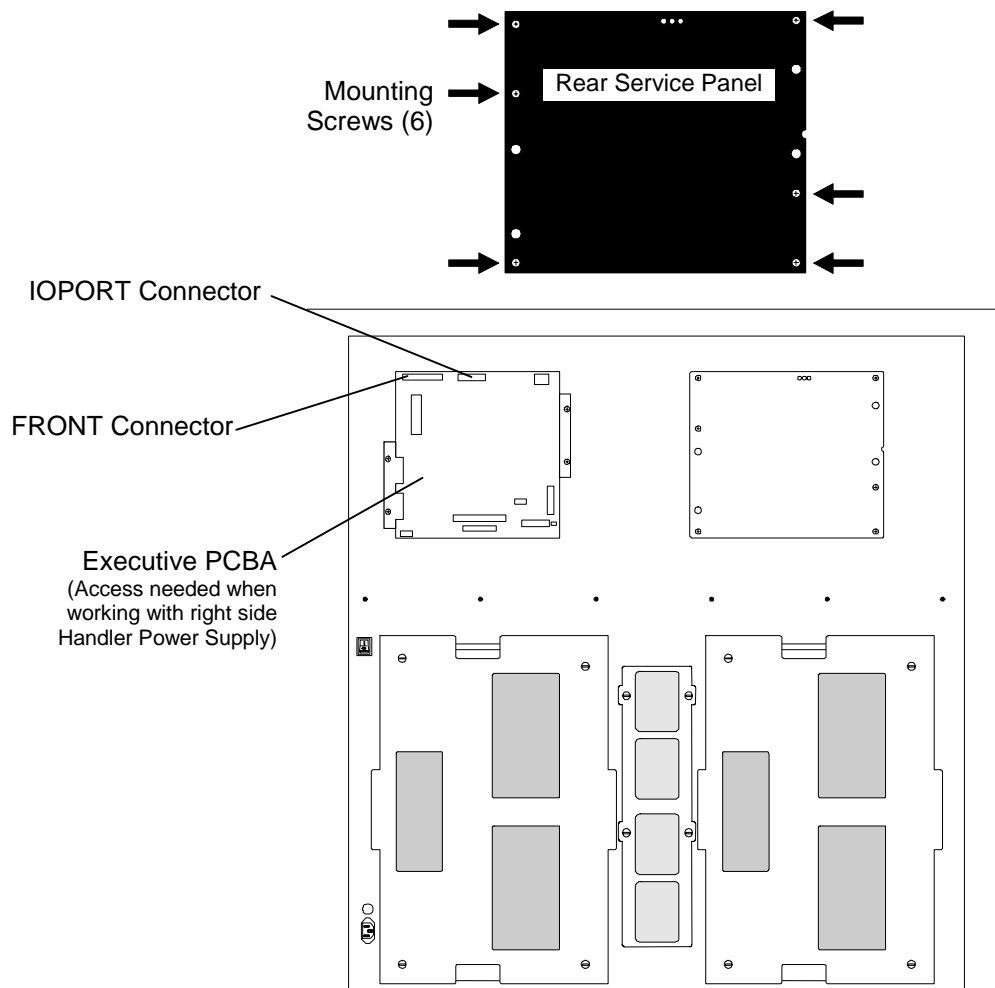
Figure 7-36   TLS Rear View

Front

Switch Bracket
(FRONT) Cable

I/O Port Cable

Right Side
Handler Power Supply

Left Side
Handler Power Supply

Y-Clear Detector
PCBA Cable

Clips
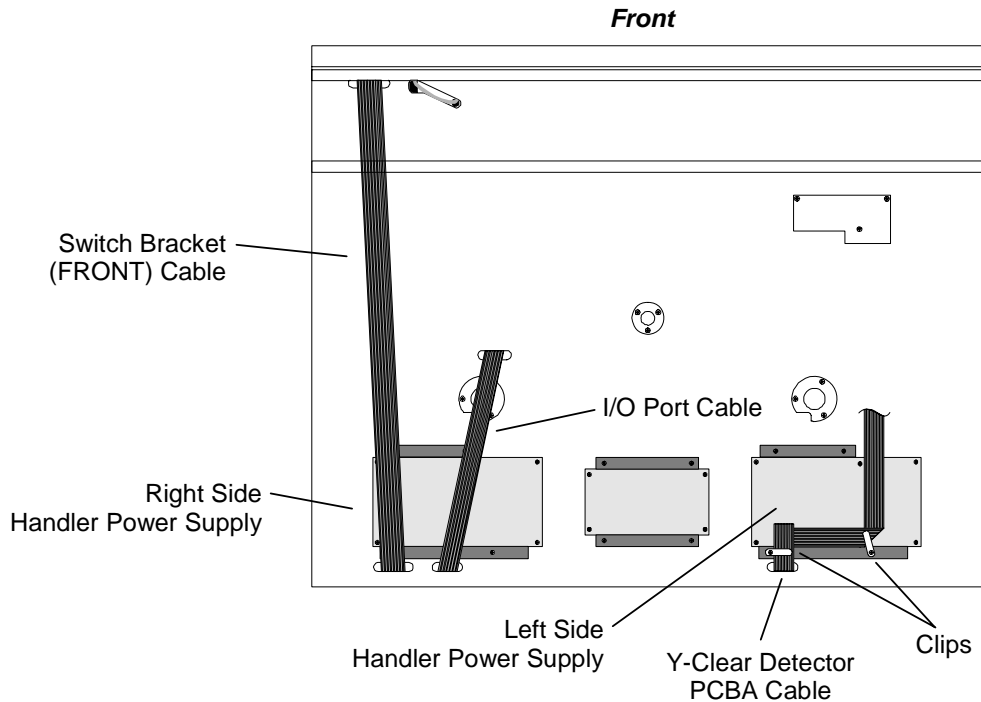
Figure 7-37   Top View of Handler Power Supplies (As seen from the rear of the TLS)

Power Supply
Mounting Screws (4)

Power Cable Connector

Yellow Wires

Protective Screen

2-Wire Cable
Connector

Screen Mounting
Screws (4)

Brown Wires

Power Cable
Connector Screws (2)

Handler Power Supply Label

2-Wire Cable
Connector

*Potential
Cable Connector
Locations*

2-Wire Cable
Connector

Power Cable
Connector

Power Cable
Connector
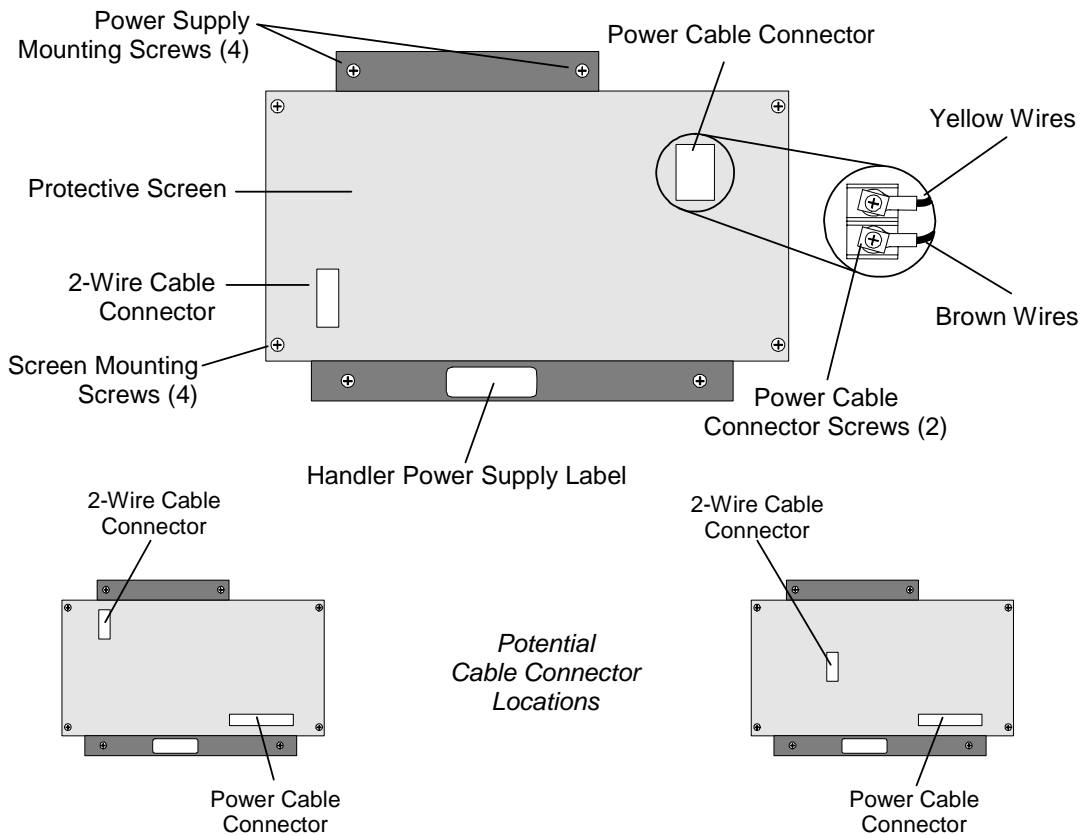
Figure 7-38   Handler Power Supply (Top View, as seen from the rear of the TLS)

7.13.6   Dual Bay Handler Power Supply Replacement

1.   Lower the Power Supply down into place on top of the TLS.

NOTE

Make sure that the Power Supply is turned so that the connectors on its PCBA are facing in the lower left and upper right corners, as seen from the back of the TLS (Figure 7-38).

2.   Install all four Power Supply mounting screws (Figure 7-38). When installing the left side screws make sure that the cable clips are replaced as shown in Figure 7-37.

3.   Reconnect the Power Cable and the 2–Wire Cable connector to the Power Supply PCBA (Figure 7-38). For 500826-05-2 models only position the power cable ring lugs wires over the terminals with the yellow wires at the top position and the brown wires at the bottom. Use a Phillips or flat screwdriver to replace the two screws removed earlier.

4.   Place the protective Screen on top of the Power Supply, then install all four Screen mounting screws (Figure 7-38). Make sure that neither power cable is pinched by the Screen.

5.   This step only applies if the right side Handler Power Supply was removed. Reconnect the Switch Bracket (FRONT) Cable and the I/OPORT Cable to the Executive PCBA (Figure 7-42). Make sure that the connectors are fully inserted, until the locking tabs of the mating connectors are fully closed. Slide the cables under the three clips on the inside rear of the TLS.

6.   This step only applies if the right side Handler Power Supply was removed. Place the Rear Service Panel onto the TLS, then use a number 2 Phillips screwdriver to reinstall all six Rear Service Panel mounting screws (Figure 7-37).

7.   This step only applies if the left side Handler Power Supply was removed. Position the Y-clear detector cable as seen in Figure 7-37 and slide it under the clips. If a clip is too tight use a number 2 Phillips screwdriver to loosen the screw attached to the clip and retighten it after the cable is in place.

8.   Replace the Top Panel (Section 7.4.2).

7.14 Blower Power Supply

P/N 500826-08-6

Dual bay library models contain a power supply for the Blower Assembly.

Tools Required:

- **Number 2 Phillips Screwdriver**

7.14.1 Blower Power Supply Removal

Refer to Figure 7-39.

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. Remove all four Protective Screen mounting screws, then lift the Protective
   Screen off of the TLS.
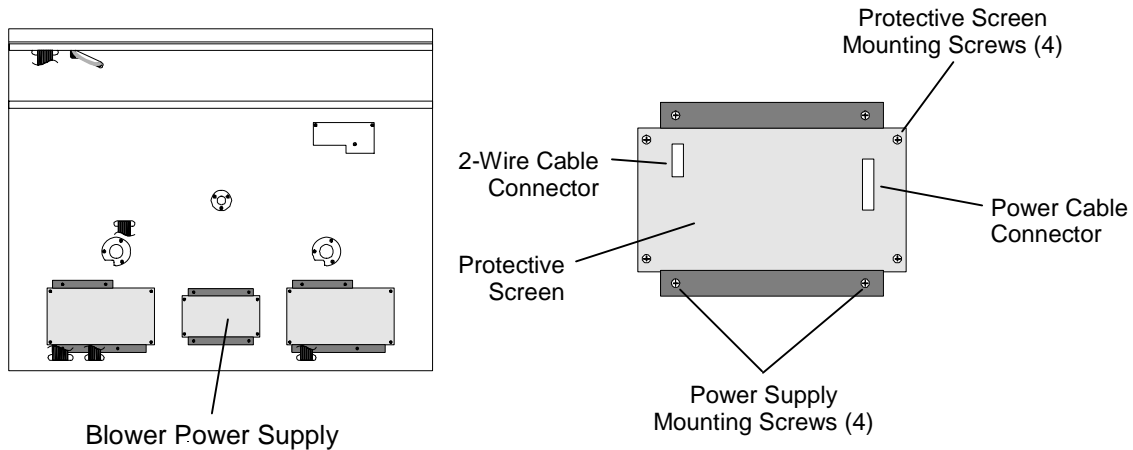
Figure 7-39   Top View of Blower Power Supply (As seen from the rear of the TLS)

   4.   Disconnect the Power Cable and the 2-Wire Cable connectors from the Blower
         Power Supply PCBA.

   5.   Remove all four Power Supply mounting screws.

   6.   Lift the Power Supply up and out of the TLS.

7.14.2   Blower Power Supply Replacement

   1.   Lower the Power Supply down into place on top of the TLS. Make sure that when
         viewed from the rear of the TLS, the 2 Wire Cable connector is on the left and
         the Power Cable connector is on the right. See Figure 7-39.

   2.   Install all four Power Supply mounting screws.

   3.   Reconnect the Power Cable and 2-Wire Cable connectors to the Power Supply
         PCBA.

   4.   Place the Protective Screen on top of the Power Supply, then install all four
         Screen mounting screws. Make sure that neither power cable is pinched by the
         Screen.

   5.   Replace the Top Panel (Section 7.4.2).

7.15   Tape Drive Power Supply

NOTE

*To determine which model of Tape Drive power supply is installed in the library, remove the top
and left or right side panels then read the Tape Drive Power Supply Label located on the power
supply. See Figure 7-41. The label will read 500826-xx-x. Make sure that the replacement power
supply has the same part number (or its equivalent) as the one that is to be removed.*

Please contact Technical Support for Tape Drive Power Supply part numbers

Single bay libraries contain one or two Tape Drive Power Supplies. The 6110, 8111,
62xx and 82xx models contain a single supply and the 54xx, 64xx and 84xx models use
two supplies.

The 58xxx, 68xxx and 88xxx (dual bay) models contain four Tape Drive Power Sup-
plies. Two are located on the left side of the library and two are on the right side. Note
that the four power supplies provide power to the drive bays as shown in Figure 7-40
as seen from the front of the library. The supply on the top right side provides power
to drive bays R.T1 and R.T2 while the supply below it provides the power to bays R.T3
and R.T4. The left side supplies are the opposite of this configuration with the top
supply powering bays L.T3 and L.T4 while the bottom supply provides power to bays
L.T1 and L.T2.
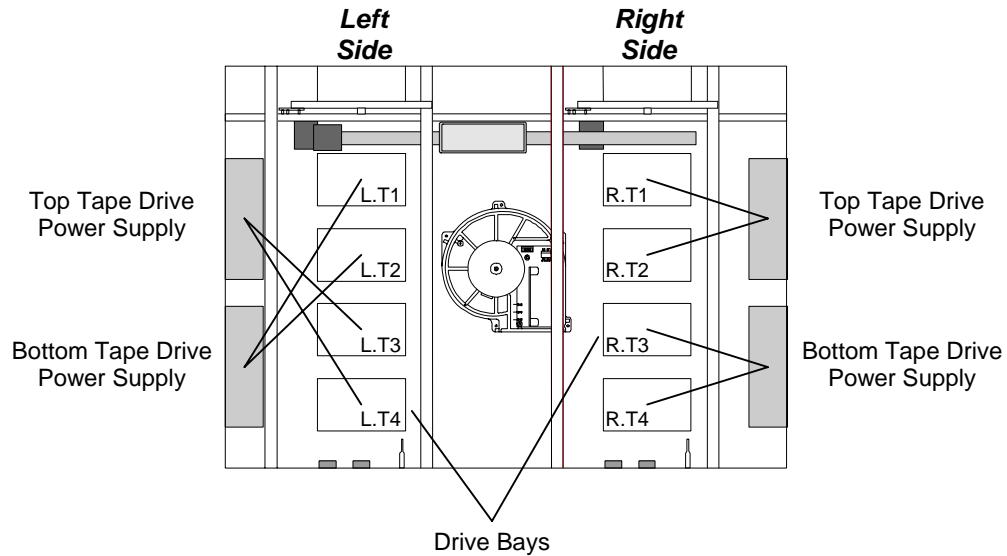
Figure 7-40 Relationship of the Drive Bays to the Tape Drive Power Supplies

Note that the power supplies in single bay libraries may be a different P/N than the ones in dual bay libraries and are not interchangeable.

Tools Required:

- **Number 2 Phillips Screwdriver**

7.15.1   Tape Drive Power Supply Removal

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. On single bay libraries remove the right Side Panel, as seen from the front of the TLS. For dual bay models remove the left or right Side Panel depending on which power supply is being removed (Section 7.4.3).

Power Supply Mounting Screws (4)

Power Cable Connector

2-Wire Cable
Connector

Protective
Screen

Tape Drive
Power Supply Label

Screen Mounting Screws (4)

Potential Cable Connector Locations

Power Supply Mounting Screws (4)   Screen Mounting Screws (4)

Tape Drive
Power Supply Label

Protective
Screen

Power Cable
Connector

2-Wire Cable Connector

Tape Drive
Power Supply Label

2-Wire Cable Connector

Power Cable
Connector

Figure 7-41   Tape Drive Power Supplies

    4.   Remove all four Protective Screen mounting screws.

    5.   Disconnect the Power Cable and the 2–Wire Cable connectors from the Power Supply PCBA.

    6.   Remove all four Power Supply mounting screws.

    7.   Lift the Power Supply out of the TLS.

7.15.2 Tape Drive Power Supply Replacement

See Figure 7-41

1. Insert the Power Supply into place in the side of the TLS with its connectors oriented correctly as seen in Figure 7-41.

2. Install all four Power Supply mounting screws.

3. Reconnect the Power Cable and the 2–Wire Cable connectors to the Power Supply PCBA.

4. Place the Protective Screen on top of the Power Supply and install all four Protective Screen mounting screws.

5. Replace the right or left side Panel (Section 7.4.4).

6. Replace the Top Panel (Section 7.4.2).

7.16   Executive PCBA

Executive II   **P/N 501137-01-2**
Executive III   **P/N 501387-01-3**
Executive IV   **P/N 501447-01-5**
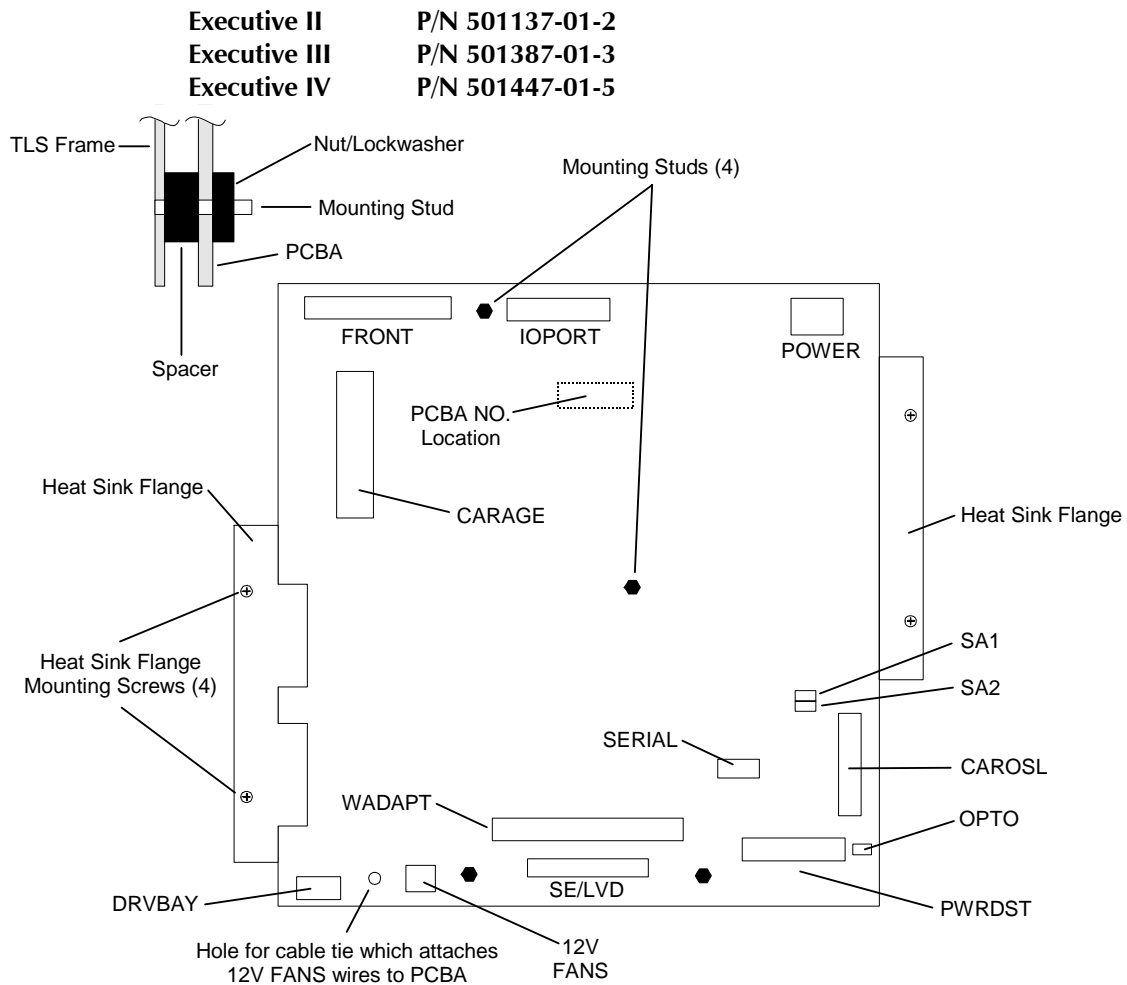
Figure 7-42   Executive II and III PCBA's
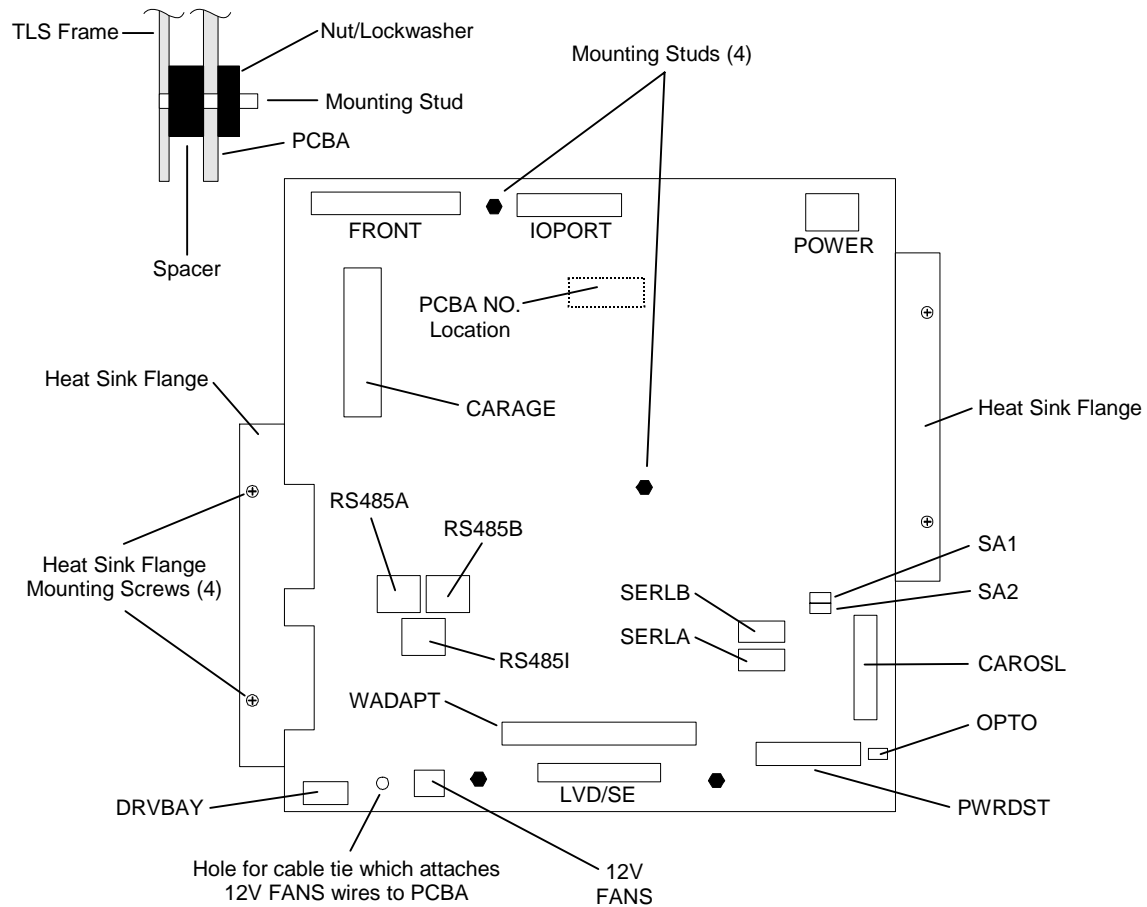
Figure 7-43   Executive IV PCBA

7.16.1   Executive PCBA Removal

Refer to Figure 7-42 or Figure 7-43.

The TLS-58xxx, 68xxx and 88xxx (dual bay) models contain two Executive PCBAs (Printed Circuit Board Assemblies) referred to as the left and right Executive PCBAs when viewed from the front of the TLS. The replacement procedure that follows will apply to replacing Executive PCBAs in either single bay or dual bay libraries, making note of specific operations when required.

Refer to Table 7-4 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 P/N
Executive II	501137-01-2
Executive III	501387-01-3
Executive IV	501447-01-5

Table 7-4   Executive PCBA Identification

Tools Required:

- **Number 2 Phillips Screwdriver**
- **1/4-inch Hex Nutdriver**

Material Required:

- **3-inch x 3/32-inch Cable Ties**

NOTICE

If a history of the configuration changes that were made at the time of initial TLS installation is not available, and if the menu system is still operational, enter the `Configuration` menu. Record all of the custom configuration settings, in all of the sub–menus, except for the `Log` and `Emulation` sub–menus. This custom configuration information must be re–entered after the new Executive board is installed (Section 7.16.3).

1. Turn off the TLS power and remove the power cord.

2. Use a number 2 Phillips screwdriver to remove all six Rear Service Panel mounting screws, then remove the Rear Service Panel (Figure 7-44).

3. Disconnect all of the cable connectors from the Executive PCBA. (There are at least 7 cables. The 12V FANS, CAROSL (Carousel), RS485A, RS485B, RS485I, SERLA, SERLB and Serial cables are model–dependent/optional cables.)

4. If a HVD Adapter PCBA is mounted on the Executive PCBA, follow the procedure in Section 7.20 to remove it and mount it onto the replacement Executive PCBA (Figure 7-77).

5. On dual bay libraries only, remove and save the jumpers from the pins at SA1 and SA2 (side specific). They will need to be attached to the replacement Executive PCBA. On the left side Executive PCBA a jumper is attached to SA1. On the right side Executive PCBA jumpers are attached to both SA1 and SA2.

6. Remove all four Phillips mounting screws from the Heat Sink Flanges.

NOTE

In the next step, the spacers behind the Executive PCBA come loose when the PCBA mounting nuts are removed.

7. Use a 1/4-inch nutdriver (a magnetic nutdriver works best for this job) to remove all four PCBA mounting nuts from the PCBA mounting studs. Be careful not to drop the nuts into the bottom of the TLS.

8. Lift the Executive PCBA off of the PCBA mounting studs and out of the TLS.

9. Reinstall all four PCBA mounting nuts onto the PCBA mounting studs, to keep the PCBA spacers in place.
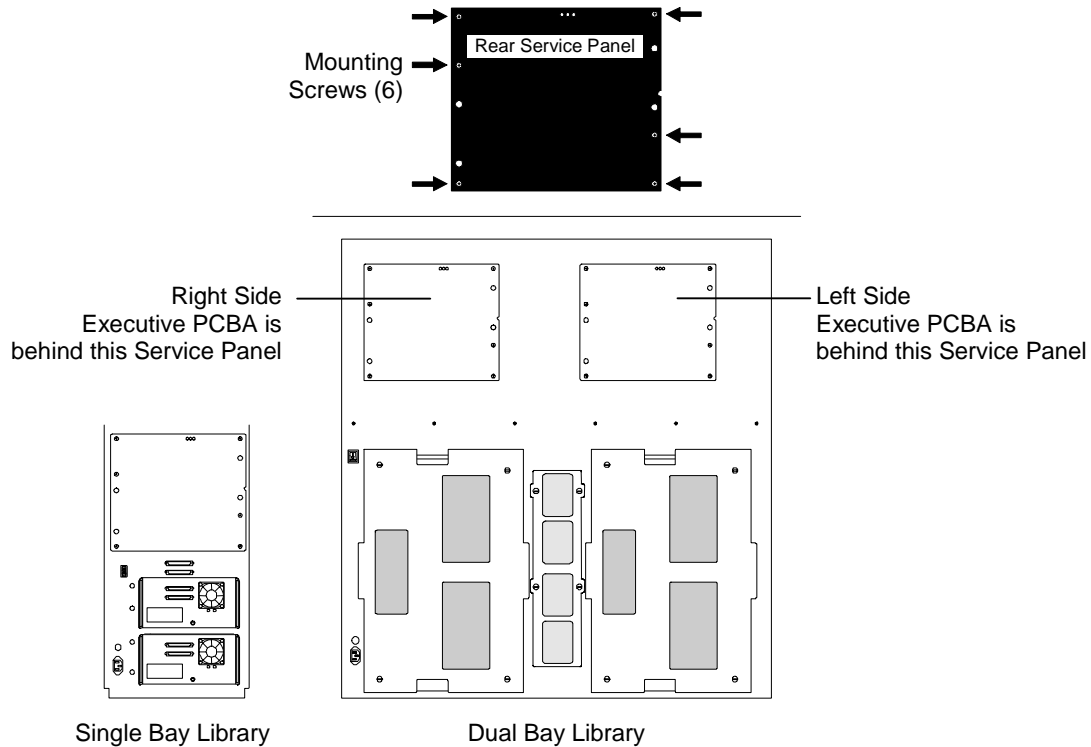
Figure 7-44 View of Rear Service Panels

7.16.2 Executive PCBA Replacement

Refer to Figure 7-42 or Figure 7-43.

7.16.2.1 Introduction

Executive PCBA FRUs are not configured for any particular TLS model (or any specific TLS unit) at the factory. Also, since all of a unit's configuration, calibration and inventory information is stored in its Executive PCBA's non–volatile Clock/RAM chip (which is permanently attached to the Executive PCBA), all this information is lost when the Executive PCBA is replaced. Therefore, the configuration information in the Executive PCBA FRU _will not match_ the configuration of the TLS when it is first installed.

After replacing an Executive PCBA, ***before doing anything else***, the user must update the configuration information in the new Executive PCBA to match the library's installed hardware (see Section 7.16.3). *Do not, under any circumstances, apply power*

to the TLS while the cabinet door is closed if you think the unit's configuration is in-correct. If in doubt, open the cabinet door, apply power to the TLS and check the unit's configuration – ***never guess!***

CAUTION

To prevent possible injury or equipment damage, <u>BEFORE APPLYING POWER</u> af-ter the Executive PCBA is replaced, <u>MAKE SURE THE CABINET DOOR IS OPEN</u>.

When power is applied to the TLS while the cabinet door is open, no TLS motors will operate. The configuration information in the new Executive PCBA must be updated to match the library's installed hardware, <u>BEFORE</u> any TLS motors are al-lowed to operate. See Section 7.16.3.

Executive PCBA Flash PROM

The flash PROM on the Executive PCBA contains only the operating firmware and none of a unit's configuration information. The number of items in the configuration data set may change with firmware revisions. It is always recommended that when changing the Executive PCBA, the firmware revision level remain unchanged until the new board is properly installed and the unit works satisfactorily. Only then should the firmware be upgraded. Don't attempt to change two things at once, it can cause problems.

7.16.2.2 Replacing the Executive PCBA

1. This step applies to dual bay libraries only. Using the jumpers that were re-moved earlier from the Executive PCBA, attach a jumper to the pins at SA1 for a left side Executive PCBA and attach jumpers to the pins at both SA1 and SA2 for a right side Executive PCBA.

NOTE

In the next step, the spacers behind the mounting nuts on the PCBA mounting studs come loose when the nuts are removed.

2. Remove all four nuts from the PCBA mounting studs, then make sure that all four PCBA spacers are in place on the PCBA mounting studs.

3. Set the top of the Executive PCBA into the rear panel opening, but do not place it onto the mounting studs.

4. For all single bay libraries Executive PCBAs and the right side PCBA of dual bay units, press the Front cable firmly into the FRONT connector, until both locking tabs on the FRONT connector close over the Front cable's connector.

5. Press the I/O port cable firmly into the IOPORT connector, until both locking tabs on the IOPORT connector close over the I/O port cable's connector.

6. If a ground lug exists, plug in onto the FRAME terminal.

7. Plug the Power Cable onto the POWER connector.

8. First, make sure that the remaining cables are not behind the Executive PCBA, and that they have not fallen down inside of the TLS. Next, lift the Executive PCBA up into the Rear Panel opening, past the mounting studs. Finally, push the bottom edge of the Executive PCBA into the Rear Panel opening.

9. Lower the Executive PCBA to align all four Mounting Stud holes in the PCBA with all four PCBA mounting studs, then install the PCBA onto the studs.

10. Reinstall all four PCBA mounting nuts (with lockwashers) onto the mounting studs, then use a 1/4–inch nutdriver to tighten the mounting nuts firmly against the Executive PCBA.

11. Reinstall all four Phillips mounting screws in the Heat Sink Flanges, then use a number 2 Phillips screwdriver to tighten the mounting screws until they are snug.

12. Reconnect all the remaining cables to the Executive PCBA.
    a) For each ribbon cable, press the ribbon cable's connector firmly into its mating connector, until both locking tabs on the mating connector close over the ribbon cable's connector.

    b) For each non–ribbon cable, make sure that *all* of the pins on the cable's connector are fully engaged with the corresponding mating connector.

    c) The remaining cables include:

    - **CAROSL (Carousel)**

    - **PWRDST**

    - **SERIAL (Executive II and III PCBA's only)**
      Connect this cable so that the stripe on the ribbon cable is on the right side of the SERIAL connector, as shown below.
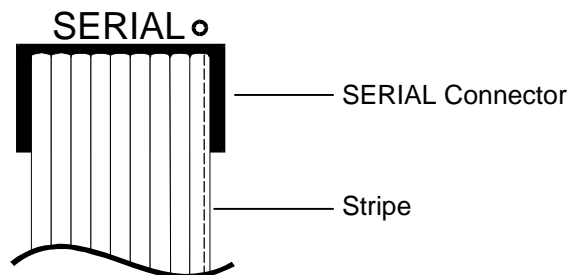
    - **SE/LVD or LVD/SE**
      a) If a HVD Adapter PCBA _is not_ installed on the replacement Executive PCBA, connect the SCSI cable to the SE/LVD connector on the Executive PCBA (the bottom SCSI connector in Figure 7-77).

      b) If a HVD Adapter PCBA _is_ installed on the replacement Executive PCBA, connect the SCSI cable to the SCSIID connector on the HVD Adapter PCBA (Figure 7-77). See Section 7.20 for details about connecting the SCSI Differential Adapter PCBA.

- **12VFANS**
  The connector is not polarity–sensitive or keyed. After the connector is attached to the PCBA, insert a Cable Tie through the hole in the Executive PCBA (Figure 7-42), then secure the Fan Assembly's power cable to the Executive PCBA.

- **RS485A, RS485 or RS485I**
  These connectors are keyed.

CAUTION

To avoid equipment damage, be sure that all pins on the 12VFANS cable's plug mate correctly with all pins on the 12VFANS connector on the Executive PCBA.

- **CARAGE (**Carriage**)**

- **OPTO**
  This connector is keyed.

- **DRVBAY (**Drive Bay**)**

13. Reinstall the Rear Service Panel, then use a number 2 Phillips screwdriver to reinstall all six Rear Service Panel mounting screws (Figure 7-44).

14. Open the cabinet door.

7.16.3   Reconfiguring the TLS

CAUTION

To prevent possible injury or equipment damage, <u>BEFORE APPLYING POWER</u> after the Executive PCBA is replaced, <u>MAKE SURE THE CABINET DOOR IS OPEN</u>.

When power is applied to the TLS while the cabinet door is open, no TLS motors will operate. The configuration information in the new Executive PCBA must be updated to match the library's installed hardware, <u>BEFORE</u> any TLS motors are allowed to operate.

1. Make sure that the cabinet door is open, then reconnect the power cord and turn on the TLS power.

NOTE

Both the +12V and +5V LEDs at the top of the Executive board must light. Confirm that the Front Panel display lights and that characters are displayed.

2. Inspect the label on the rear–panel to determine the unit's model number.

NOTE

If the TLS was upgraded in the field to a larger model, the rear–panel label may not indicate the correct, current model number.

3. Inspect the label on the Carriages to determine their revision levels (e.g., `Carriage: B`). See Figure 7-46.

4. If a Barcode Reader or Readers are installed, inspect the labels to determine model numbers (e.g., `WA3700/B-2221`). See Figure 7-46.

5. Inspect the label on the I/O port assembly to determine its revision level (e.g., `I/O Port: A`). See Figure 7-47.

6. On dual bay models (58xxx, 68xxx and 88xxx), inspect the label on the Shuttle Assembly to determine its revision level (e.g., `Shuttle: A`). See Figure 7-83.

7. Follow the instructions in Section 5.3.1 to enter `Update` for the password in the Private menu.

8. Enter the `Configuration\Advanced\Changer\Mechanics` menu.

Carriage Assembly Label

Carriage Assembly
(Top View)
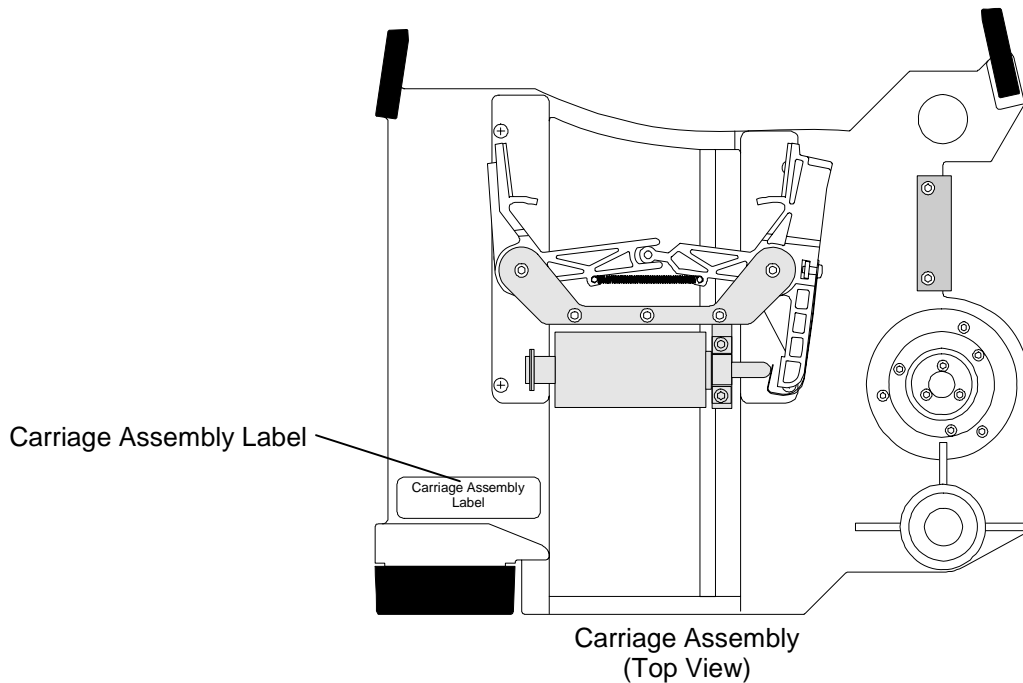
Figure 7-45   Carriage Assembly Label
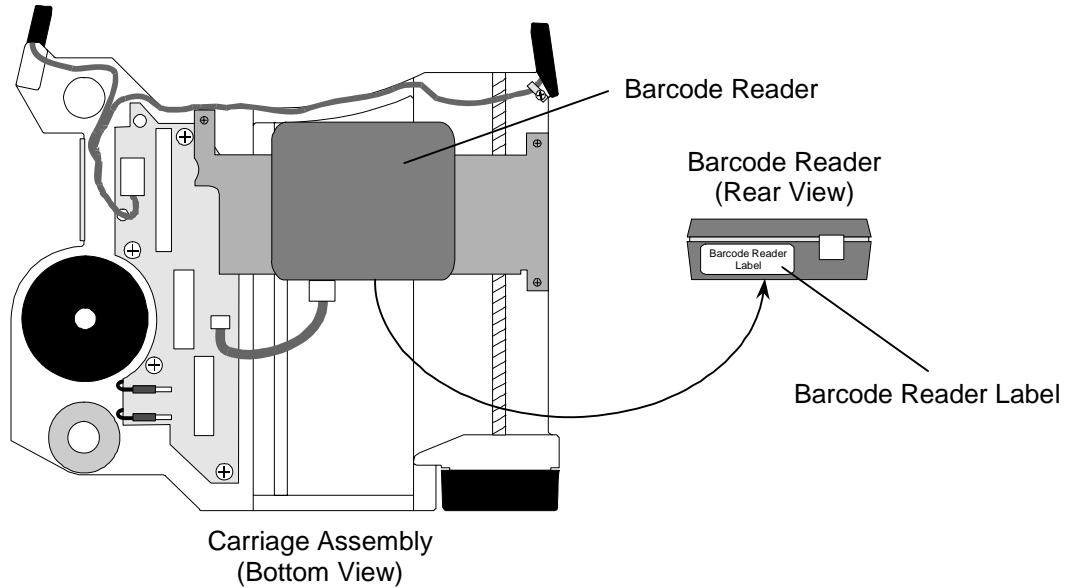
Figure 7-46   Barcode Reader Label
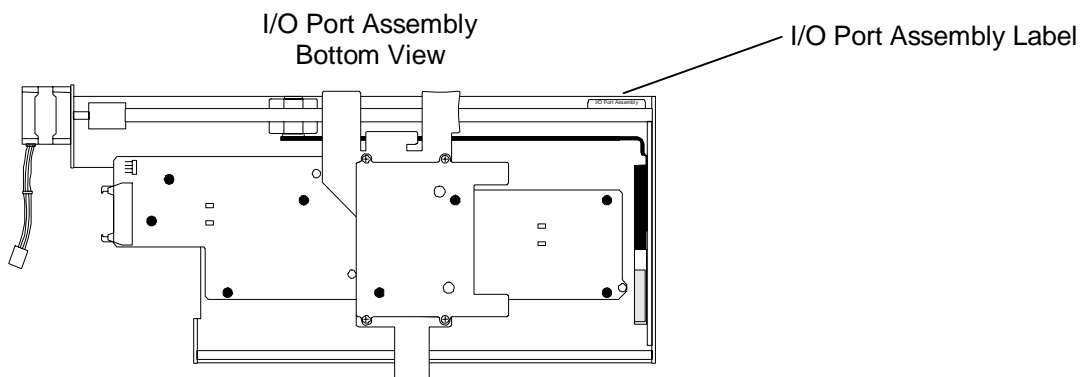
Figure 7-47   I/O Port Assembly Label

9. **a)** Edit the `Configuration\Advanced\Changer\Mechanics` menu as necessary to make sure that all the menu items match the hardware installed in the TLS.

Be especially sure that the proper Carriage revision level (A, B, etc.) is displayed in the menu. The TLS will not operate properly if the Carriage item is not correct.

b) If the configuration data was recorded before the old Executive PCBA was removed (Section 7.16.1), that information can now be used to reconfigure the new Executive PCBA. However, double check to make sure that all the `Configuration\Advanced\Changer\Mechanics` menu items match the hardware installed in the TLS.

NOTE

The TLS automatically rebuilds the calibration data during the calibration operation (Section 7.16.4). The inventory data is automatically restored when the unit is returned to service. However, the custom configuration data (e.g., the Carriage revision level) must be manually re-entered.

The contents of the `Configuration\Advanced\Changer\Mechanics` menu may change in future revisions of the TLS firmware. Always make sure that all the menu items match the installed hardware.

7.16.4 Recalibrating the TLS

1. After making sure that the unit is properly configured (see Section 7.16.3), close the cabinet door.

NOTE

For units with firmware revision 1.22 or earlier, after changing the unit's configuration, switch the TLS power off and then back on before calibrating the unit. This procedure ensures proper operation of the CALIBRATE command in step two below.

2. Follow the instructions in Section 5.3.2 to recalibrate the unit.

3. Follow the instructions in Section 5.3.3 to clear any existing passwords, to prevent unauthorized access to the Private menu.

7.17 Drive Bay PCBA

6110 and 8111 models	**P/N 501297-01-4**
62xx and 82xx models	**P/N 501257-01-8**
54xx, 64xx and 84xx models (Upper Bay Board)	**P/N 501257-01-8**
54xx, 64xx and 84xx models (Lower Bay Board)	**P/N 501257-02-6**
58xxx, 68xxx and 88xxx models (Upper Bay Board)	**P/N 501257-03-4**
58xxx, 68xxx and 88xxx models (Lower Bay Board)	**P/N 501257-02-6**

TLS models 6110, 62xx, 8111 and 82xx contain a single Drive Bay PCBA while 54xx, 64xx and 84xx models contain two PCBAs. The dual bay 58xxx, 68xxx and 88xxx models contain four PCBAs, two for the right side drive bay and two for the left side drive bay.

Tools Required:

- **1/4-inch Hex Nutdriver**

- **Number 2 Phillips Screwdriver**

- **Flat-blade Screwdriver (Dual Bay Models)**
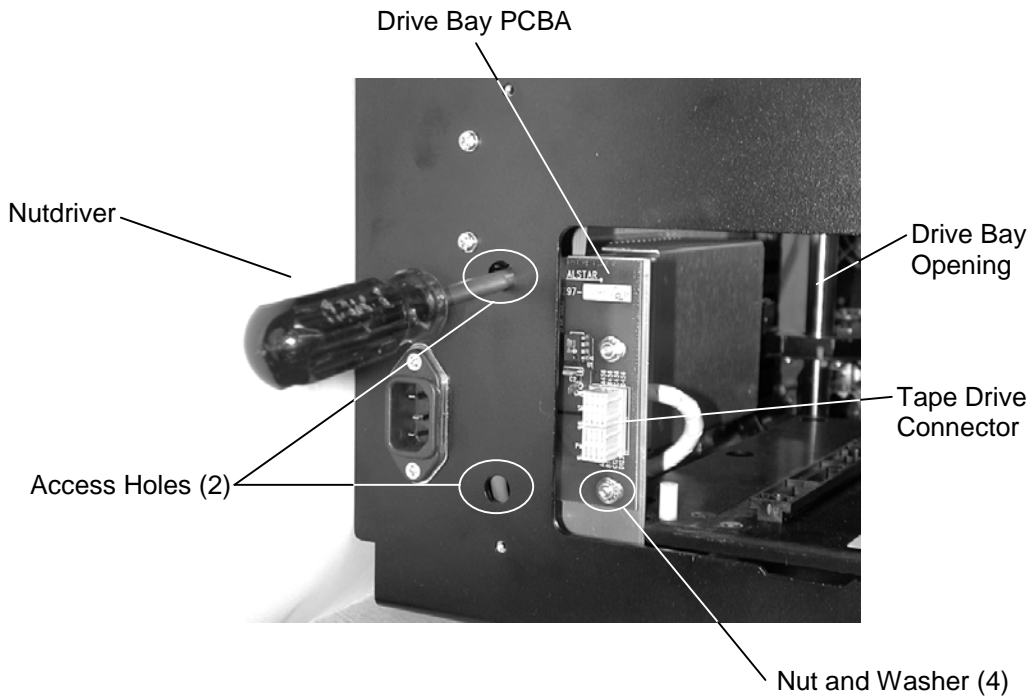
Figure 7-48   81xx Series The Drive Bay PCBA

7.17.1   Drive Bay PCBA Removal 6110 and 8111 Models
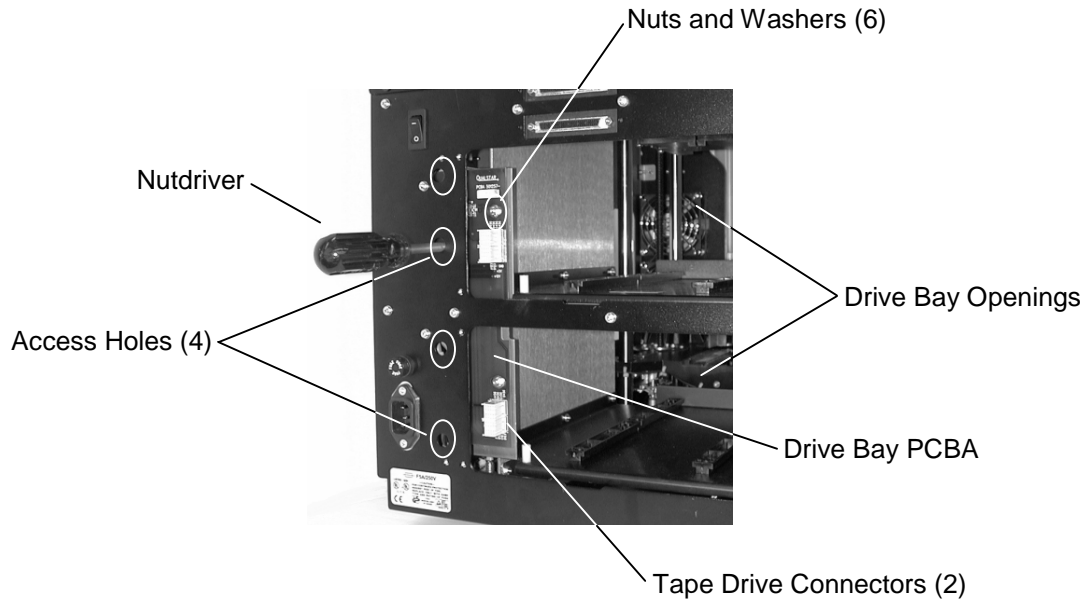
1.   Turn off the TLS power and remove the power cord.

2.   Remove the Top Panel (Section 7.4.1).

3.   Remove the right Side Panel, as seen from the front of the TLS (Section 7.4.3).

4.   Remove the tape drive assembly, if installed in the TLS.

5.   Remove the Tape Drive Power Supply (Section 7.15.1).

6.   Disconnect all the cables from the Drive Bay PCBA (Figure 7-48).

NOTE

In the next step, the washers and nuts on the PCBA mounting studs may drop into the cabinet when they are being removed.

7.   Reach through the two access holes in the rear of the TLS with a 1/4-inch nut-driver (a magnetic nutdriver works best) to remove the PCBA mounting nuts (Figure 7-48). Access the remaining two PCBA mounting nuts from the drive bay opening and remove them.

8.   Carefully lift the Drive Bay PCBA off the PCBA Mounting Studs and out of the TLS.

9. Retrieve any washers or nuts that may have fallen into the cabinet.

7.17.2 Drive Bay PCBA Replacement 6110 and 8111 Models

1. Insert the Drive Bay PCBA into the TLS and align its mounting screw holes with the PCBA Mounting Studs (Figure 7-48).

NOTE

In the next step, only finger tighten the nuts. The PCBA needs to be loosely held to the PCBA Mounting Studs.

2. Install a washer by hand or with long nose pliers onto a PCBA Mounting Stud, then with a 1/4-inch nutdriver (a magnetic nutdriver works best) thread PCBA Mounting Nuts onto the PCBA Mounting Studs. Install the remaining PCBA Mounting screws the same way (Figure 7-48).
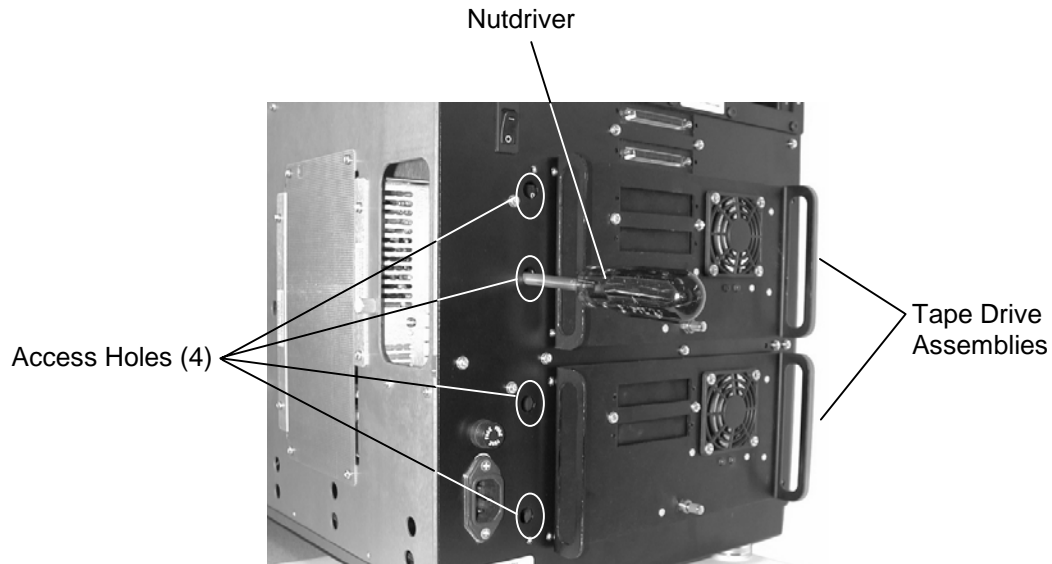
3. Install a tape drive assembly into the TLS being careful to align the Tape Drive Connector on the Drive Bay PCBA with its mating connector on the tape drive assembly. It may be necessary to move the Drive Bay PCBA to properly align the connectors. Refer to Chapter 5 in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450) for more information on tape drive assembly installation.

4. Look through the top of the TLS' frame to confirm that the Tape Drive Connector on the tape drive assembly is fully inserted into its mating connector on the Drive Bay PCBA.

5. With a 1/4-inch nutdriver (a magnetic nutdriver works best) reach through the two access holes in the rear of the TLS and tighten the PCBA Mounting Nuts onto the PCBA Mounting Studs.

6. Remove the tape drive assembly from the TLS.

7. Access the remaining two PCBA Mounting Nuts from the drive bay opening and tighten them.

8. Reconnect all the cables to the Drive Bay PCBA (Figure 7-48).

9. Replace the Tape Drive Power Supply (Section 7.15.2).

10. Replace the right Side Panel (Section 7.4.4).

11. Replace the Top Panel (Section 7.4.2).

7.17.3 Drive Bay PCBA Removal 62xx and 82xx Models

Figure 7-49 82xx Series Drive Bay PCBA

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. Remove the right Side Panel, as seen from the front of the TLS (Section 7.4.3).

4. Remove tape drive assemblies, if installed in the TLS.

5. Remove the Tape Drive Power Supply (Section 7.15.1).

6. Disconnect all the cables from the Drive Bay PCBA (Figure 7-49).

7. Using a number 2 Phillips screwdriver remove the three support bracket mounting screws from the rear of the TLS, and then remove the bracket (Figure 7-50).

NOTE

In the next step, the nuts on the cable holders may drop into the cabinet when the screws are removed.

8. Using a number 2 Phillips screwdriver, remove the two cable holder mounting screws from the rear of the TLS (Figure 7-50).

Cable Holder Screws (2)

Support Bracket Screws (3)

Cable Holder Nut (2)

Cable

Cable Holder (2)

Cable Tie

Support Bracket

Cable Holder Screws (2)

Rear of TLS

Support Bracket Screws (3)

Sectional View from the Top
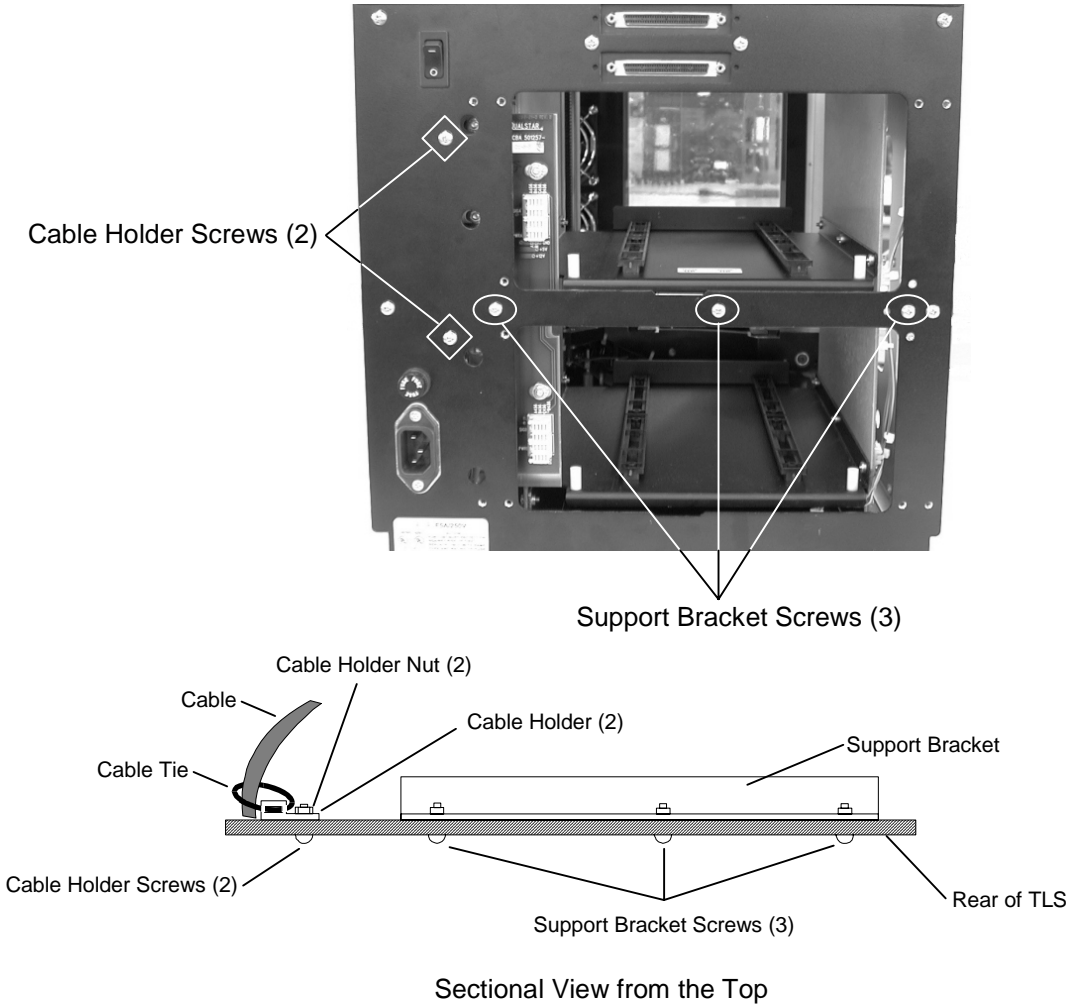
Figure 7-50   Bracket Screws

Cables

Tape Drive Power Supply Opening
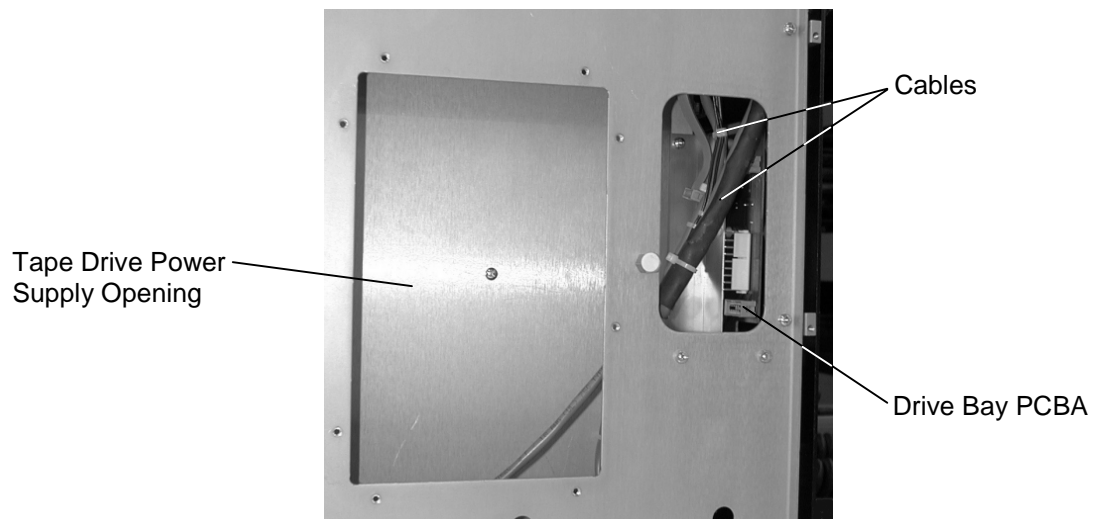
Drive Bay PCBA

Figure 7-51   Cables-Right Side of TLS

9. Carefully move the cables that are behind the Drive Bay PCBA around to the front of the PCBA (Figure 7-51).

NOTE

In the next step, the washers and nuts on the PCBA Mounting studs may drop into the cabinet when they are being removed.

10. Reach through the four access holes in the rear of the TLS with a 1/4-inch nut-driver (a magnetic nutdriver works best) to remove the PCBA mounting nuts (Figure 7-49). Access the remaining two PCBA mounting nuts from the drive bay openings and remove them.

11. Carefully lift the Drive Bay PCBA off the PCBA Mounting Studs and out of the TLS.

12. Retrieve any washers or nuts that may have fallen into the cabinet.

7.17.4 Drive Bay PCBA Replacement 62xx and 82xx Models

1. Before replacing the Drive Bay PCBA, determine that the board has the proper jumper and IC (integrated circuit) configuration. Jumpers must be installed on the board at the SCL and SDA connectors and the IC component must be installed at location U1. See Figure 7-52.
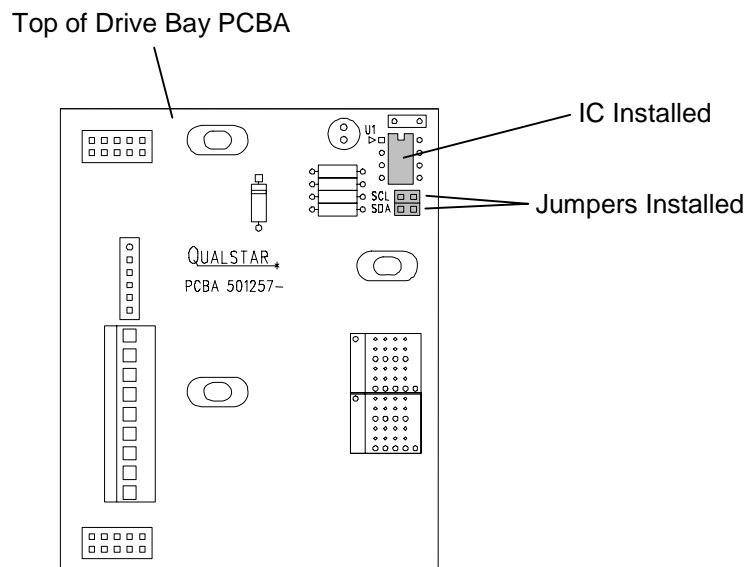
Figure 7-52   62xx and 82xx Model Drive Bay PCBA Jumper and IC Configuration

2. Insert the Drive Bay PCBA into the TLS and align its mounting screw holes with the PCBA Mounting Studs (Figure 7-49).

NOTE

In the next step, only finger tighten the nuts. The PCBA needs to be loosely held to the PCBA Mounting Studs.

3. Install a washer by hand or with long nose pliers onto a PCBA Mounting Stud, then with a 1/4-inch nutdriver (a magnetic nutdriver works best) thread PCBA Mounting Nuts onto the PCBA Mounting Studs. Reinstall the remaining PCBA Mounting screws the same way (Figure 7-49).

Figure 7-53   82xx Series Drive Bay PCBA with Tape Drive Assemblies

4. Install two tape drive assemblies into the TLS being careful to align the Tape Drive Connector's on the Drive Bay PCBA with the mating connector's on the tape drive assemblies. It may be necessary to move the Drive Bay PCBA to properly align the connectors (Figure 7-53). Refer to Chapter 5 in the Installation and Operation Manual (Qualstar document number 501450) for more information on tape drive assembly installation.

5. Confirm that the Tape Drive Connector's on both tape drive assemblies are fully inserted into the mating connectors on the on the Drive Bay PCBA.

6. With a 1/4-inch nutdriver (a magnetic nutdriver works best) reach through the four access holes in the rear of the TLS and tighten the PCBA Mounting Nuts onto the PCBA Mounting Studs (Figure 7-53).

7. Remove the tape drive assemblies from the TLS.

8. Access the remaining two PCBA Mounting Nuts from the drive bay openings and tighten them.

9. Carefully move the cables to the rear of the Drive Bay PCBA (Figure 7-51). Align the mounting holes in the cable holders with the cable holder mounting screw holes (Figure 7-50).

10. Insert a cable holder screw through both the TLS' frame and mounting hole in a cable holder. Install a nut by hand or with long nose pliers onto the end the cable holder screw. Tighten the screw using a number 2 Phillips screwdriver. Reinstall the remaining cable holder mounting screw the same way (Figure 7-50).

11. Align the support bracket with its mounting holes on the rear of the TLS. Using a number 2 Phillips screwdriver reinstall all three support bracket mounting screws and tighten securely (Figure 7-50).

12. Reconnect all the cables to the Drive Bay PCBA (Figure 7-49).

13. Replace the Tape Drive Power Supply (Section 7.15.2).

14. Replace the right Side Panel (Section 7.4.4).

15. Replace the Top Panel (Section 7.4.2).

7.17.5 Drive Bay PCBA Removal 54xx, 64xx and 84xx Models

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. Remove the right Side Panel, as seen from the front of the TLS (Section 7.4.3).

4. Remove tape drive assemblies, if installed in the TLS.

5. Remove one or both of the Tape Drive Power Supplies (Section 7.15.1).

6. Disconnect all cables from the Drive Bay PCBA being removed (Figure 7-54).

7. Through the access holes in the right side of the TLS use a number 2 Phillips screwdriver to remove the three Drive Bay PCBA Bracket screws for the PCBA being removed. Save the screws for later use (Figure 7-55).

8. Remove any cable ties that are attached to the PCBA.

9. Carefully guide the PCBA and its Bracket through one of the openings in the right side of the TLS' frame.

10. Use a 1/4-inch nutdriver to remove the six PCBA mounting nuts and washers, then lift the PCBA off the mounting studs of the Bracket (Figure 7-56).

Upper Drive Bay PCBA
P/N 501257-01-8

Cable
Connections

Lower Drive Bay PCBA
P/N 501257-02-6
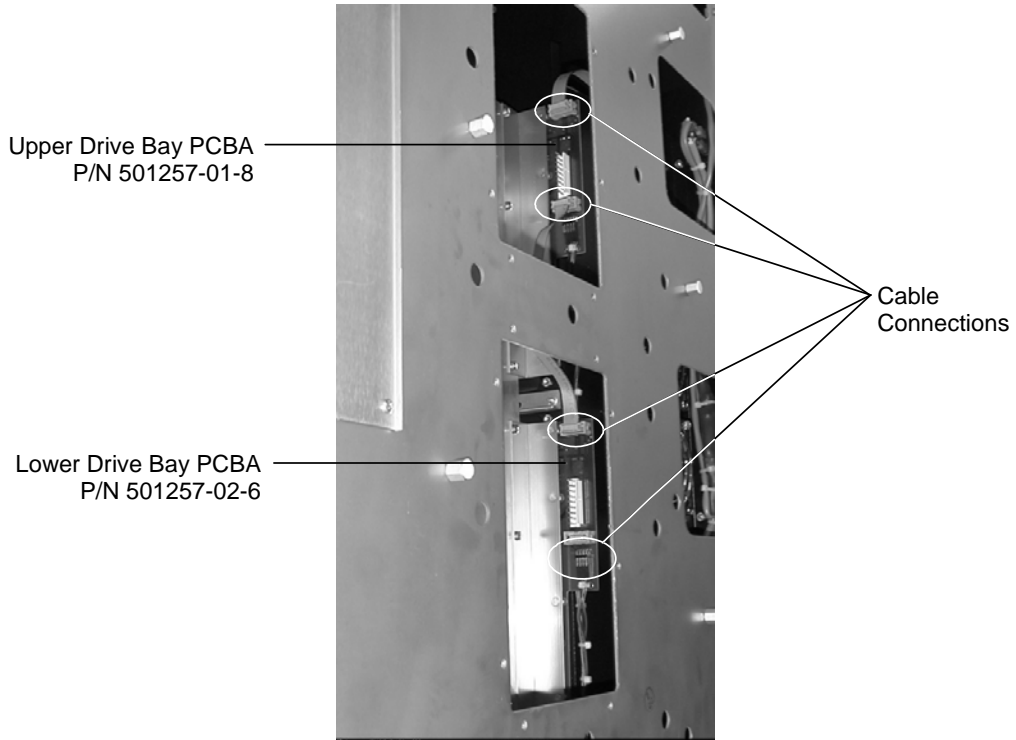
Figure 7-54   64xx Series Drive Bay PCBAs - Right Side of TLS

Drive Bay PCBA
Brackets
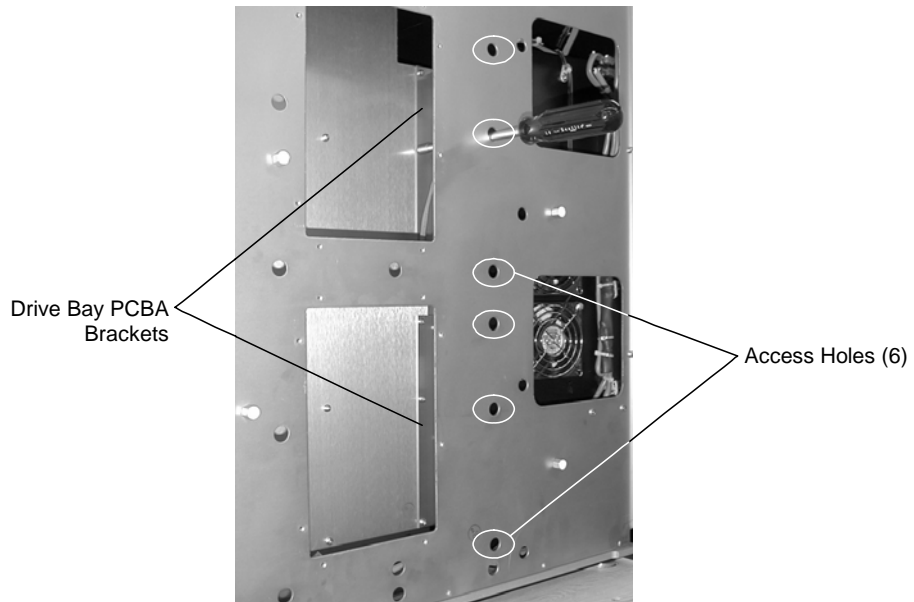
Access Holes (6)

Figure 7-55   Drive Bay PCBA Brackets and Access Holes - Right Side of TLS

Drive Bay PCBA
Mounting Nuts (6)
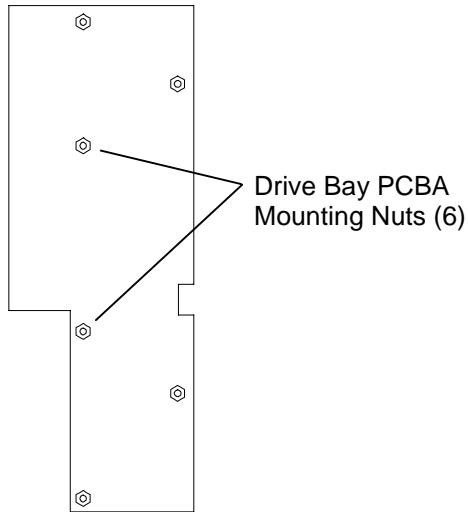
Figure 7-56   Drive Bay PCBA Mounting Nuts

7.17.6   Drive Bay PCBA Replacement 54xx, 64xx and 84xx Models

1. Before replacing the Drive Bay PCBA, determine that the board has the proper jumper and IC (integrated circuit) configuration. For the Upper Bay Board (P/N 501257-01-8) jumpers must be installed on the board at the SCL and SDA connectors and the IC component must be installed at location U1. For the Lower Bay Board (P/N 501257-02-6) jumpers must not be present at the SCL and SDA connectors and the IC component must be removed at location U1. See Figure 7-57.

2. Align the Drive Bay PCBA mounting screw holes with the mounting studs of the Bracket.

Top of Drive Bay PCBA

IC Installed

Jumpers Installed

54xx/64xx/84xx Upper Bay PCBA
(P/N 501257-01-8)

Top of Drive Bay PCBA

IC Removed

Jumpers Removed

54xx/64xx/84xx Lower Bay PCBA
(P/N 501257-02-6)
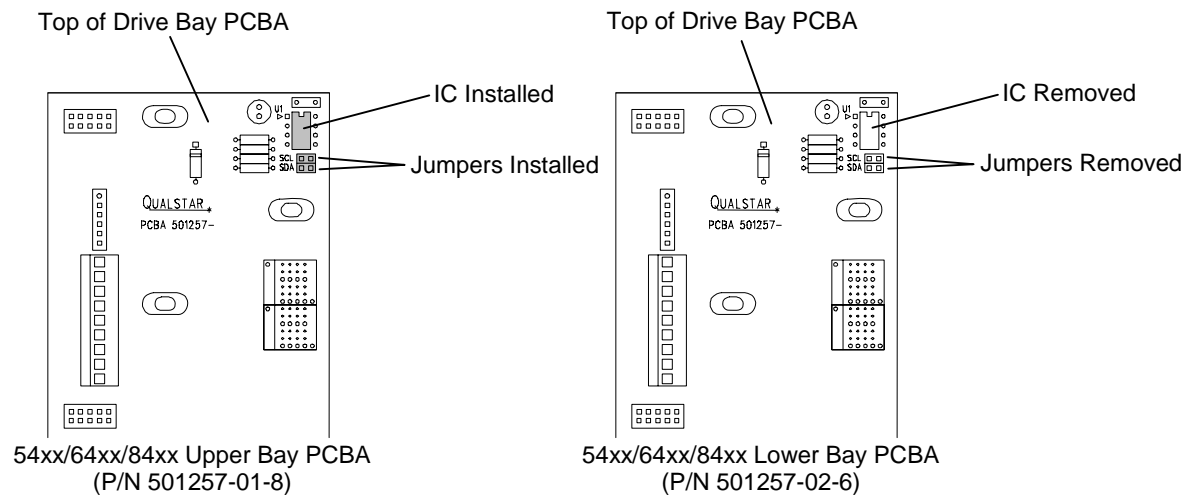
Figure 7-57   54xx, 64xx and 84xx Model Drive Bay PCBA Jumper and IC Configuration

3. Install a washer onto a mounting stud, then with a 1/4-inch nutdriver thread a PCBA mounting nut onto the mounting stud. Install the remaining PCBA Mounting screws the same way (Figure 7-56).

4. Carefully guide the PCBA and its Bracket through one of the openings in the right side of the TLS' frame. Maneuver the tape drive connectors on the PCBA so they are facing out the drive bay openings (Figure 7-58). Align the Brackets three holes with the corresponding threaded holes in the TLS.

NOTE

In the next step, only finger tighten the screws. The Bracket needs to be loosely held to the frame of the TLS.

5. Insert a Drive Bay Bracket screw through a hole in the bracket. Thread the screw into the TLS finger tight. Install the remaining two Bracket screws the same way.

6. Install two tape drive assemblies into the TLS in the drive bays that correspond to the PCBA that is being installed. Carefully align the Tape Drive Connector's on the Drive Bay PCBA with the mating connector's on the tape drive assemblies (Figure 7-58). It may be necessary to move the Drive Bay PCBA Bracket to properly align the connectors. Refer to Chapter 5 in the Installation and Operation Manual (Qualstar document number 501450) for more information on tape drive assembly installation.

7. Confirm that the Tape Drive Connector's on both tape drive assemblies are fully inserted into the mating connectors on the on the Drive Bay PCBA.
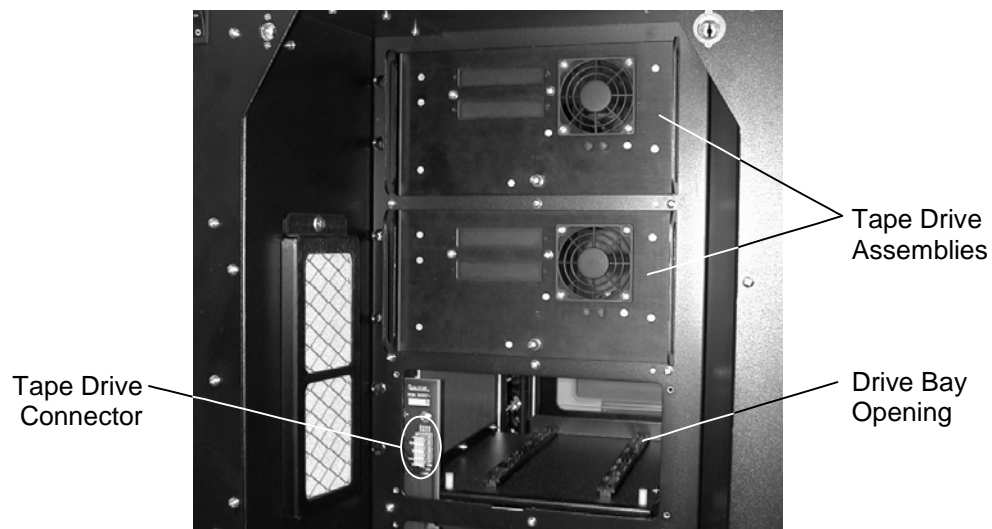
Figure 7-58   84xx Series Drive Bay with Tape Drive Assemblies

8. With a use a number 2 Phillips screwdriver reach through the three access holes in the side of the TLS and tighten the three Drive Bay PCBA Bracket screws (Figure 7-55).

9. Remove the Tape Drive Assemblies from the TLS.

10. Replace any cable ties that were removed when the PCBA was removed from the TLS.

11. Reconnect all cables to the Drive Bay PCBA (Figure 7-54).

12. Replace the Tape Drive Power Supply or Supplies (Section 7.15.2).

13. Replace the right Side Panel (Section 7.4.4).

14. Replace the Top Panel (Section 7.4.2).

7.17.7 Drive Bay PCBA Replacement for58xxx, 68xxx and 88xxx Models

The dual bay 58xxx, 68xxx and 88xxx models contain four PCBAs, two for the right side drive bay and two for the left side drive bay (as seen from the front of the library). Because of the different disassembly requirements for replacing the PCBAs, the procedures that follow have been divided into left and right sides.

7.17.7.1 Right Side Drive Bay PCBA Removal

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. Remove the right Side Panel, as seen from the front of the TLS (Section 7.4.3).

4. Use a flat bladed screwdriver to loosen all four of the quarter-turn fasteners on the access cover on the left side as seen from the rear (Figure 7-59). Carefully remove the access cover.
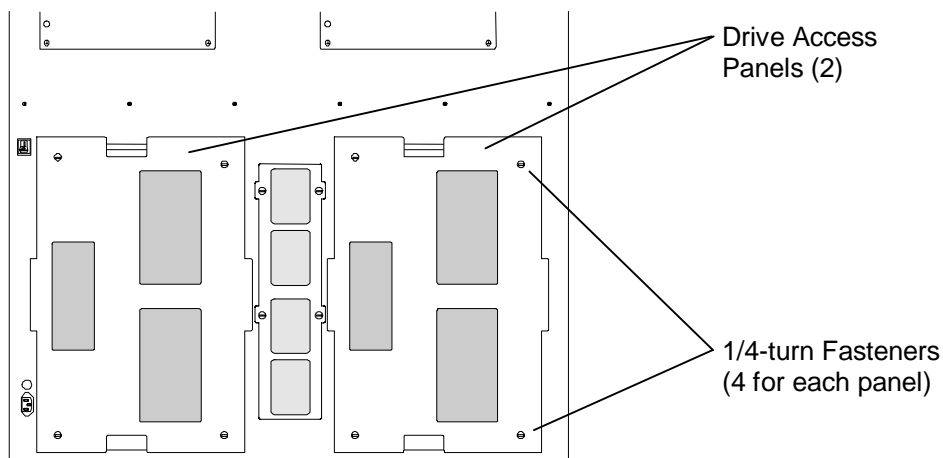
Figure 7-59   Access Panels on rear of Dual Bay TLS

5. Remove tape drive assemblies, if installed in the right side drive bays of the TLS.

6. Remove one or both of the Tape Drive Power Supplies to allow easy access to the PCBAs (Section 7.15.1).

7. Disconnect all cables from the Drive Bay PCBA being removed (Figure 7-60).

8. Through the access holes and/or the opening in the right side of the TLS use a long number 2 Phillips screwdriver to remove the three Drive Bay PCBA Bracket screws for the PCBA being removed. See Figure 7-61. Save the screws for later use.

9. Carefully guide the PCBA and its Bracket through one of the openings in the right side of the TLS' frame.

10. Use a 1/4-inch nutdriver to remove the six PCBA mounting nuts and washers, then lift the PCBA off the mounting studs of the Bracket (Figure 7-62). Note that the spacers behind the PCBA come loose when the PCBA is removed.

Cable Connections

Upper Drive Bay PCBA   Lower Drive Bay PCBA
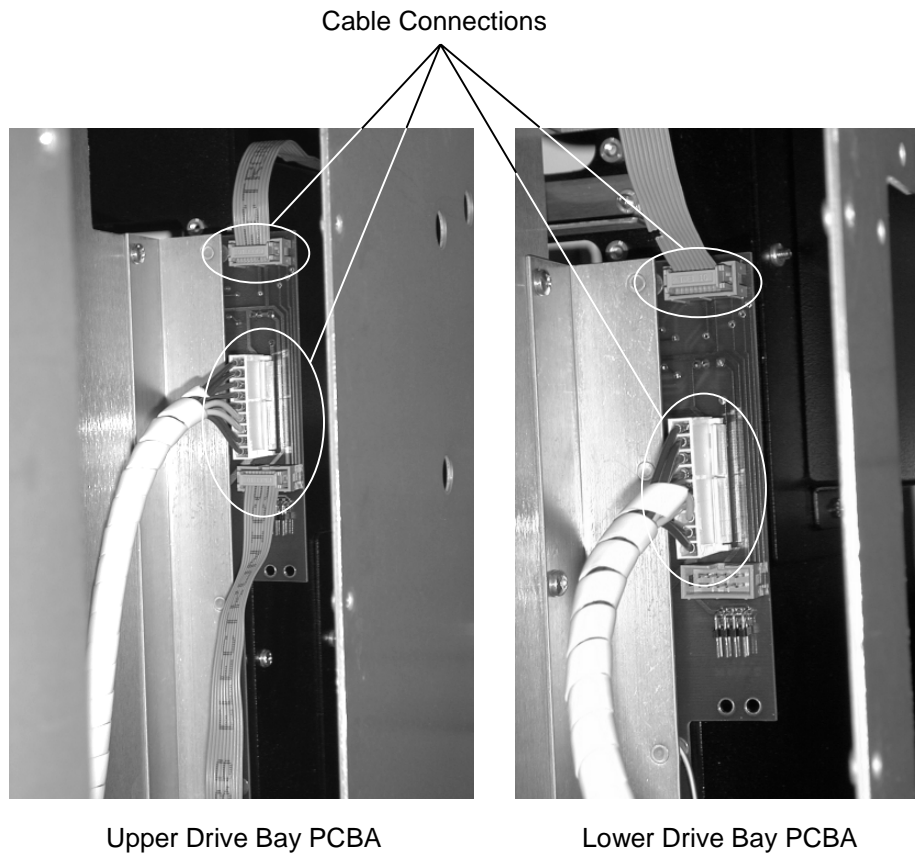
Figure 7-60   58xxx, 68xxx and 88xxx Models Right Side Drive Bay PCBAs

Screwdriver

Access Holes (4)

Drive Bay PCBA
Brackets

Opening in side of TLS.
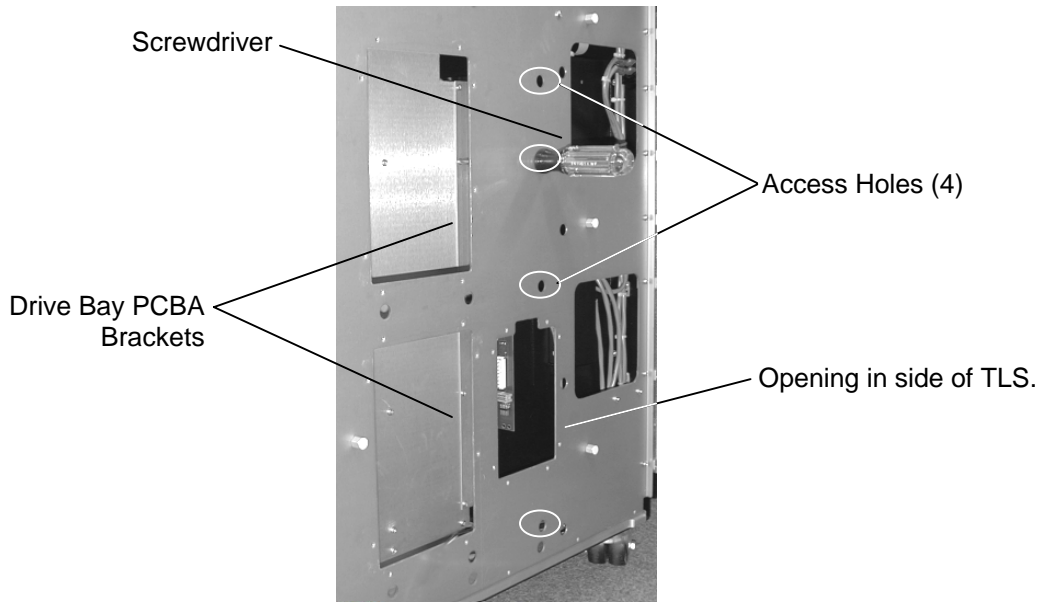
Figure 7-61   58xxx,68xxx and 88xxx Models Right Side Drive Bay PCBA Brackets and Access Holes

Drive Bay PCBA
Mounting Nuts (6)
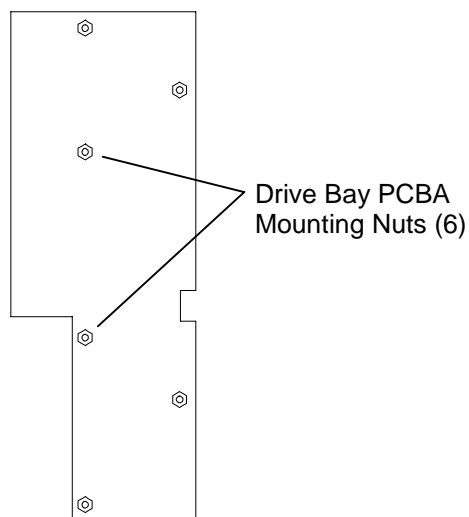
Figure 7-62   Drive Bay PCBA Mounting Nuts

7.17.7.2   Right Side Drive Bay PCBA Replacement

1.   Before replacing the Drive Bay PCBA, determine that the board has the proper jumper and IC (integrated circuit) configuration. For the Upper Bay Board (P/N 501257-03-4) a jumper must be installed on the board at the SDA connector and a jumper must not be present at the SCL connector. The IC component must be installed at location U1. For the Lower Bay Board (P/N 501257-02-6) jumpers must not be present at the SDA and SCL connectors and the IC component must be removed at location U1. See Figure 7-63.

Top of Drive Bay PCBA

IC Installed

Jumper Removed
at SCL

Jumper Installed
at SDA

Top of Drive Bay PCBA

IC Removed

Jumpers Removed

QUALSTAR
PCBA 501257–

QUALSTAR
PCBA 501257–

58xxx/68xxx/88xxx Upper Bay PCBA
(P/N 501257-03-4)

58xxx/68xxx/88xxx Lower Bay PCBA
(P/N 501257-02-6)
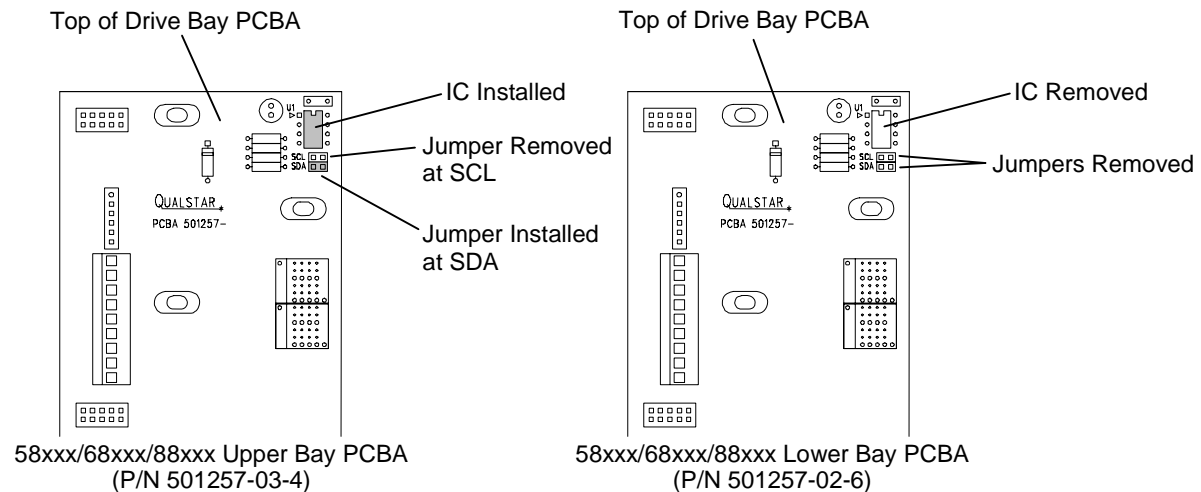
Figure 7-63   58xxx, 68xxx and 88xxx Model Drive Bay PCBA Jumper and IC Configuration

2. Replace any spacers that came loose from the mounting studs of the Bracket.

3. Align the Drive Bay PCBA mounting screw holes with the mounting studs of the Bracket.

4. Install a washer onto a mounting stud, then with a 1/4-inch nutdriver thread a PCBA mounting nut onto the mounting stud. Install the remaining PCBA Mounting screws the same way (Figure 7-62).

5. Carefully guide the PCBA and its Bracket through one of the openings in the right side of the TLS' frame. Maneuver the tape drive connectors on the PCBA so they are facing out the drive bay openings (Figure 7-64). Align the Brackets three holes with the corresponding threaded holes in the TLS.

NOTE

In the next step, only finger tighten the screws. The Bracket needs to be loosely held to the frame of the TLS.

6. Insert a Drive Bay Bracket screw through a hole in the bracket. Thread the screw into the TLS finger tight. Install the remaining two Bracket screws the same way.

7. Install two tape drive assemblies into the TLS in the drive bays that correspond to the PCBA that is being installed. Carefully align the Tape Drive Connector's on the Drive Bay PCBA with the mating connector's on the tape drive assemblies (Figure 7-64). It may be necessary to move the Drive Bay PCBA Bracket to properly align the connectors. Refer to Chapter 5 in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450) for more information on tape drive assembly installation.

8. Confirm that the Tape Drive Connector's on both tape drive assemblies are fully inserted into the mating connectors on the on the Drive Bay PCBA.

9. Using a long number 2 Phillips screwdriver reach through the access holes and/or opening in the side of the TLS and tighten the three Drive Bay PCBA Bracket screws (Figure 7-61).

10. Remove the Tape Drive Assemblies from the TLS.

11. Reconnect all cables to the Drive Bay PCBA (Figure 7-60).

12. Replace the Tape Drive Power Supply or Supplies (Section 7.15.2).

13. Replace the right Side Panel (Section 7.4.4).

14. Replace the Top Panel (Section 7.4.2).
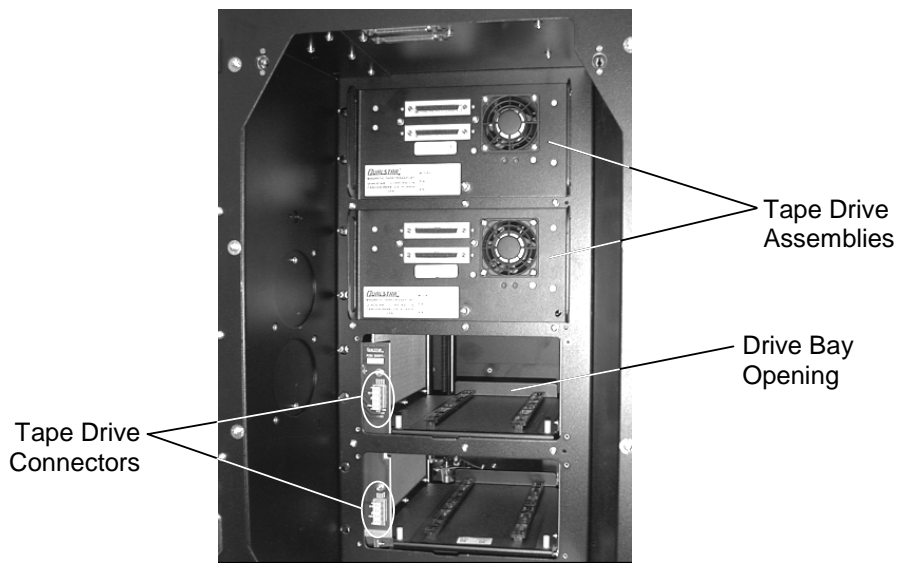
Figure 7-64   58xxx, 68xxx and 88xxx Models Drive Bay with Tape Drive Assemblies - Right Side Shown

7.17.7.3   Left Side Drive Bay PCBA Removal

1. Turn off the TLS power and remove the power cord.

2. Use a flat bladed screwdriver to loosen all four of the quarter-turn fasteners on the access cover on the right side as seen from the rear (Figure 7-59). Carefully remove the access cover.

3. Remove tape drive assemblies, if installed in the left side drive bays of the TLS.

4. Remove the Blower Assembly (Section 7.9.2).

5. Disconnect all cables from the Drive Bay PCBA being removed (Figure 7-65).

6. Use a number 2 Phillips screwdriver to remove the three Drive Bay PCBA Bracket screws for the PCBA being removed. See Figure 7-66. Save the screws for later use.

7. Carefully guide the PCBA and its Bracket through the front opening of the TLS.

8. Use a 1/4-inch nutdriver to remove the six PCBA mounting nuts and washers, then lift the PCBA off the mounting studs of the Bracket (Figure 7-62). Note that the spacers behind the PCBA come loose when the PCBA is removed.
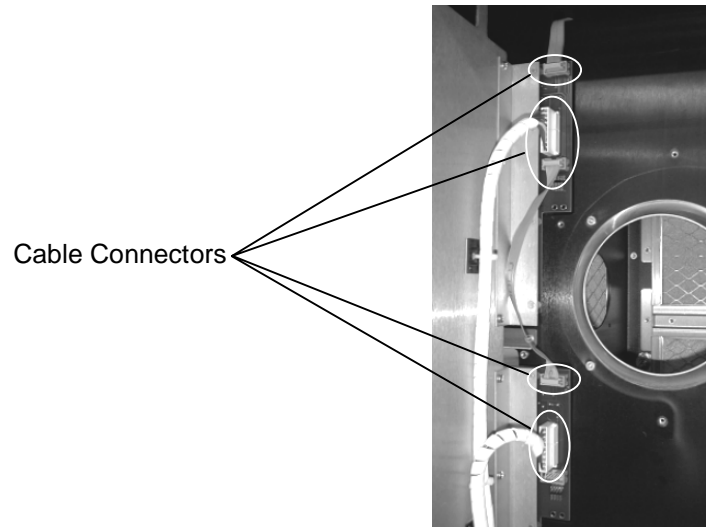
Figure 7-65   58xxx, 68xxx and 88xxx Models Left Side Drive Bay PCBAs
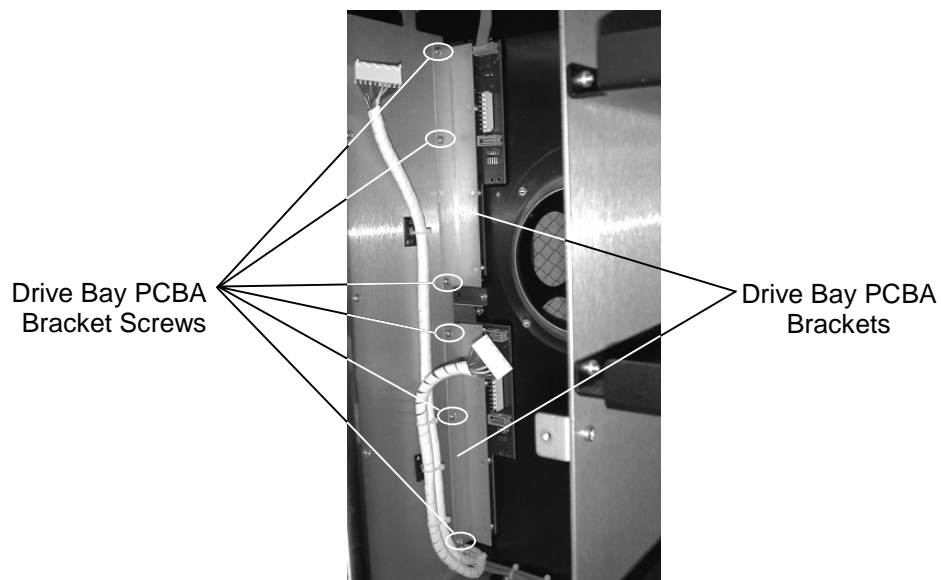
Figure 7-66   58xxx, 68xxx and 88xxx Models Left Side Drive Bay PCBA Brackets and Screws

7.17.7.4 Left Side Drive Bay PCBA Replacement

1. Before replacing the Drive Bay PCBA, determine that the board has the proper jumper and IC (integrated circuit) configuration. For the Upper Bay Board (P/N 501257-03-4) a jumper must be installed on the board at the SDA connector and a jumper must not be present at the SCL connector. The IC component must be installed at location U1. For the Lower Bay Board (P/N 501257-02-6) jumpers must not be present at the SDA and SCL connectors and the IC component must be removed at location U1. See Figure 7-63.

2. Replace any spacers that came loose from the mounting studs of the Bracket.

3. Align the Drive Bay PCBA mounting screw holes with the mounting studs of the Bracket.

4. Install a washer onto a mounting stud, then with a 1/4-inch nutdriver thread a PCBA mounting nut onto the mounting stud. Install the remaining PCBA Mounting screws the same way (Figure 7-62).

5. Carefully guide the PCBA and its Bracket through the front of the TLS. Maneuver the tape drive connectors on the PCBA so they are facing out the drive bay openings (Figure 7-64). Align the Brackets three holes with the corresponding threaded holes in the TLS.

NOTE

In the next step, only finger tighten the screws. The Bracket needs to be loosely held to the frame of the TLS.

6. Insert a Drive Bay Bracket screw through a hole in the bracket. Thread the screw into the TLS finger tight. Install the remaining two Bracket screws the same way.

7. Install two tape drive assemblies into the TLS in the drive bays that correspond to the PCBA that is being installed. Carefully align the Tape Drive Connector's on the Drive Bay PCBA with the mating connector's on the tape drive assemblies (Figure 7-64). It may be necessary to move the Drive Bay PCBA Bracket to properly align the connectors. Refer to Chapter 5 in the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450) for more information on tape drive assembly installation.

8. Confirm that the Tape Drive Connector's on both tape drive assemblies are fully inserted into the mating connectors on the on the Drive Bay PCBA.

9. Use a number 2 Phillips screwdriver to tighten the three Drive Bay PCBA Bracket screws (Figure 7-66).

10. Reconnect all cables to the Drive Bay PCBA (Figure 7-65).

7.18　Carousel PCBA

P/N 500617-02-2

This section applies only to libraries with carousels. Single bay libraries will contain a single carousel and TLS-58xxx, 68xxx and 88xxx (dual bay) models contain two identical carousels referred to as the left and right carousels when viewed from the front of the TLS.

The replacement procedure that follows will apply to replacing the Carousel PCBA from either single or dual bay models, making note of specific operations when required.

NOTICE

> There are two versions of the Carousel Printed Circuit Board Assembly: PCBA 500617-01-4 and PCBA 500617-02-2. The -01 version uses a 20-pin, vertical CAROSL (Carousel) connector, while the -02 version uses a 20-pin, right-angle CAROSL connector. The 5000/6000/8000 models require the -02 version with the right-angle CAROSL connector.

Tools Required:

- **Number 2 Phillips Screwdriver**

7.18.1　Carousel PCBA Removal
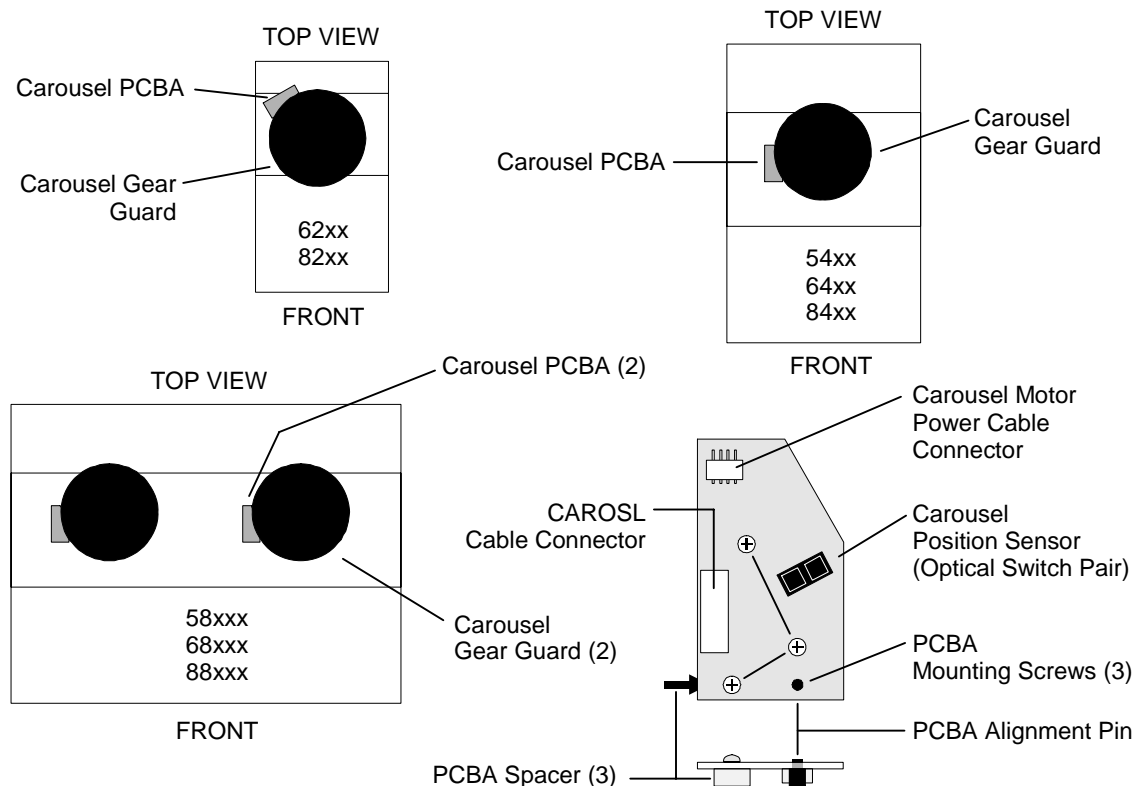
Figure 7-67　The Carousel PCBA (3 Views)

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. Remove as many tape magazines mounted on the carousel as needed to access the Carousel PCBA.

4. Greater access can be gained in 62xx and 82xx model libraries if the Top Panel (Section 7.4.1) and the left Side Panel, as seen from the front of the TLS (Section 7.4.3) are removed.

5. Remove as many Magazine Anchors from the carousel of 54xx/64xx/84xx and 58xxx/68xxx/88xxx models as needed to access the Carousel PCBA. For each Magazine Anchor that is removed, use a number 2 Phillips screwdriver to remove the two Receiver Mounting Screws and then remove the Magazine Anchor. To keep the receiver in alignment replace the two Receiver Mounting Screws into the Receiver Mounting Screw holes and tighten with a number 2 Phillips screwdriver. See Figure 7-68.

6. Reach in through the cabinet door and disconnect the CAROSL Cable and the Carousel Motor Power Cable from the Carousel PCBA (Figure 7-67).
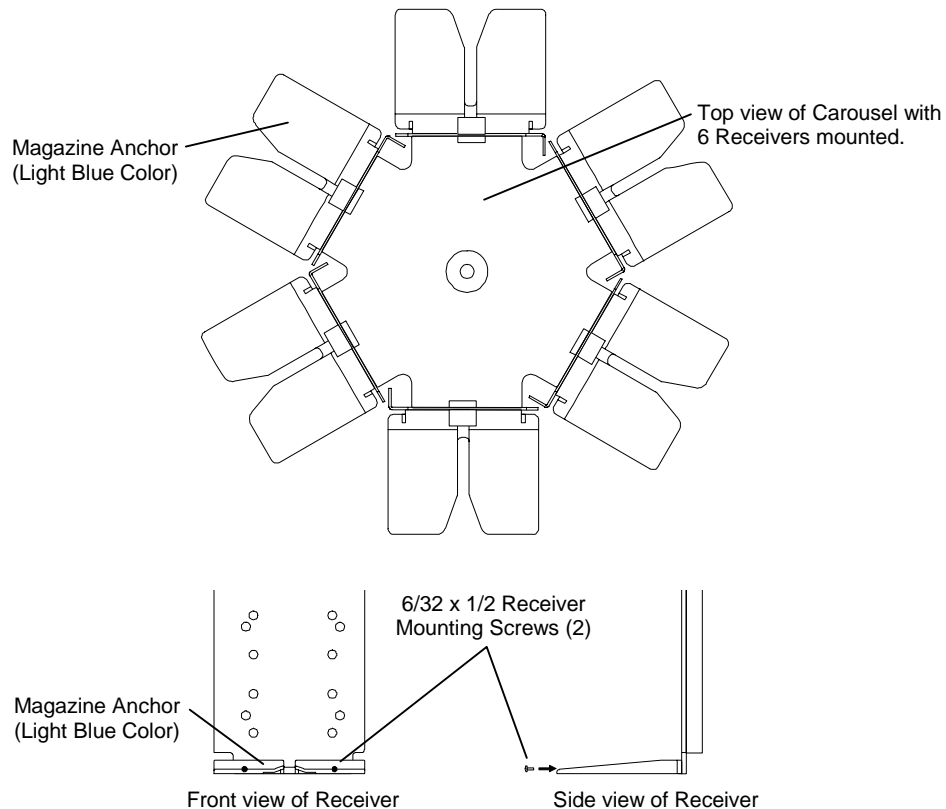
Figure 7-68   Magazine Anchors Shown on 54/64/84xx or 58/68/88xxx Models

If necessary, rotate the carousel slightly by hand to reach each PCBA mounting screw (Figure 7-67).

7. Use a number 2 Phillips screwdriver to remove all three PCBA mounting screws and PCBA spacers (Figure 7-67).

CAUTION

In the next step, be careful not to damage the Carousel Position Sensor on the Carousel Gear Guard Figure 7-67), as you remove the Carousel PCBA.

8. Lift the Carousel PCBA slightly to clear the PCBA Alignment Pin, then gently slide the PCBA along the Carousel Gear Guard toward the front of the cabinet. When the Carousel Position Sensor is in front of the Carousel Gear Guard, slide the Carousel PCBA towards the cabinet door to remove it (Figure 7-67).

7.18.2 Carousel PCBA Replacement

CAUTION

In the next steps, be careful not to damage the Carousel Position Sensor on the Carousel Gear Guard (Figure 7-67), as you install the Carousel PCBA.

Make sure that the Carousel PCBA is replaced with the 500617-02-2 version of the PCBA.

1. Turn off the TLS power and remove the power cord.

2. Hold the Carousel PCBA level and turn it so that the Carousel Position Sensor faces the Carousel Gear Guard.

3. Gently slide the PCBA along the Carousel Gear Guard toward the left, rear of the cabinet and fit the PCBA down over the PCBA Alignment Pin (Figure 7-67).

4. Align the Carousel PCBA spacers under the PCBA with the PCBA mounting screw holes (Figure 7-67).

5. Use a Phillips screwdriver to install all 3 PCBA mounting screws, then tighten the screws until they are snug (Figure 7-67). If necessary, rotate the carousel slightly by hand to reach each PCBA mounting screw.

6. Reach in through the cabinet door and connect the CAROSL Cable and the Carousel Motor Power Cable to the Carousel PCBA (Figure 7-67). The connectors are keyed to fit only one way.

7. For each Magazine Anchor that was removed, use a number 2 Phillips screwdriver to remove the two Receiver Mounting Screws. Position a Magazine Anchor

at the bottom of the receiver and align the mounting screw holes. Insert the two Receiver Mounting Screws through the Magazine Anchor and tighten them securely with a number 2 Phillips screwdriver. See Figure 7-68.

8. If removed on a 62xx or 82xx library, replace the left Side Panel (Section 7.4.4).

9. If removed on a 62xx or 82xx library, replace the Top Panel (Section 7.4.2).

10. Close the cabinet door.

7.19   Carousel Motor

62xx and 82xx models   **P/N 500822-76-2**
54xx, 64xx and 84xx models   **P/N 500822-68-9**
58xxx, 68xxx and 88xxx models **P/N 500822-53-1**

This section applies only to libraries with carousels. Single bay libraries will contain a single carousel and TLS-58xxx, 68xxx and 88xxx (dual bay) models contain two identical carousels referred to as the left and right carousels when viewed from the front of the TLS.

The replacement procedure that follows will apply to replacing the Carousel Motor in single bay models. The TLS-58xxx, 68xxx and 88xxx (dual bay) models replacement procedure begins at Section 7.19.3 and will apply to replacing either Carousel Motor, making note of specific left or right side operations when required.

Tools Required:

- **Number 2 Phillips Screwdriver**

- **Flat Blade Screwdriver
  (Dual Bay Models)**

- **3/32-inch Allen (Hex) Wrench
  (Single Bay Models)**

- **7/64-inch Allen (Hex) Wrench
  (Dual Bay Models)**

Material Required:

- **3-inch x 3/32-inch Cable Ties**

7.19.1   Single Bay Carousel Motor Removal
(54xx, 62xx, 64xx, 82xx and 84xx Libraries)

1. Turn off the TLS power and remove the power cord.

2. Remove the Top Panel (Section 7.4.1).

3. For 62xx and 82xx model libraries, remove the left Side Panel (Section 7.4.3).

4. Open the cabinet door.

5. Follow the procedure in Section 7.10.1 to remove the I/O port assembly.

6. For 54xx, 64xx and 84xx model libraries, remove all of the Magazine Anchors (3 or 6, model dependent). For each Magazine Anchor being removed, use a number 2 Phillips screwdriver to remove the two Receiver Mounting Screws and then remove the Magazine Anchor. To keep the receiver in alignment replace the two Receiver Mounting Screws into the Receiver Mounting Screw holes and tighten with a number 2 Phillips screwdriver. See Figure 7-68.

7. Use a number 2 Phillips screwdriver to remove all three mounting screws from the Upper Carousel Pivot Support (Figure 7-69), then lift the Upper Carousel Pivot Support up out of the TLS (Figure 7-70).
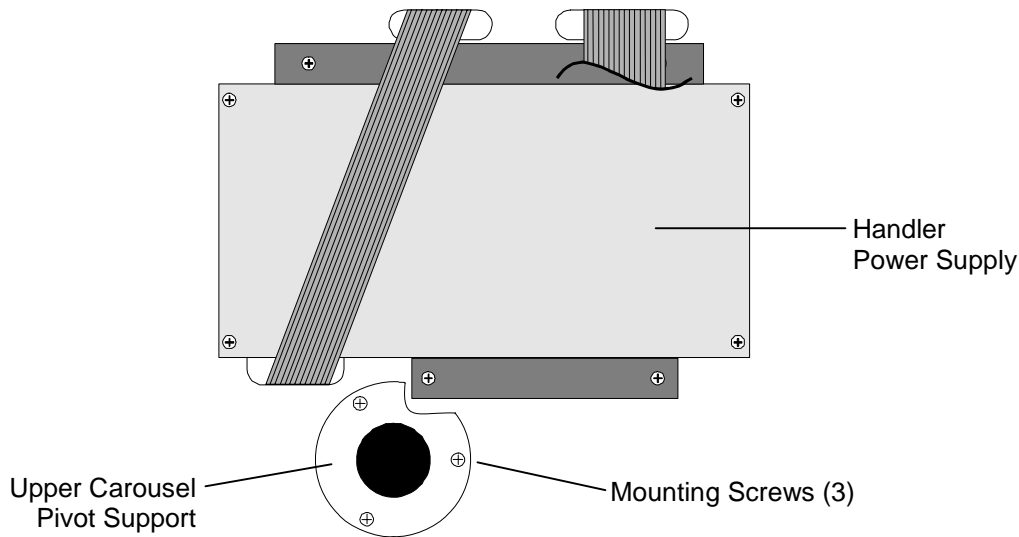
Figure 7-69   Single Bay TLS Top View – 62xx Shown

CAUTION

Be careful not to damage the Carousel Position Sensor with the Carousel Gear Guard when you remove the Carousel (Figure 7-67).

8. **a)** For TLS series 62xx and 82xx, lift the Carousel up until the Lower Carousel Bearing clears the Midplate, then move the Carousel about four inches forward, then about one inch toward the left side of the cabinet, to gain access to the Carousel Motor's mounting screws (Figure 7-70).

    b) For TLS series 54xx, 64xx and 84xx, lift the Carousel up until the Lower Carousel Bearing clears the Midplate, then move the Carousel about three inches toward the right side of the cabinet, to gain access to the Carousel Motor's mounting screws (Figure 7-70).

9. Disconnect the Carousel Motor cable from the Carousel PCBA (Figure 7-67).

10. For TLS models 62xx and 82xx, remove the motor cable's nylon cable tie that is attached to the Midplate (Figure 7-71).

11. For TLS models 54xx, 64xx and 84xx, from below pull the motor cable through the hole in the Midplate.

NOTE

For TLS models 62xx and 82xx, the Carousel Motor is mounted in the right side of the cabinet (as seen from the front). For 54xx, 64xx and 84xx models, the Carousel Motor is mounted in the left side of the cabinet.

12. Use a 3/32-inch Allen wrench to remove all four Carousel Motor mounting screws (Figure 7-70).

13. Remove the Carousel Motor from the cabinet.

Upper Carousel Bearing —
Upper Carousel Pivot Support

Upper Carousel Bearing

Top View

Upper Carousel Pivot —

Front of TLS

Carousel Gear Guard

Carousel Gear —

Lower Carousel Pivot

Mounting Screws (4)

Midplate

Carousel Motor Shaft Gear

Motor Cable —
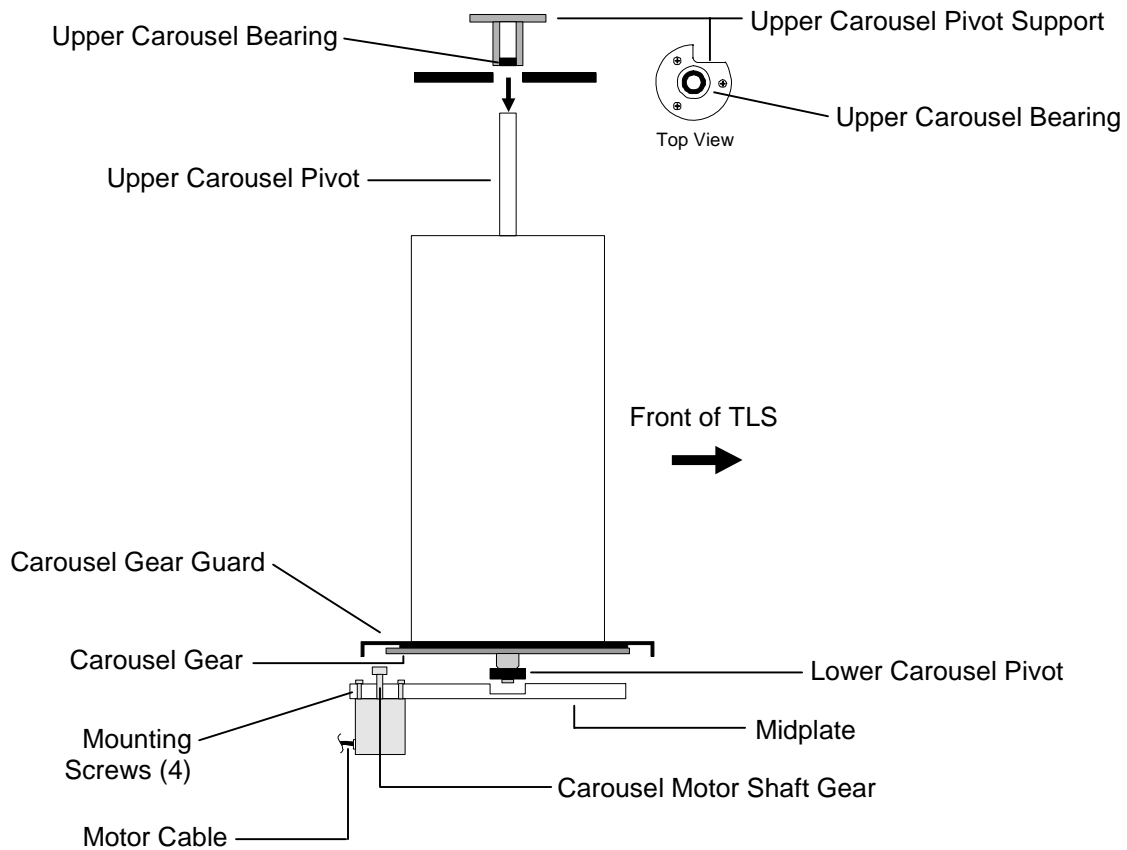
Figure 7-70   Single Bay Carousel Assembly
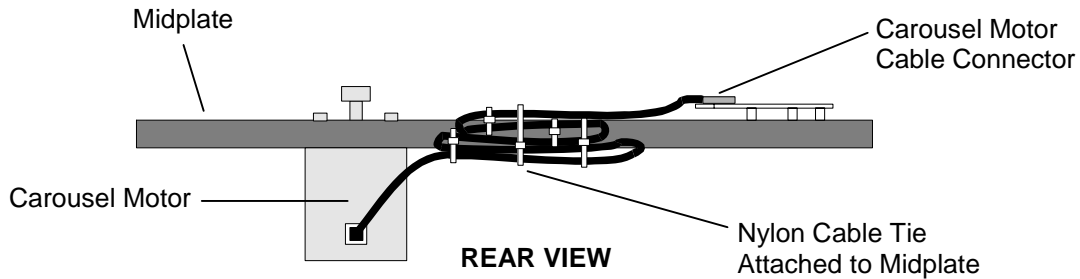
Figure 7-71   Carousel Motor Nylon Cable Ties at Rear of 62xx and 82xx Libraries

7.19.2   Single Bay Carousel Motor Replacement (54xx, 62xx, 64xx, 82xx and 84xx Libraries)

1.   Align the mounting holes in the Carousel Motor with the corresponding mounting holes in the TLS' Midplate. For TLS models 62xx and 82xx the motor's cable faces the rear of the TLS and for the 54xx, 64xx and 84xx models the motor's cable faces the left side of the TLS (Figure 7-70).

NOTE

For TLS models 62xx and 82xx, the Carousel Motor is mounted in the right side of the cabinet (as seen from the front). For 54xx, 64xx and 84xx models, the Carousel Motor is mounted in the left side of the cabinet.

2.   Use a 3/32-inch Allen wrench to install and securely tighten all four Carousel Motor mounting screws.

3.   Reconnect the Carousel Motor cable to the Carousel PCBA (Figure 7-67).

4.   For TLS models 62xx and 82xx, replace the motor cable's nylon cable tie that was attached to the TLS Frame (Figure 7-71).

CAUTION

Be careful not to damage the Carousel Position Sensor with the Carousel Gear Guard when you reinstall the Carousel (Figure 7-67).

5.   Align the lower Carousel Bearing with the TLS Midplate, then lower the Carousel down into place (Figure 7-70). Be sure to align the Carousel Gear with the gear on the Carousel Motor shaft as you lower the Carousel into position.

6.   Align the Upper Carousel Bearing with the Upper Carousel Pivot Support, then lower the Upper Carousel Pivot Support down through the top of the TLS onto the Upper Carousel Pivot (Figure 7-70).

7. Align the mounting screw holes in the Upper Carousel Pivot Support with the mounting screw holes in the TLS, then use a number 2 Phillips screwdriver to install all three Upper Carousel Pivot Support mounting screws (Figure 7-69).

8. Follow the procedure in section 7.10.2 to replace the I/O port assembly.

9. For each Magazine Anchor that was removed on 54xx, 64xx and 84xx models, use a number 2 Phillips screwdriver to remove the two Receiver Mounting Screws. Position a Magazine Anchor at the bottom of the receiver and align the mounting screw holes. Insert the two Receiver Mounting Screws through the Magazine Anchor and tighten them securely with a number 2 Phillips screwdriver. See Figure 7-68.

10. Replace the left Side Panel on 62xx and 82x models (Section 7.4.4).

11. Replace the Top Panel (Section 7.4.2).

7.19.3 Dual Bay Carousel Motor Removal (58xxx, 68xxx and 88xxx Libraries)

1. Turn off the TLS power and remove the power cord.

2. Use a flat bladed screwdriver to loosen all four of the quarter-turn fasteners on the access cover on the side where the Carousel Motor is being removed (Figure 7-59). Carefully remove the access cover.

3. Remove the Top Panel (Section 7.4.1).

4. If removing the left side Carousel Motor, remove the left Side Panel (Section 7.4.3) then remove the top most Tape Drive Power Supply (7.15.1). This will allow easier access to the Carousel Motor mounting screws.

5. If present, remove the tape drive assembly from the top location in the drive bay on the side where the Carousel Motor is being removed.

6. Open the cabinet door.

7. Remove the tape magazines mounted on the carousel on which the motor is being removed.

8. Remove both of the Magazine Anchors from 3 consecutive receivers on the carousel. For each Magazine Anchor being removed, use a number 2 Phillips screwdriver to remove the two Receiver Mounting Screws and then remove the Magazine Anchor. To keep the receiver in alignment replace the two Receiver Mounting Screws into the Receiver Mounting Screw holes and tighten with a number 2 Phillips screwdriver before removing the next Magazine Anchor. See Figure 7-72.

9. Remove all six Phillips screws from the Blower Guard Screen. See Figure 7-25.

10. Reach in through the cabinet door and disconnect the Carousel Motor Power Cable from the Carousel PCBA (Figure 7-67 and Figure 7-73).

11. Push the Carousel Motor Cable down through the hole in the Midplate.

12. If removing the right side Carousel Motor, follow the procedure in Section 7.10.1 to remove the I/O port assembly.

13. Use a number 2 Phillips screwdriver to remove all three mounting screws from the Upper Carousel Pivot Support (Figure 7-74), then lift the Upper Carousel Pivot Support up out of the TLS (Figure 7-75).

14. Lift the Carousel up until the Lower Carousel Bearing clears the Midplate, then move the Carousel about three inches forward, then about two inches toward the right side of the cabinet (Figure 7-75). This will allow the Carousel Motor Shaft Gear to be moved freely.

NOTE

A small flashlight, small mirror and ball point Allen wrenches may be useful when removing the Carousel Motor mounting screws.

15. Working from the front and rear of the TLS use a 7/64" Allen wrench to remove all four Carousel Motor mounting screws (Figure 7-75). Note that a combination of short and long arm 7/64" Allen wrenches may be needed to access the various mounting screw locations.

16. Remove the Carousel Motor from the cabinet.

Magazine Anchor
(Light Blue Color)

Top view of Carousel with 6
Receivers mounted

Remove 3 Consecutive
Pairs of Magazine Anchors

6/32 x 1/2 Receiver
Mounting Screws (2)

Magazine Anchor
(Light Blue Color)

6/32 x 1/2 Receiver
Mounting Screws (2)

Front view of Receiver

Side view of Receiver
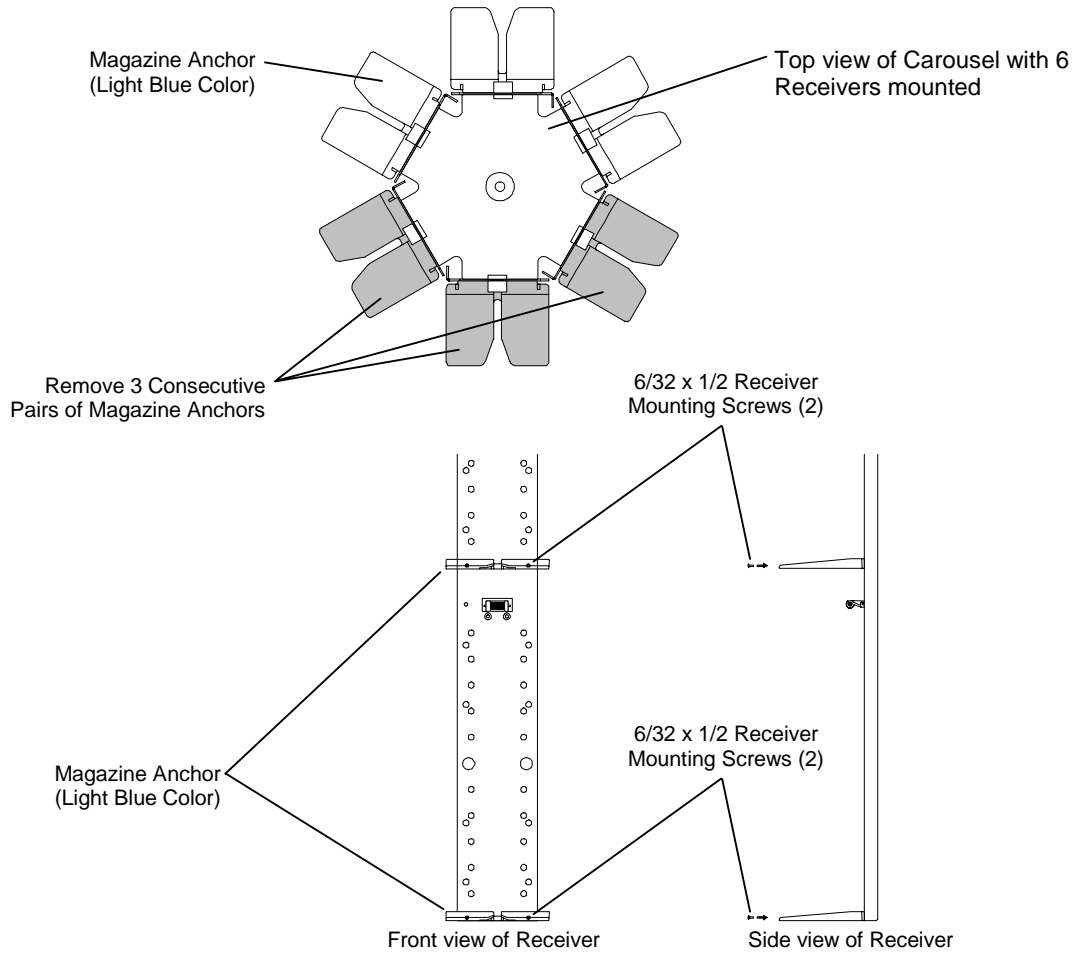
Figure 7-72   Magazine Anchors Shown on 58xxx/68xxx/88xxx Models

Carousel Motor Shaft Gear

Side View

Carousel Motor Cable Connector

Hole in Midplate

Carousel PCBA

Mounting Screws (4)

Motor Cable

Midplate
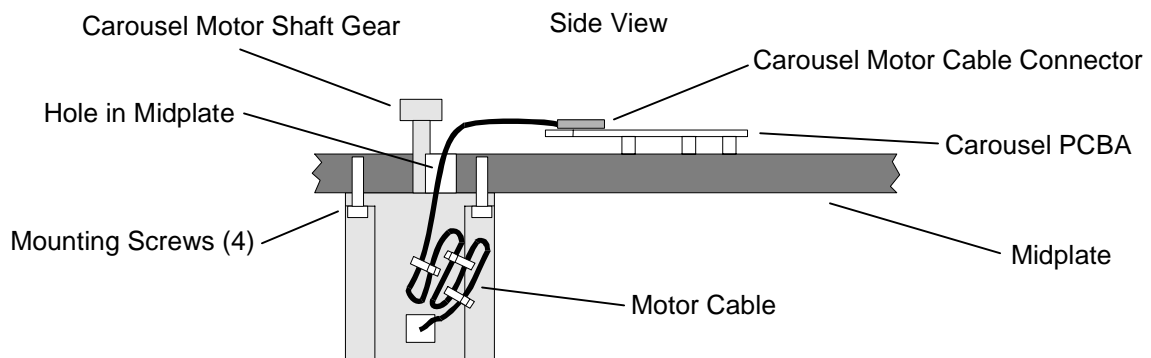
Figure 7-73   Carousel Motor in Dual Bay TLS

Blower Power Supply

Handler
Power Supply
Left Side

Handler
Power Supply
Right Side

Mounting
Screws (3)

Upper Carousel
Pivot Support
Left Side

Mounting
Screws (3)

Upper Carousel
Pivot Support
Right Side
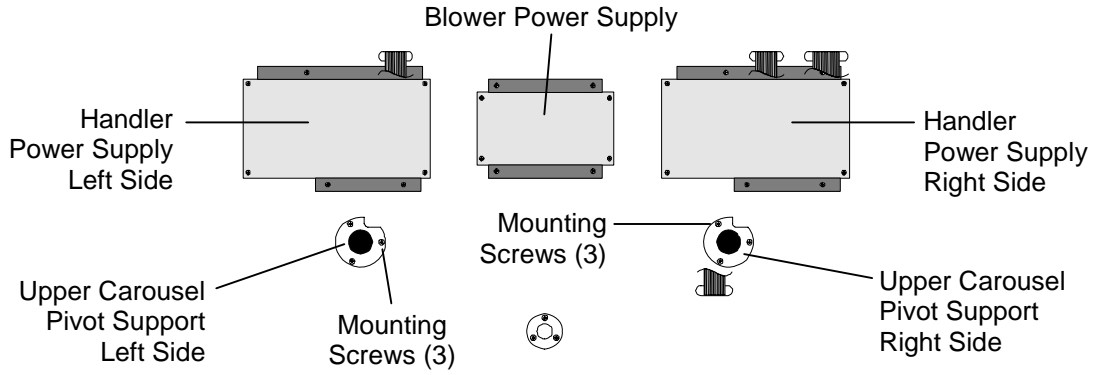
Figure 7-74   Dual Bay TLS Top View

CAUTION

**Be careful not to damage the Carousel Position Sensor with the Carousel Gear
Guard when you remove the Carousel (Figure 7-67).**

Upper Carousel Bearing

Upper Carousel Pivot Support

Upper Carousel Bearing

Top View

Upper Carousel Pivot

Carousel Gear Guard

Carousel Gear

Lower Carousel Pivot

Mounting
Screws (4)

Midplate

Carousel Motor Shaft Gear

Motor Cable
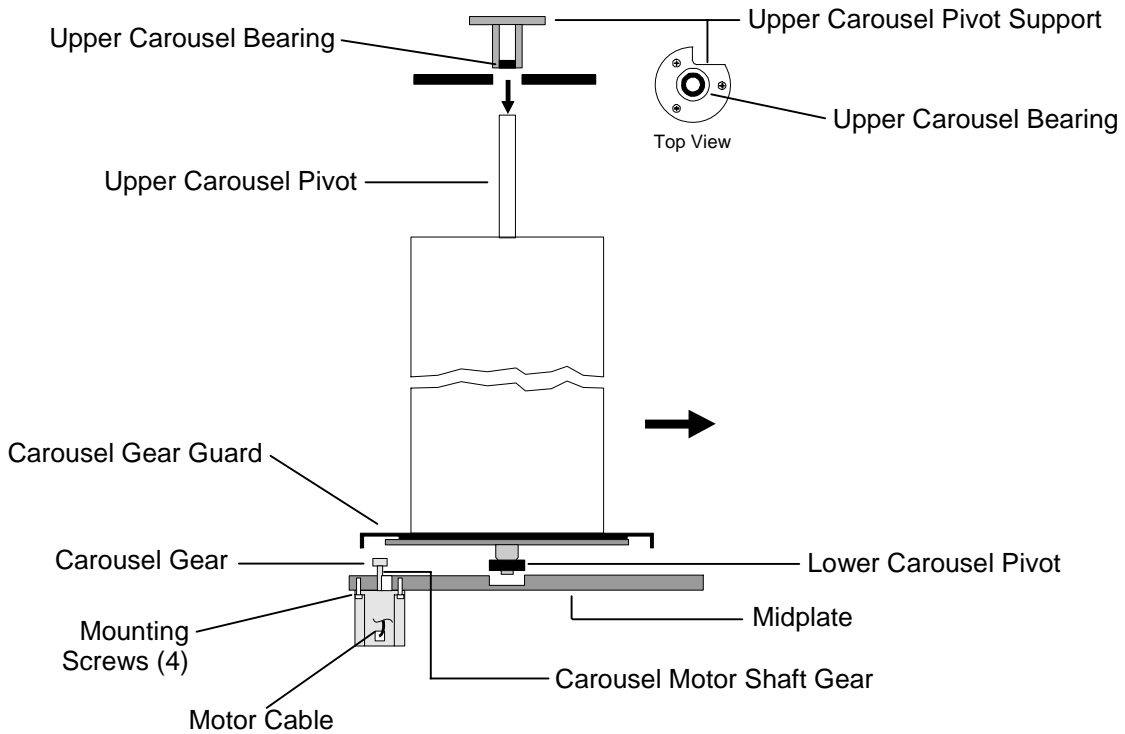
Figure 7-75   Dual Bay Carousel Assembly

7.19.4 Dual Bay Carousel Motor Replacement (58xxx, 68xxx and 88xxx Libraries)

1. Turn off the TLS power and remove the power cord.

2. Align the mounting holes in the Carousel Motor with the corresponding mounting holes in the TLS' Midplate. The motor's cable will face the left side of the TLS when properly oriented (Figure 7-75).

NOTE

A small flashlight, small mirror and ball point Allen wrenches may be useful when installing the Carousel Motor mounting screws.

---

3. Use a 7/64-inch Allen wrench to install and securely tighten all four Carousel Motor mounting screws.

4. Reconnect the Carousel Motor cable to the Carousel PCBA (Figure 7-73).

CAUTION

Be careful not to damage the Carousel Position Sensor with the Carousel Gear Guard when you reinstall the Carousel (Figure 7-67).

---

5. Align the lower Carousel Bearing with the TLS Midplate, then lower the Carousel down into place (Figure 7-75). Be sure to align the Carousel Gear with the gear on the Carousel Motor shaft as you lower the Carousel into position.

6. Align the Upper Carousel Bearing with the Upper Carousel Pivot Support, then lower the Upper Carousel Pivot Support down through the top of the TLS onto the Upper Carousel Pivot (Figure 7-75).

7. Align the mounting screw holes in the Upper Carousel Pivot Support with the mounting screw holes in the TLS, then use a number 2 Phillips screwdriver to install all three Upper Carousel Pivot Support mounting screws (Figure 7-74).

8. If the right side Carousel Motor is being replaced, follow the procedure in section 7.10.2 to replace the I/O port assembly.

9. For each Magazine Anchor that was removed, use a number 2 Phillips screwdriver to remove the two Receiver Mounting Screws. Position a Magazine Anchor at the bottom of the receiver and align the mounting screw holes. Insert the two Receiver Mounting Screws through the Magazine Anchor and tighten them securely with a number 2 Phillips screwdriver. See Figure 7-72.

10. Insert the Blower Guard Screen through the front opening of the library and align it's six mounting screw holes with the six mounting tabs located between the drive bays. Use a Phillips screwdriver to reinstall all six screws that were removed earlier.

11. If the left side Carousel Motor is being replaced, replace the left Side Panel (Section 7.4.4).

12. Replace the Top Panel (Section 7.4.2).

7.20 SCSI High Voltage Differential Adapter PCBA

P/N 501407-01-1

Single bay libraries contain one Executive PCBA.

TLS-58xxx, 68xxx and 88xxx (dual bay) models contain two Executive PCBAs. A SCSI HVD Adapter PCBA may be attached to one or both of these Executive PCBAs. If there is one attached to each Executive board, they are referred to as the left and right HVD Adapter PCBAs when viewed from the front of the TLS.

Tools Required:

- **Number 2 Phillips Screwdriver**
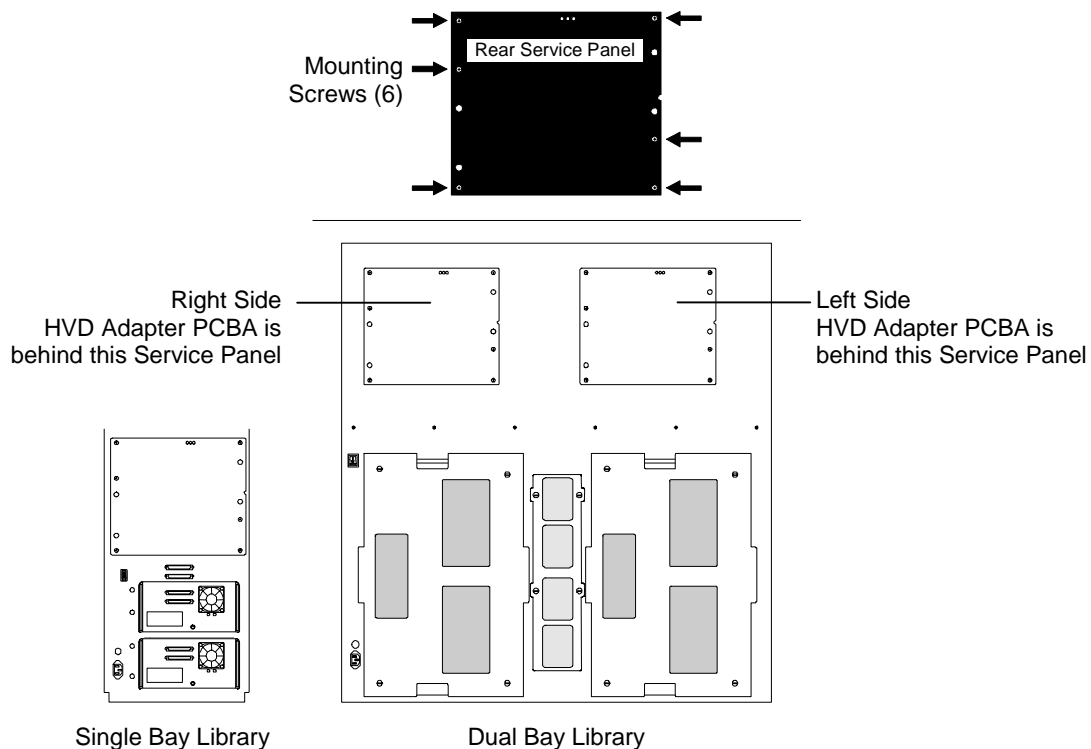
Figure 7-76   Rear View of Service Panels

7.20.1 SCSI High Voltage Differential Adapter PCBA Removal

1. Turn off the TLS power and remove the power cord.

2. Use a number 2 Phillips screwdriver to remove all six Rear Service Panel mounting screws (Figure 7-76), then remove the panel.

3. Disconnect the SCSI cable from connector SCSIID on the HVD Adapter PCBA (Figure 7-77).

4. Gently pull the HVD Adapter PCBA away from the Executive PCBA (Figure 7-77).

7.20.2 SCSI High Voltage Differential Adapter PCBA Replacement

This procedure assumes that the PCBA was removed in Section 7.20.1.

1. Insert all three PCBA spacers on the HVD Adapter PCBA into the mounting holes in the Executive PCBA making sure that the female WADAPT connector is aligned with the male ADAPT connector on the Executive PCBA. See Figure 7-77.

2. Gently press the HVD Adapter PCBA into place. Make sure that the male and female WADAPT connectors are fully seated.

3. Connect the SCSI Cable Assembly to connector SCSIID on the HVD Adapter PCBA (Figure 7-77).

4. Place the Rear Service Panel onto the TLS, then use a number 2 Phillips screwdriver to reinstall all six Rear Service Panel mounting screws (Figure 7-76).

Executive PCBA

SCSIID

PCBA Spacers (3)

Male WADAPT
on HVD Adapter

Female WADAPT
on Executive

SE/LVD or LVD/SE
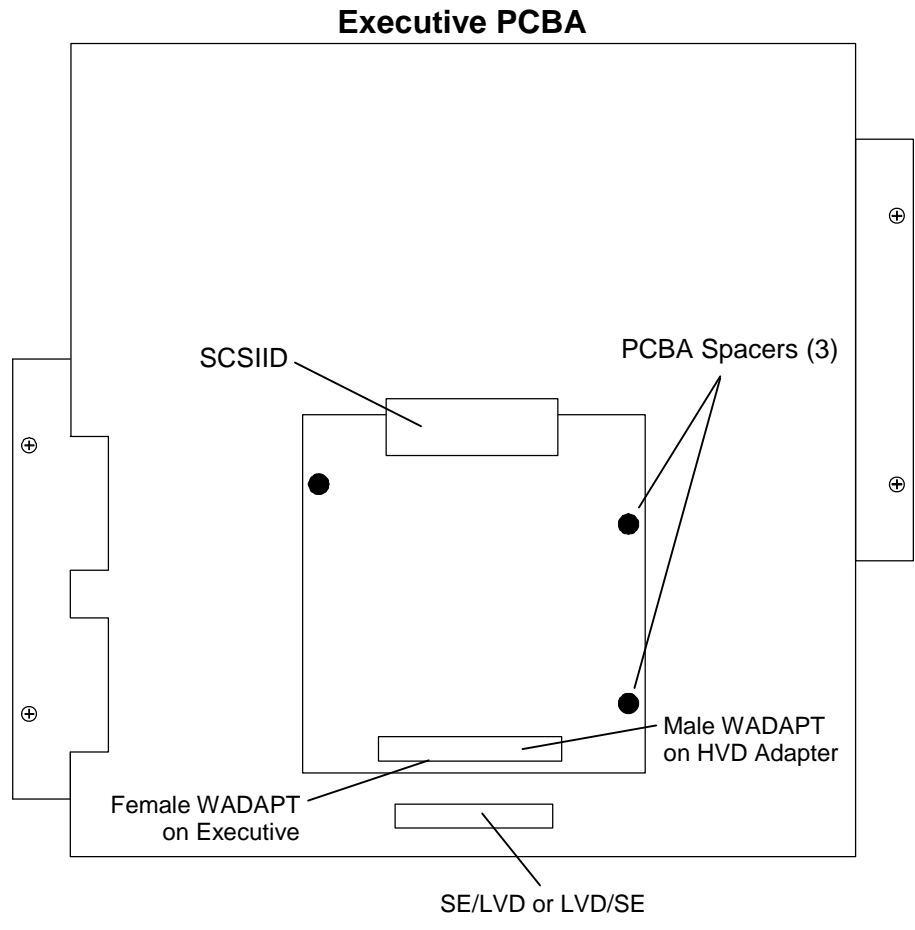
Figure 7-77   HVD Adapter PCBA

7.21   Q-Link

P/N 501657-01-9

Tools Required:

- **Number 2 Phillips Screwdriver**
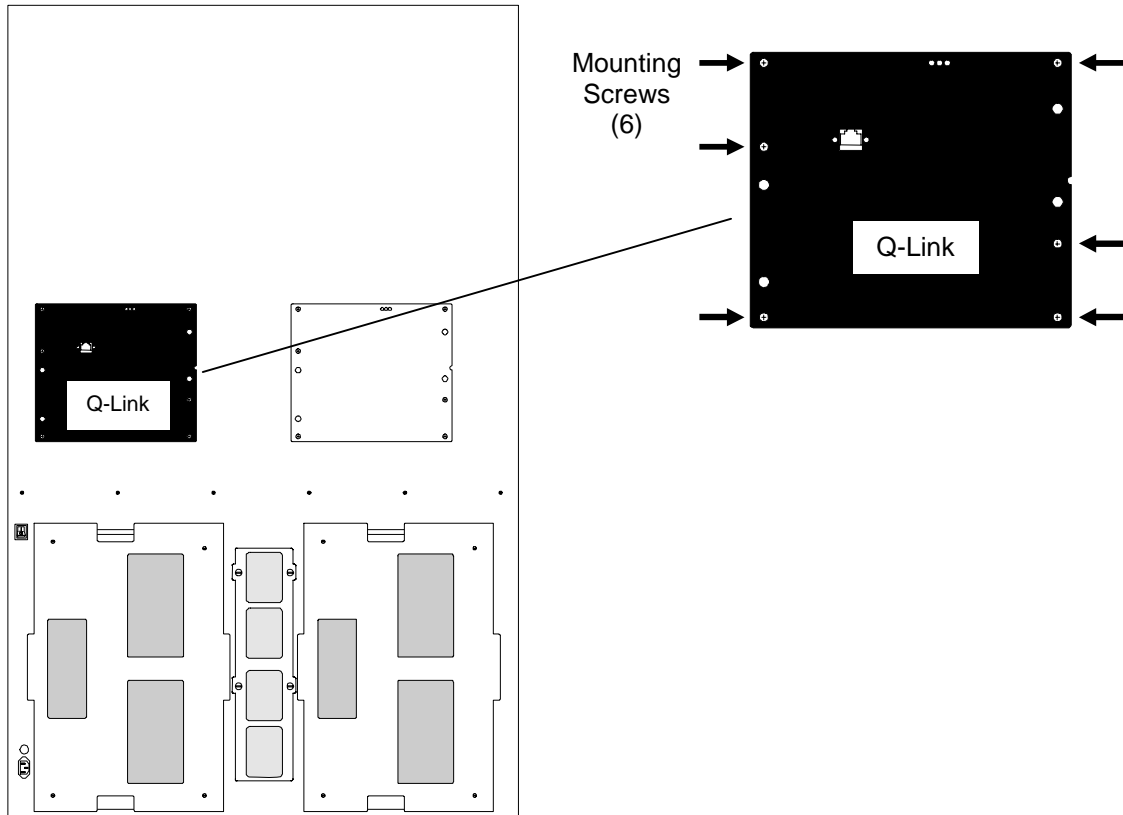
Figure 7-78   Q-Link on Rear of TLS (Dual Bay Model Shown)

7.21.1   Q-Link Removal

1.   Turn off the TLS power and remove the power cord.

2.   Use a number 2 Phillips screwdriver to remove all six Q-Link panels mounting screws (Figure 7-78), then move the panel backwards to access the cables.

3.   Disconnect the AUPWR cable from the POWER connector on the Q-Link PCBA as shown in Figure 7-79.

4.   Disconnect the SERIAL ribbon cable from the SERIAL connector on the Q-Link PCBA as shown in Figure 7-79.

Executive PCBA

SERIAL Connector

SERIAL
Ribbon Cable

AUXPWR Connector
(behind ribbon cable)

AUXPWR Cable

Q-Link PCBA

SERIAL Connector
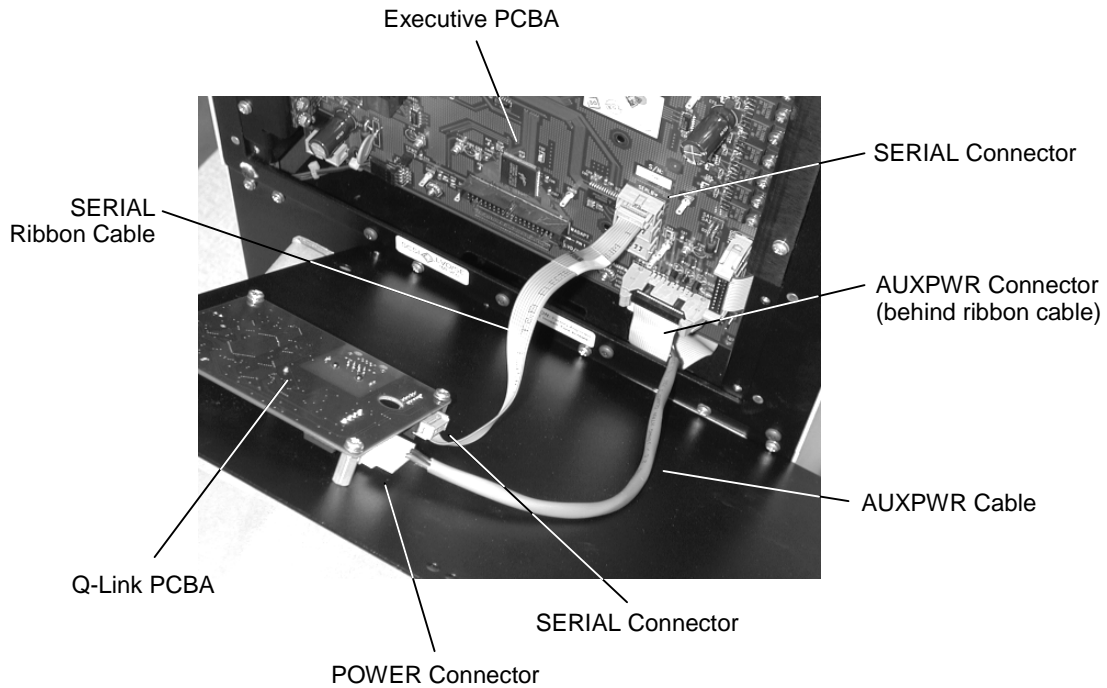
POWER Connector

Figure 7-79   Detail of AUXPWR and SERIAL Cable Connections on Q-Link PCBA

7.21.2   Q-Link Replacement

This procedure assumes that the PCBA was removed in Section 7.21.1.

1.   Connect the AUPWR cable to the POWER connector on the Q-Link PCBA as shown in Figure 7-79.

2.   Connect the SERIAL ribbon cable to the SERIAL connector on the Q-Link PCBA as shown in Figure 7-79 Make sure that the colored edge of the ribbon cable faces to your right side when the cable is installed.

3.   Carefully align the Q-Link panels six mounting screw holes with the six threaded holes in the rear on the TLS.

4.   Using a Phillips screwdriver, secure Q-Link to the rear of the TLS using the six screws removed earlier. Refer to Figure 7-78.

7.22 Shuttle Assembly

TLS-58xxx P/N 500189-03-0 (Revision B or later)
TLS-68xxx P/N 500189-02-2
TLS-88xxx P/N 500189-03-0

7.22.1 Shuttle Assembly Removal

A Shuttle Assembly is only found in TLS-58xxx, 68xxx and 88xxx (dual bay) libraries.

Tools Required:

- **Flat Blade Screwdriver**

- **Number 2 Phillips Screwdriver**
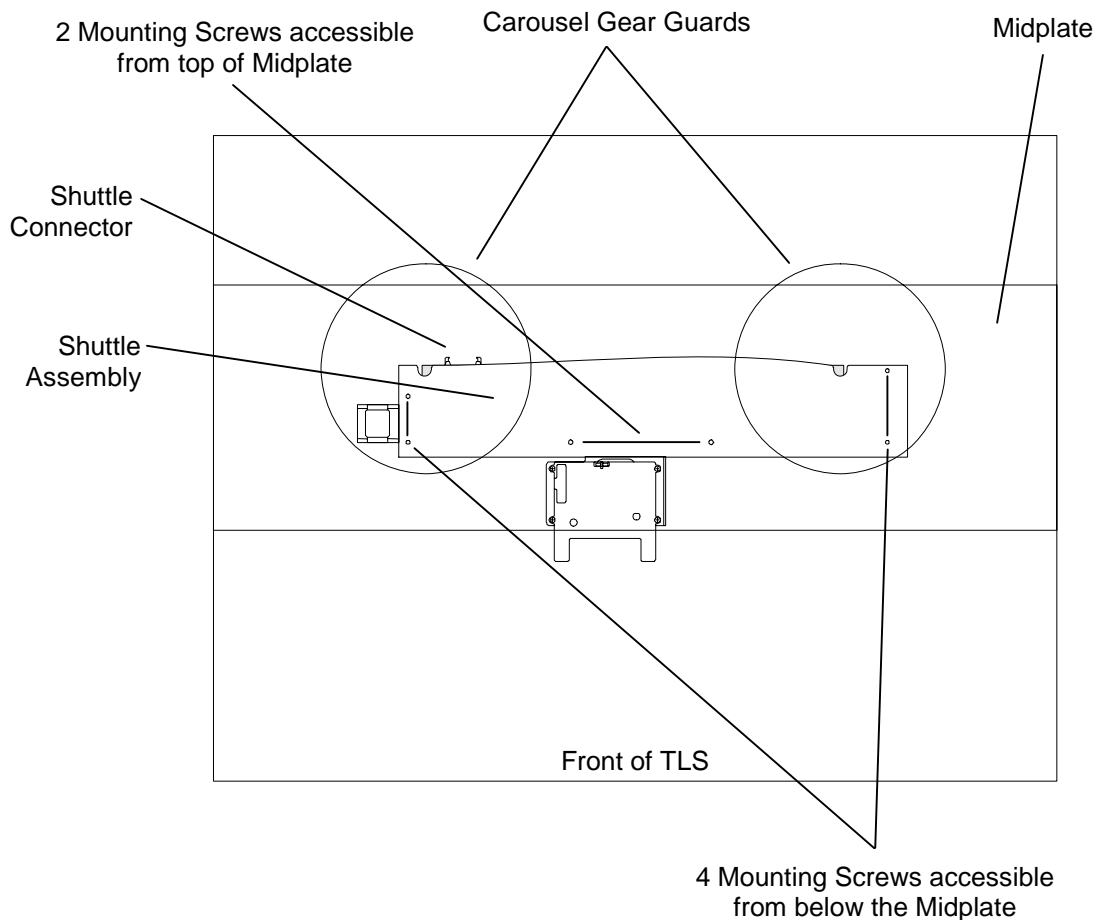
Figure 7-80   Top View of Shuttle Assembly

1.   Turn off the TLS power and remove the power cord.

2.   Use a flat bladed screwdriver to loosen all four of the quarter-turn fasteners on the access cover on the right side of the library when looking at it from the rear (Figure 7-81). Carefully remove the access cover.

3. If present, remove tape drive assemblies from the top location in the left and right side drive bays.

4. Reach into the TLS through the right side Access Panel opening and disconnect the ribbon cable from the SHUTTLE connector (Figure 7-80) on the PCBA, which is attached to the Shuttle Assembly.
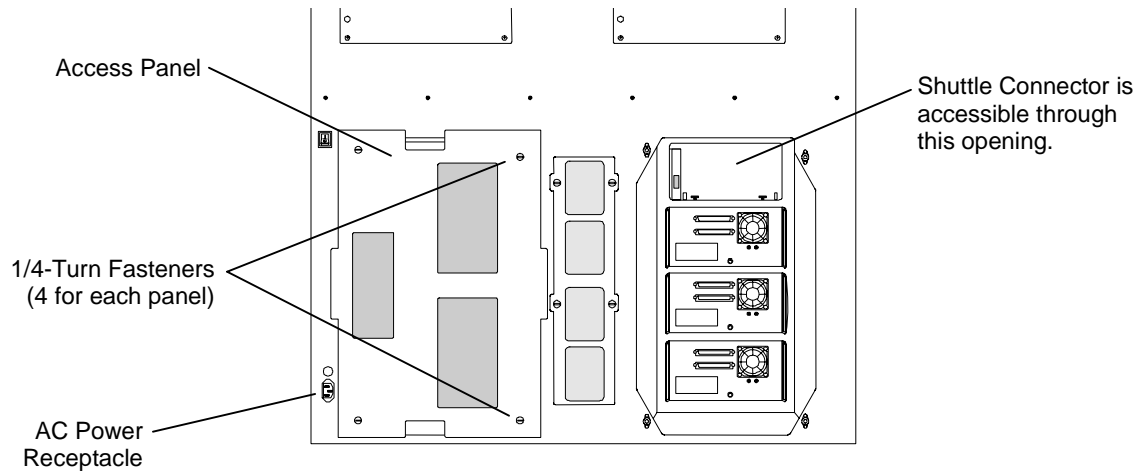
Figure 7-81   Rear of TLS with Access Panel Removed

5. Open the cabinet door.

6. Remove any tape cartridge magazines from either carousel that are protruding over the front edge of the Midplate. This will allow sufficient clearance when removing the Shuttle Assembly.

7. From the front of the TLS, use a number 2 Phillips screwdriver to remove the four Shuttle Assembly mounting screws, which are accessible underneath the Midplate (Figure 7-80).

8. While supporting the Shuttle Assembly with one hand, remove the remaining two mounting screws, which are accessible from the top of the Midplate (Figure 7-80).

9. Using both hands pull the Shuttle Assembly towards the front of the TLS while tilting it upwards to clear the Midplate, the guide shafts and the support member in the center of the front opening (Figure 7-82).

10. When the Shuttle Assembly has cleared the Midplate, the support member and the guide shafts rotate it 90 degrees to vertical and remove it through the front of the TLS (Figure 7-82).
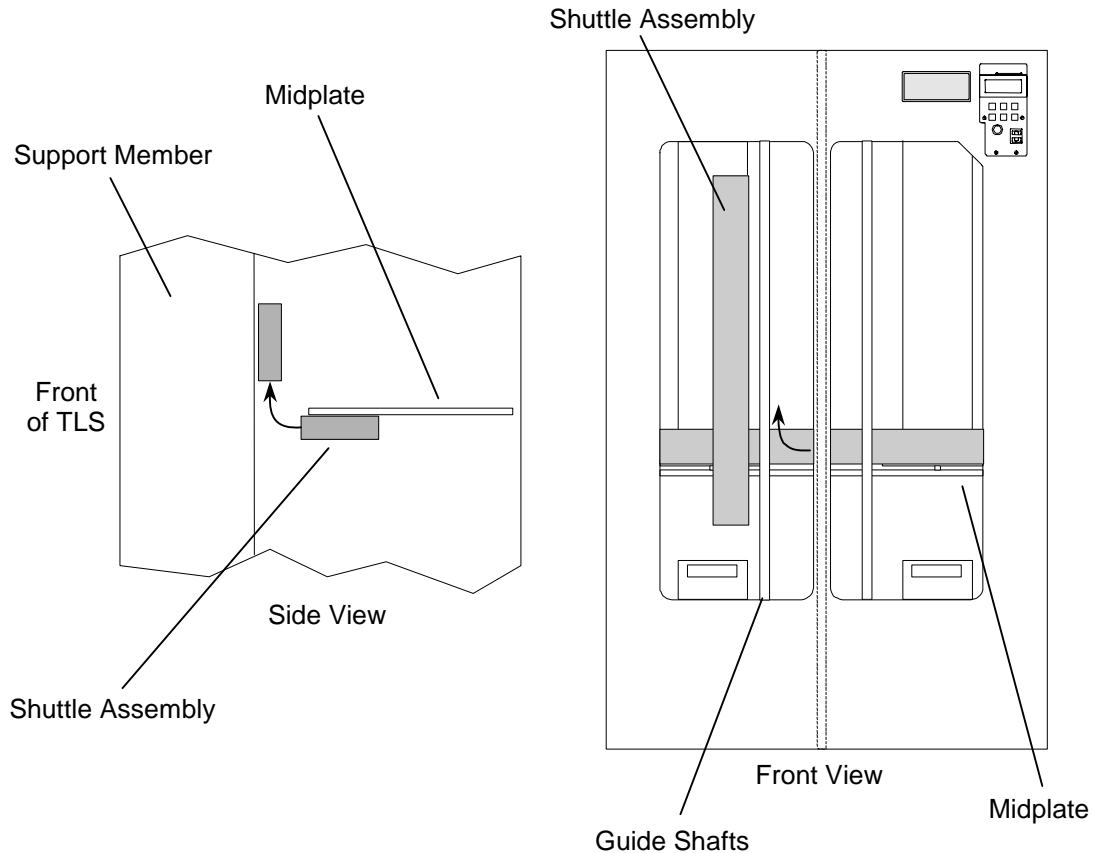
Figure 7-82   Two Views of Shuttle Assembly Removal from TLS

7.22.2   Shuttle Assembly Replacement

NOTE

TLS-58xxx models will only function correctly with 500189-03-0 Revision B (or later) Shuttle Assemblies. Read the Shuttle Assembly Label (see Figure 7-83) and look for the text: "Shuttle: B" or later.

1.   Hold the Shuttle Assembly in a vertical position with the circuit boards and wiring facing inward and insert it through the front of the TLS. When clear of the support member and guide shafts, rotate the Shuttle Assembly 90 degrees to horizontal (Figure 7-82). Note that when oriented correctly the motor will be facing the left side of the TLS.

2.   Rotate the Shuttle Assembly downward to clear the support member and guide shafts while positioning it under the Midplate. Align the Shuttle Assembly with the mounting screw holes in the bottom of the Midplate (Figure 7-80).

3.   While supporting the Shuttle Assembly with one hand, replace the two mounting screws, which are accessible from the top of the Midplate (Figure 7-80).

4. Replace the four remaining mounting screws, which are accessible from underneath the Midplate (Figure 7-80).

5. Reach into the through the right side Access Panel opening and reconnect the ribbon cable to SHUTTLE connector on the PCBA (Figure 7-80).

6. Reinstall any tape drive assemblies that were removed to access the Shuttle Assemblies mounting screws.

7. Align the Drive Access Panels four quarter-turn fasteners with the corresponding receptacles on the rear panel, then fasten it by turning the quarter-turn fasteners clockwise (Figure 7-81).

8. Recalibrate the TLS (see Section 5.3.2 for details.)

7.23   Shuttle PCBAs

P/N 501317-01-2 and 501427-01-7
The Shuttle Assembly must be removed before replacing either of the Shuttle PCBAs. There are two circuit boards on the Shuttle Assembly.

Tools Required:

- **1/4-inch Hex Nutdriver**

Material Required:

- **3-inch x 3/32-inch Cable Ties**

7.23.1   Shuttle PCBA Removal
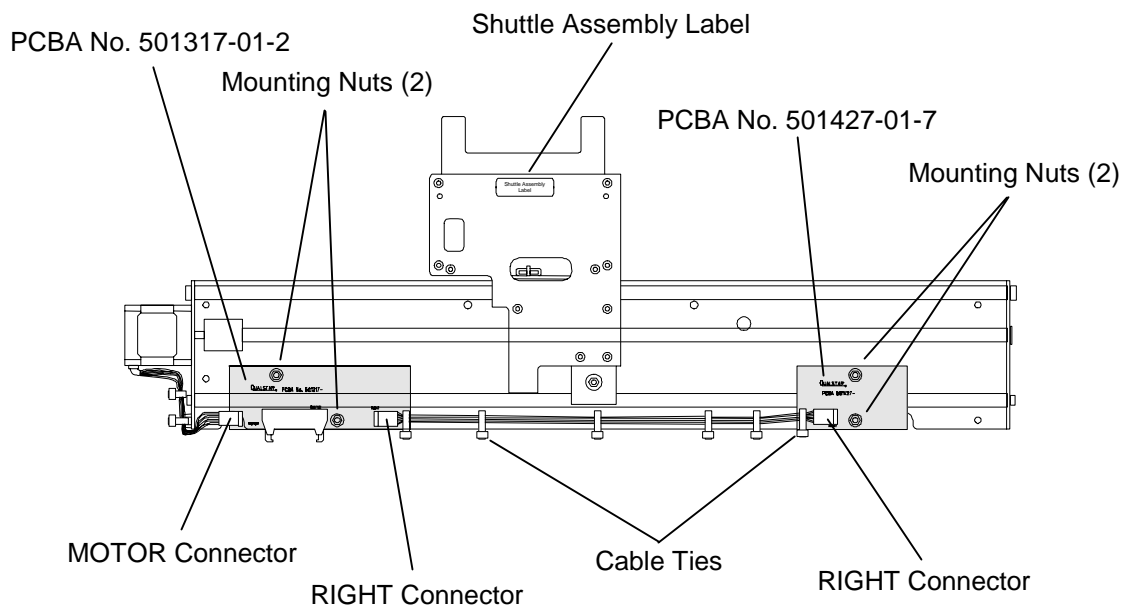
Figure 7-83   Shuttle PCBAs (Shuttle Assembly Bottom View)

1. Remove the Shuttle Assembly (see Section 7.22.1 for details).

NOTE

In steps two and four below, the spacers under the PCBAs' come loose when the PCBA mounting nuts are removed.

2. To remove PCBA No. 501317-01-2, carefully cut the cable tie which attaches the RIGHT connector wires to the PCBA then disconnect the RIGHT connector. Disconnect the MOTOR connector. Using a 1/4–inch nutdriver, remove the two mounting nuts which secure the PCBA to the Shuttle Assembly and lift the PCBA off of the mounting studs (Figure 7-83).

3. Reinstall the two PCBA mounting nuts onto the PCBA mounting studs to keep the PCBA spacers in place.

4. To remove PCBA No. 501427-01-7, carefully cut the cable tie which attaches the RIGHT connector wires to the PCBA then disconnect the RIGHT connector. Using a 1/4–inch nutdriver, remove the two mounting nuts which secure the PCBA to the Shuttle Assembly and lift the PCBA off of the mounting studs (Figure 7-83).

5. Reinstall the two PCBA mounting nuts onto the PCBA mounting studs to keep the PCBA spacers in place.

7.23.2 Shuttle PCBA Replacement

1. To replace PCBA No. 501317-01-2, remove the two nuts from the PCBA mounting studs, then make sure that the two PCBA spacers are in place on the PCBA mounting studs.

2. Align the PCBA with the two mounting studs, then install the PCBA onto the studs. Reinstall the two mounting nuts onto the mounting studs, then use a 1/4–inch nutdriver to tighten the mounting nuts firmly against the PCBA. Reconnect the MOTOR connector. Reconnect the RIGHT connector and replace the cable tie that was removed earlier (Figure 7-83).

3. To replace PCBA No. 501427-01-7, remove the two nuts from the PCBA mounting studs, then make sure that the two PCBA spacers are in place on the PCBA mounting studs.

4. Align the PCBA with the two mounting studs, then install the PCBA onto the studs. Reinstall the two mounting nuts onto the mounting studs, then use a 1/4–inch nutdriver to tighten the mounting nuts firmly against the PCBA. Reconnect the RIGHT connector and replace the cable tie that was removed earlier (Figure 7-83). Make sure that the cable ties and the cable tie mounts do not interfere with the shuttle's travel.

5. Reinstall the Shuttle Assembly (see Section 7.22.2 for details).

6. Recalibrate the TLS (see Section 5.3.2 for details.)

7.24   Y-Clear Detector PCBA

P/N 501307-01-1

TLS-6110 and TLS-8111 libraries contain a Y-Clear Detector PCBA.

In addition to the Y-Clear Detectors that are mounted on the I/O port assembly, TLS-58xxx, 68xxx and 88xxx (dual bay) libraries contain a Y-Clear Detector PCBA.

Tools Required:

- **Number 2 Phillips Screwdriver**
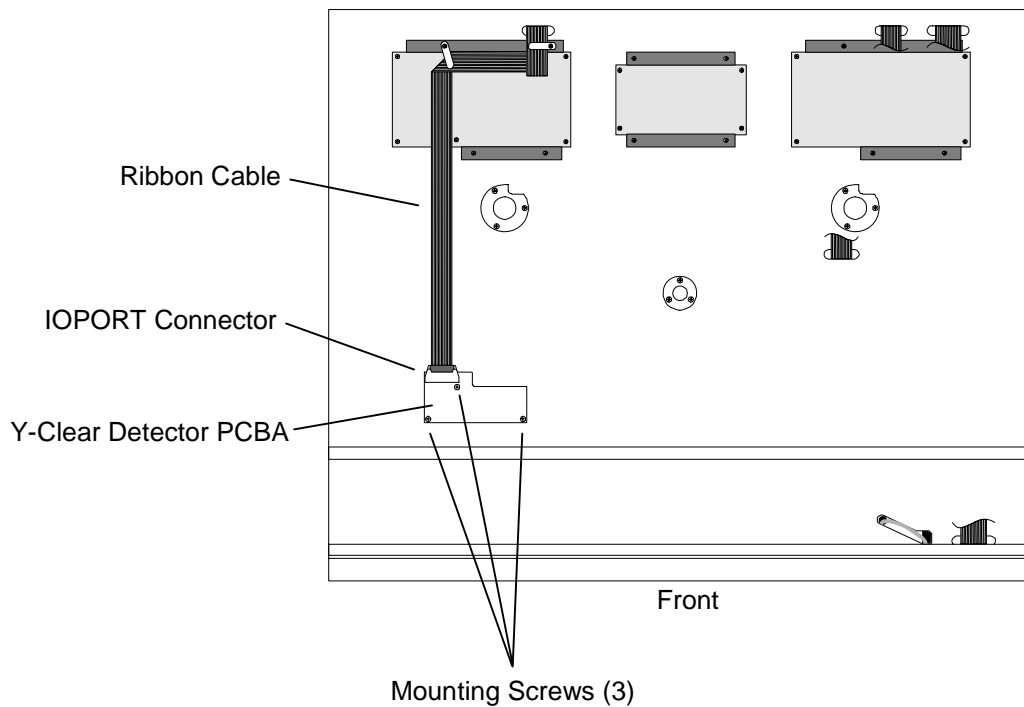
7.24.1   Y-Clear Detector PCBA Removal

Figure 7-84   Y-Clear PCBA on Top of TLS (Dual Bay Model Shown)

1.   Turn off the TLS power and remove the power cord.

2.   Remove the Top Panel (Section 7.4.1).

3.   Disconnect the ribbon cable at the IOPORT Connector (Figure 7-84).

NOTE

In this next step, the spacers under the Y-Clear Detector PCBA come loose when the PCBA mounting nuts are removed.

4. Using a number 2 Phillips screwdriver, remove the three mounting screws which secure the Y-Clear Detector PCBA to the top of the TLS (Figure 7-84).

5. Remove the Y-Clear Detector PCBA from the top of the TLS.

6. Reinstall the three PCBA mounting screws to keep the PCBA spacers in place.

7.24.2   Y-Clear Detector PCBA Replacement

1. Note the jumpers on connectors W1 and W2 on the Y-Clear Detector PCBA that was removed. Make sure that the jumpers are in the same location on the replacement PCBA before it is installed. See Figure 7-85.

Connector W1   Connector W2

Jumper Locations on
TLS-6110/8111 Models

Jumper Locations on
TLS-58/68/88xxx Models
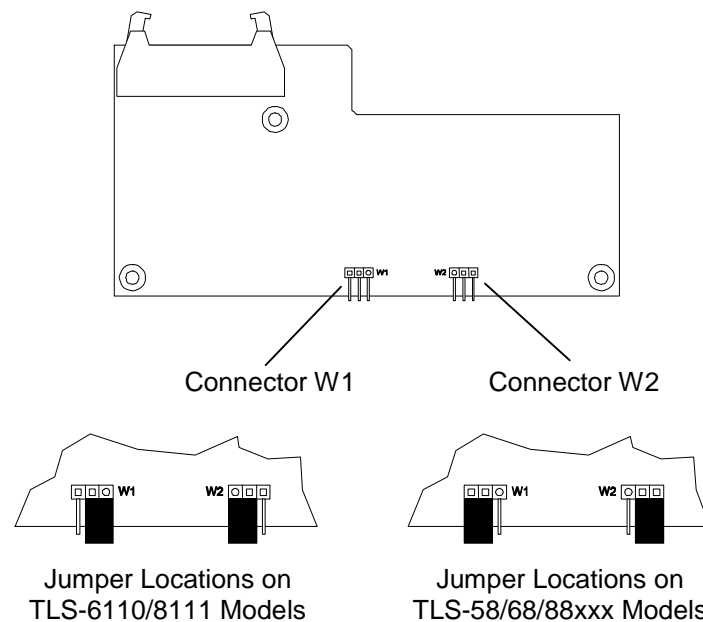
Figure 7-85   Location of Connectors W1 and W2 on Y-Clear Detector PCBA

2. Remove the three mounting screws, then make sure that the three PCBA spacers are in place on the PCBA mounting studs.

3. Place the Y-Clear Detector PCBA on the top of the TLS and align all three mounting screw holes in the PCBA with the mounting screw holes in the TLS (Figure 7-84).

4. Install all three mounting screws and securely tighten the mounting screws using a number 2 Phillips screwdriver.

5. Reconnect the ribbon cable at the IOPORT Connector (Figure 7-84).

6. Replace the Top Panel (Section 7.4.2).

7. Recalibrate the TLS (see Section 5.3.2 for details.)

7.25   After-maintenance Test Procedures

The maintenance procedures listed below ***do affect*** the TLS' calibration. After any of these procedures are completed, follow the instructions in Section 5.3.2 to recalibrate the TLS.

- **Remove and replace a Carriage Assembly.**
- **Remove and replace a Carriage Assembly PCBA.**
- **Remove and replace the I/O Port Assembly.**
- **Remove and reinstall/replace the I/O Port Assembly PCBA.**
- **Remove and replace an Executive PCBA.**
- **Remove and reinstall/replace the Shuttle Assembly PCBA.**
- **Remove and replace a Shuttle Assembly PCBA.**
- **Remove and replace the Y-Clear Detector PCBA.**

If you have performed maintenance that ***does not affect*** the TLS' calibration, like changing an air filter or the fan assembly, no special after-maintenance test procedures are necessary. In this case, executing the CALIBRATE command ***is not*** recommended.

8. Firmware Updating

8.1 Firmware Replacement

All firmware is contained in *dual-inline* integrated circuits, which are easily changed without the need for special tools. Refer to Table 8-1 for a list of the applicable boards (PCBA's – Printed Circuit Board Assemblies) and firmware part numbers.

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-58xxx, 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 Part Number	Firmware
Executive II	501137-01-2	700105
Executive III	501387-01-3	700105
Executive IV	501447-01-5	700115

Table 8-1   Boards Containing Updateable Firmware

Tools Required:

- **Number 2 Phillips Screwdriver**
  (Flash-Memory IC Replacement only)

- **Flat Blade Screwdriver**
  (Flash-Memory IC Replacement only)

8.2 Determining the Installed Hardware and Required Firmware

1. 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-58xxx, 68xxx and 88xxx models. Follow steps 2 through 4.

2. Remove power from the TLS: first turn the power switch off and then remove the power cord.

3. Remove the six Phillips screws securing the service panel on the rear of the library – refer to Figure 8-1 below. Care must be taken to not remove the four screws securing the heatsink panels.
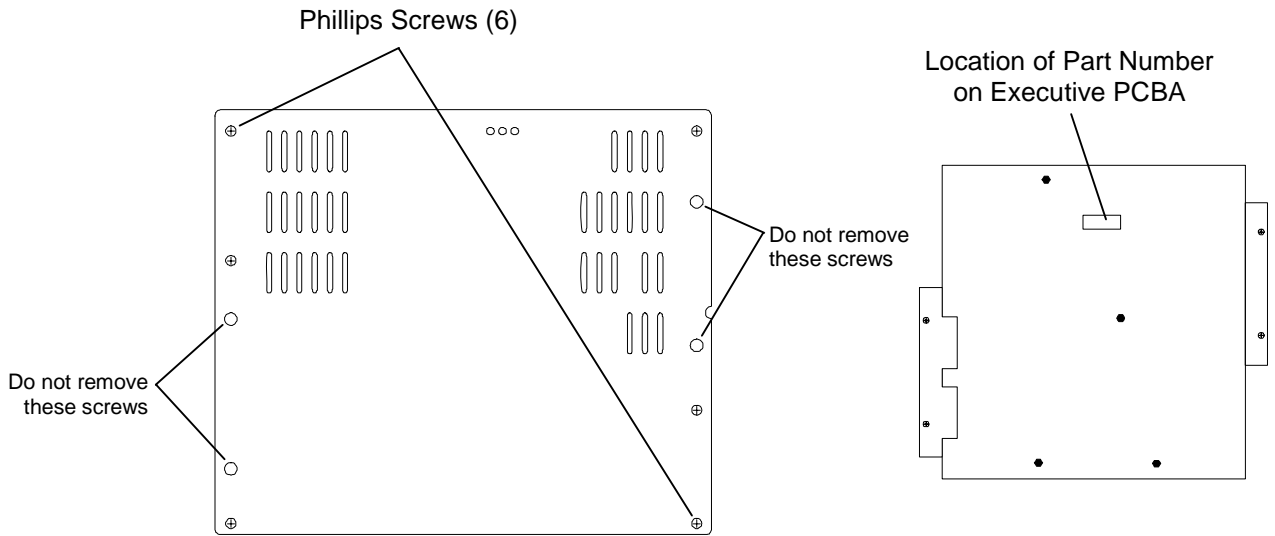
Phillips Screws (6)

Location of Part Number
on Executive PCBA

Do not remove
these screws

Do not remove
these screws

Figure 8-1 Rear Service Panel and PCBA Part Number Location

4. Refer to Table 8-1 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.

5. 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 8-2.

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 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`

Press the MENU key to return to the top menu.	

Table 8-2 Steps to View the Display Revision Status Screen

6. Table 8-3 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-5000/58xxx	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 8-3   Executive PCBA Firmware usage by Model

8.2.1   Firmware Update 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 UploadUtil.exe.

3. Execute the UploadUtil.exe to extract the following ZIPed 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 7 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:

6. 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
   ```

7. Do not turn off TLS power while the update is in progress. The last packet is number 512.

8. 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
```

9. It is very important not to power off the TLS while reprogramming is in pro-
gress. Doing so can cause the library to lose all of its program contents.

10. Following the upgrade, the TLS will perform an internal initialization function
followed by a scanning of the TLS inventory.

11. The FIRMWARE UPGRADE message will be cleared when the process has com-
pleted.

12. Go to the `Maintenance\Display Revision` menu. The displayed Part
Number and Revision must correlate with the firmware just uploaded.

8.3   Firmware Update 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 in-
structions below.
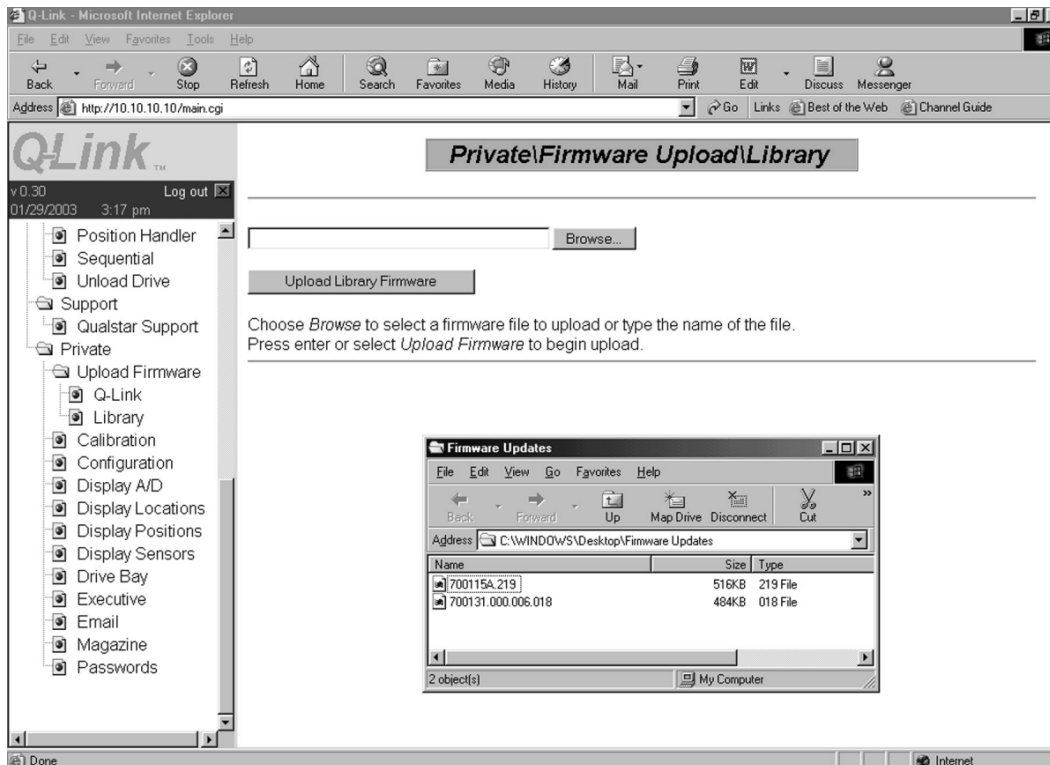
Figure 8-2   Sample of the Library Firmware Upload Screen

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

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 8-4 and Figure 8-5.

5. When the Q-Link uploading\programming is complete a screen will appear that shows the old and new firmware information. See Figure 8-3.

> 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 8-3   Sample of the Library Uploading/Programming Has Finished Screen
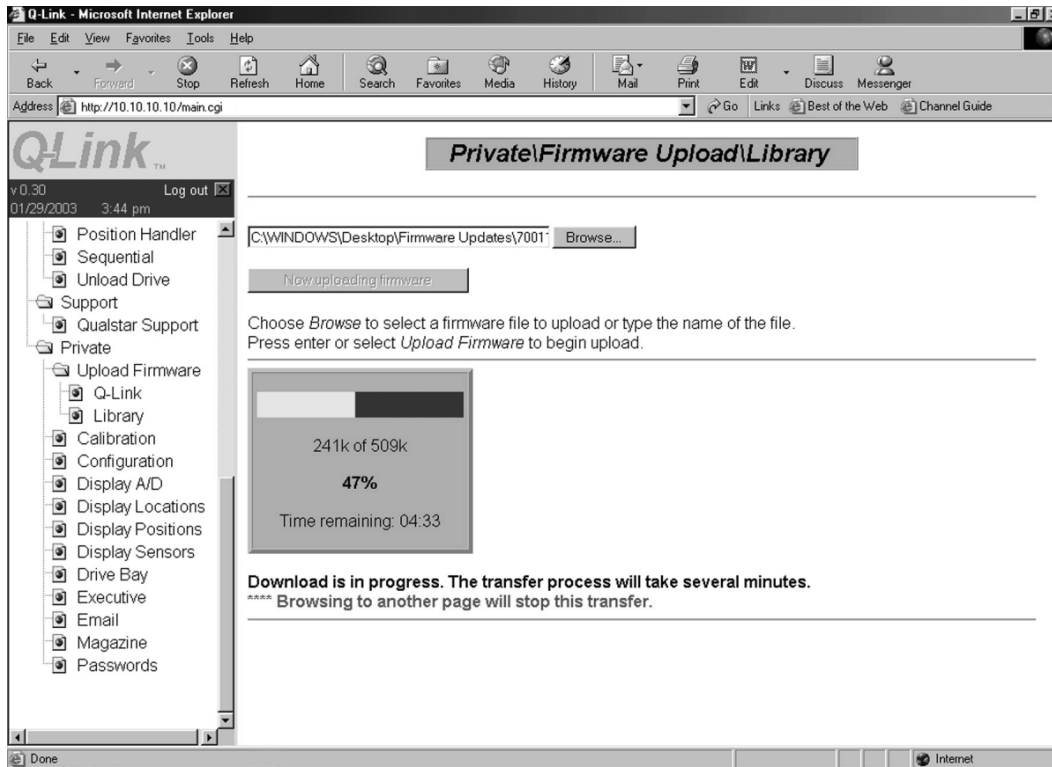
Figure 8-4   Sample of the Library Firmware Upload Progress Screen
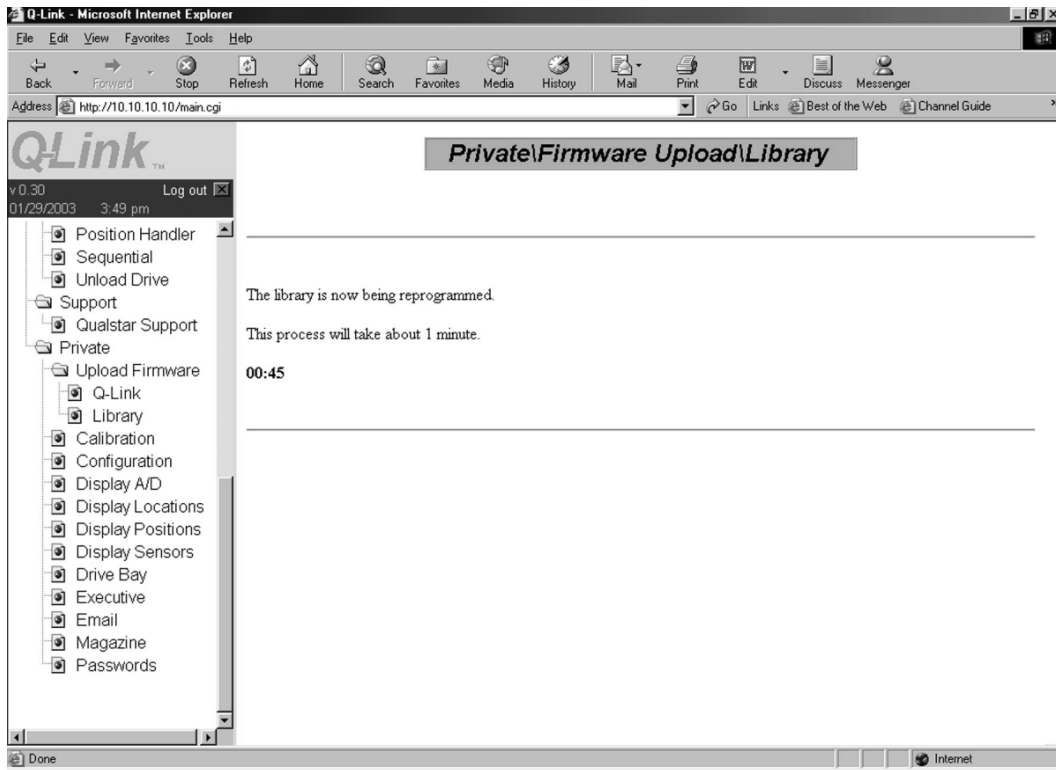
Figure 8-5   Sample of the Library Firmware Reprogramming Progress Screen

8.4   Firmware Update 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
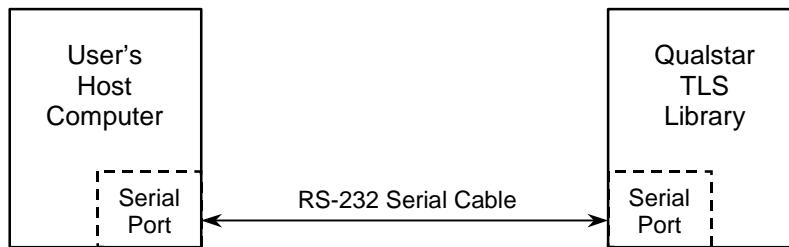
Figure 8-6   Host Computer Connected to TLS

8.4.1 RS-232 Cable Wiring

User Host or PC RS232 Serial Female DB-9 Connector		RLS 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 8-4   RS-232 Cable Wiring Requirements

8.4.2 RS-232 Serial Communications Parameters

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

Table 8-5   RS-232 Serial Communication Parameters

8.4.3 User Terminal Software Setup Example

Windows 9x and NT users can use the Communications accessory program, Hyper-Terminal. Use the `File\Properties` menu selection to configure the application for direct communications. Select the appropriate communications port. See Figure 8-8.
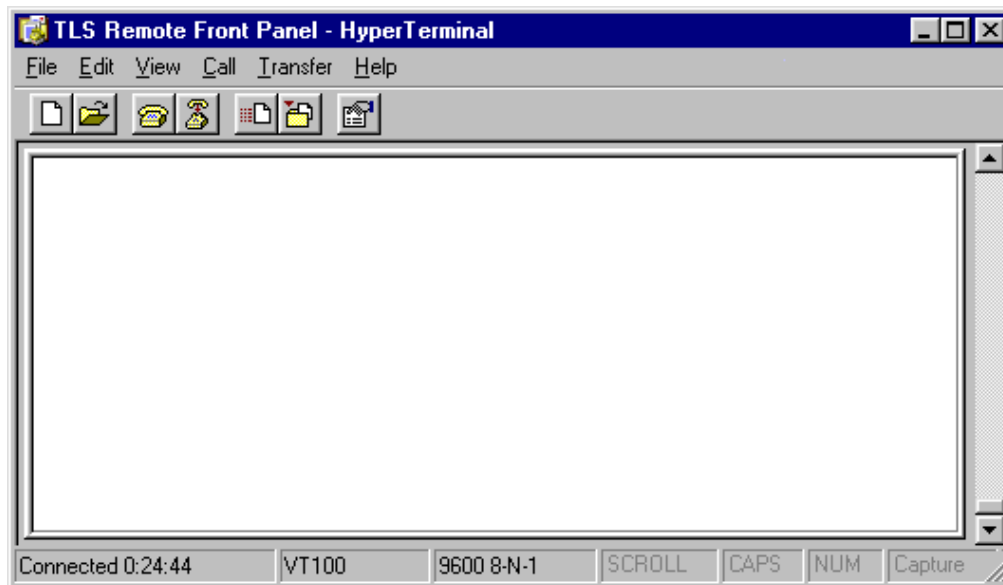
Figure 8-7   RLS Remote Front Panel Program Displayed in HyperTerminal

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 8-9.
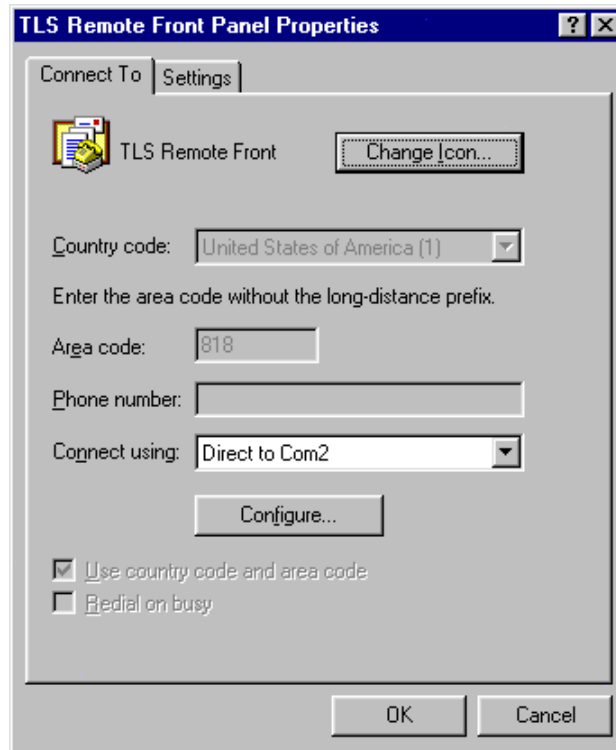
Figure 8-8   Properties Screen
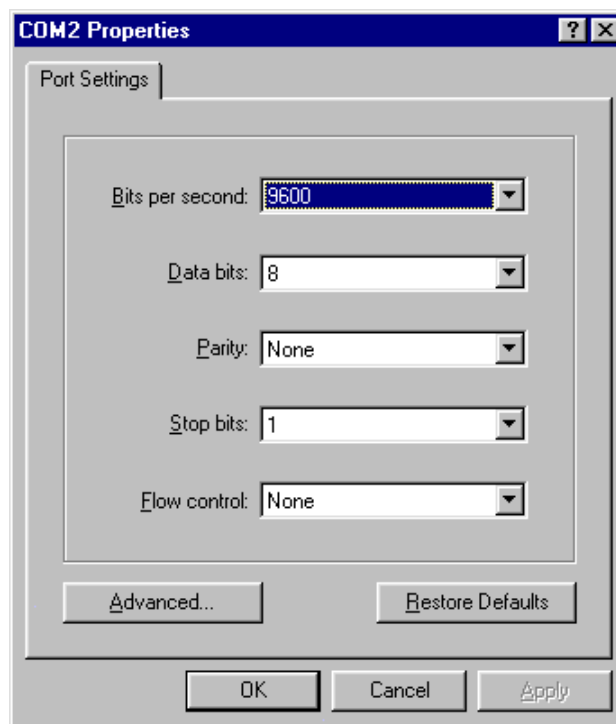
Figure 8-9   Configure Screen Under the Properties Menu

8.4.4   VT100 Terminal Emulation

Use the File\Properties Settings dialog tab to configure the application for VT100 terminal emulation. You may also consider ASCII Setup parameters to satisfy your display requirements.
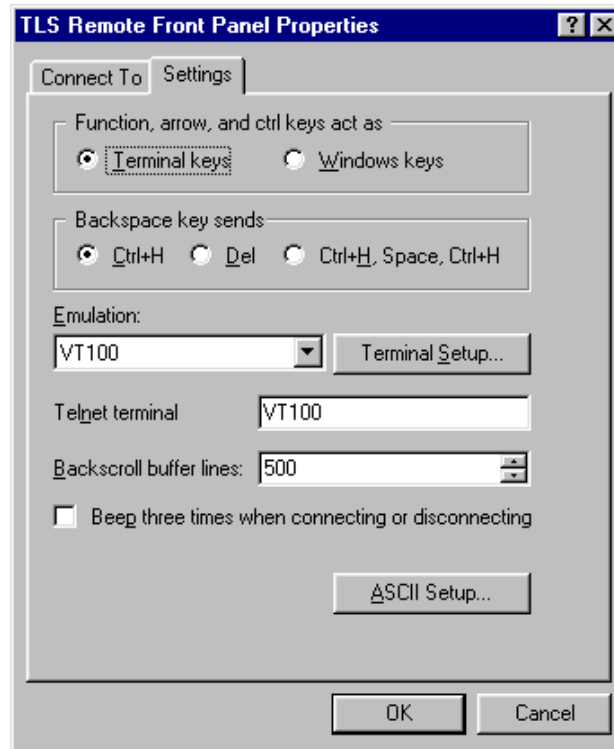

Figure 8-10   Settings Screen Under the Properties Menu
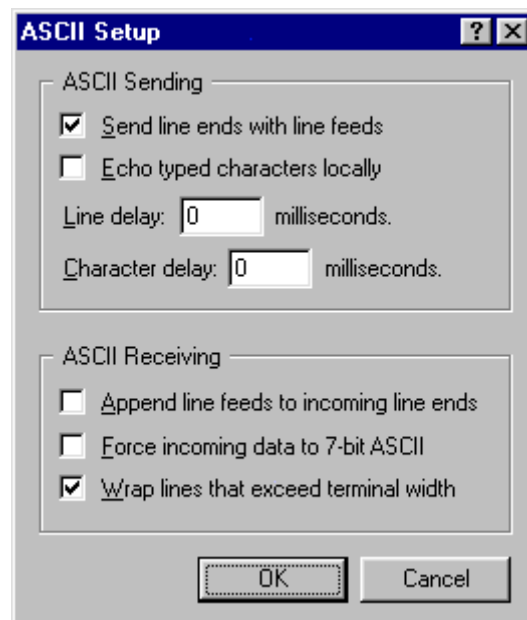
Figure 8-11   ASCII Setup Screen under Settings Screen

8.4.5 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 8-12 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.
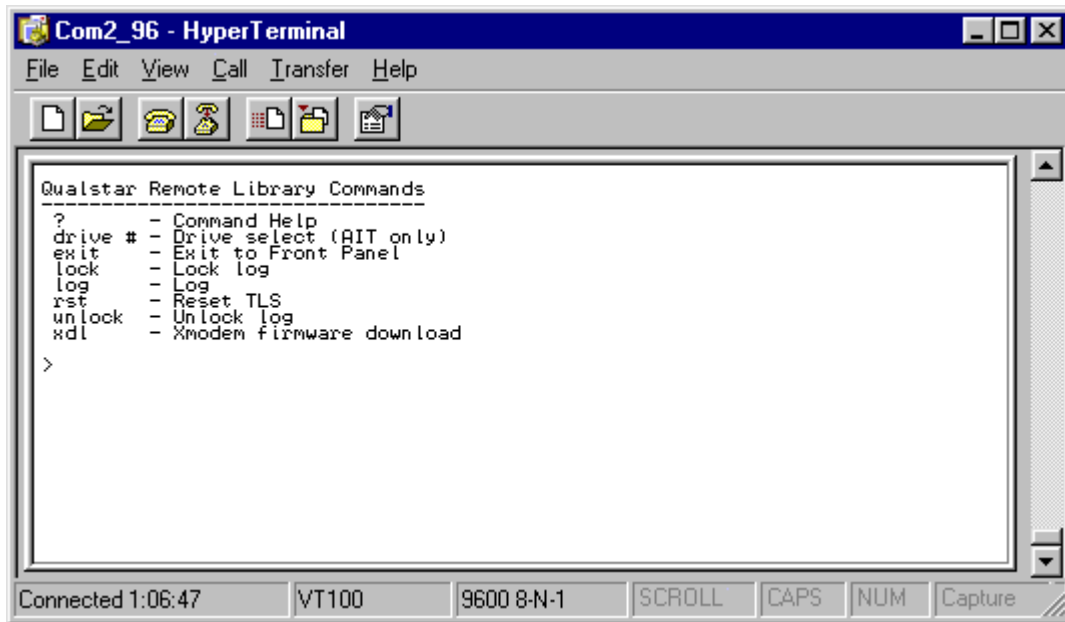
Figure 8-12   Remote Library Commands

8.4.6 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.

8.4.6.1 Example of a download session

Enter the command "xdl". The application will respond "Receiving RLS Firmware", to indicate it is waiting for the user's xmodem data.
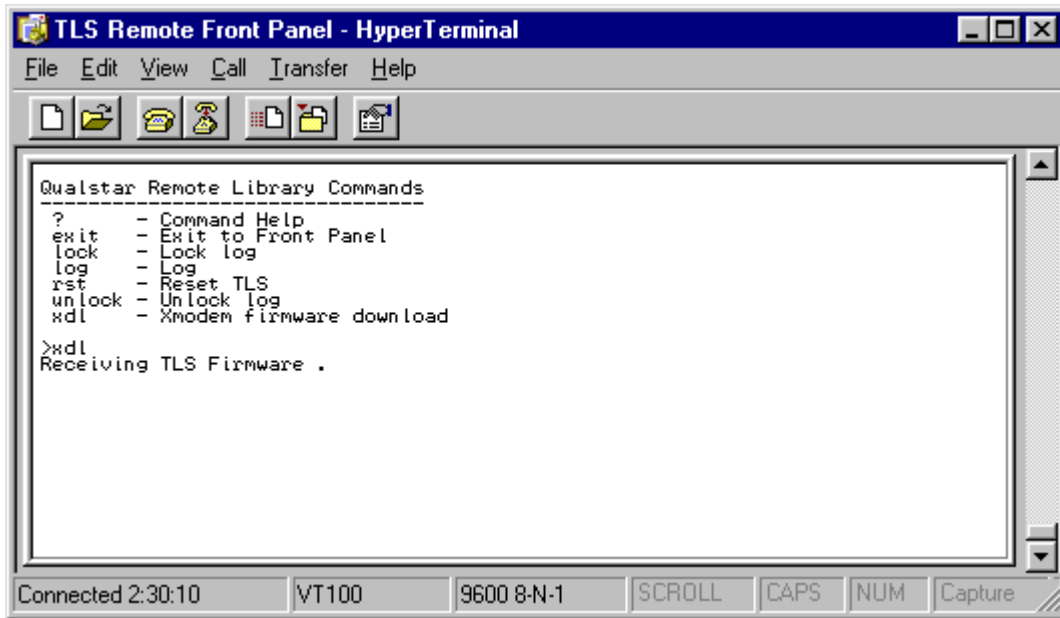
Figure 8-13   Example of Xmodem Firmware Download

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 (Ver-
sion 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. Power-
ing off the TLS Library is not necessary and can cause the TLS Library to lose its program con-
tents.*
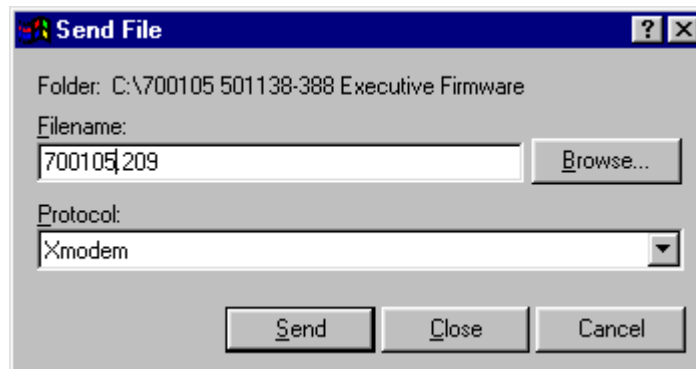
Figure 8-14   Send File Screen Under Transfer

8.4.7 Procedure for Replacing the Flash-Memory IC on Executive II, III or IV Boards

1. Turn off the TLS power and remove the power cord.

2. Use a number 2 Phillips screwdriver to remove all six Rear Service Panel mounting screws, then remove the Rear Service Panel (Figure 8-15).
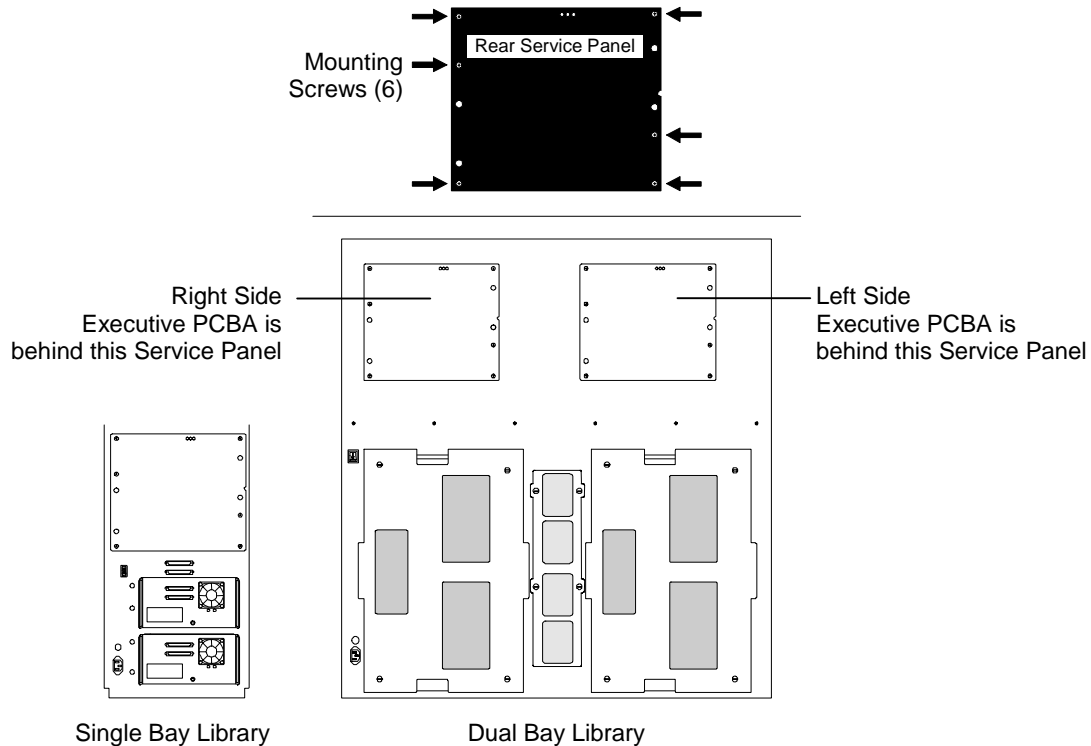

Figure 8-15 Rear Service Panels

3. Remove the Flash-Memory IC at U4 (the Part Number is 700105 or 700115) from the Executive PCBA using a flat blade screwdriver 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. Be careful not to bend the legs of the IC. Continue this procedure until the part is loosened enough to be removed by hand. Refer to Figure 8-16.

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 access 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 and verify the firmware P/N and Revision are correct.
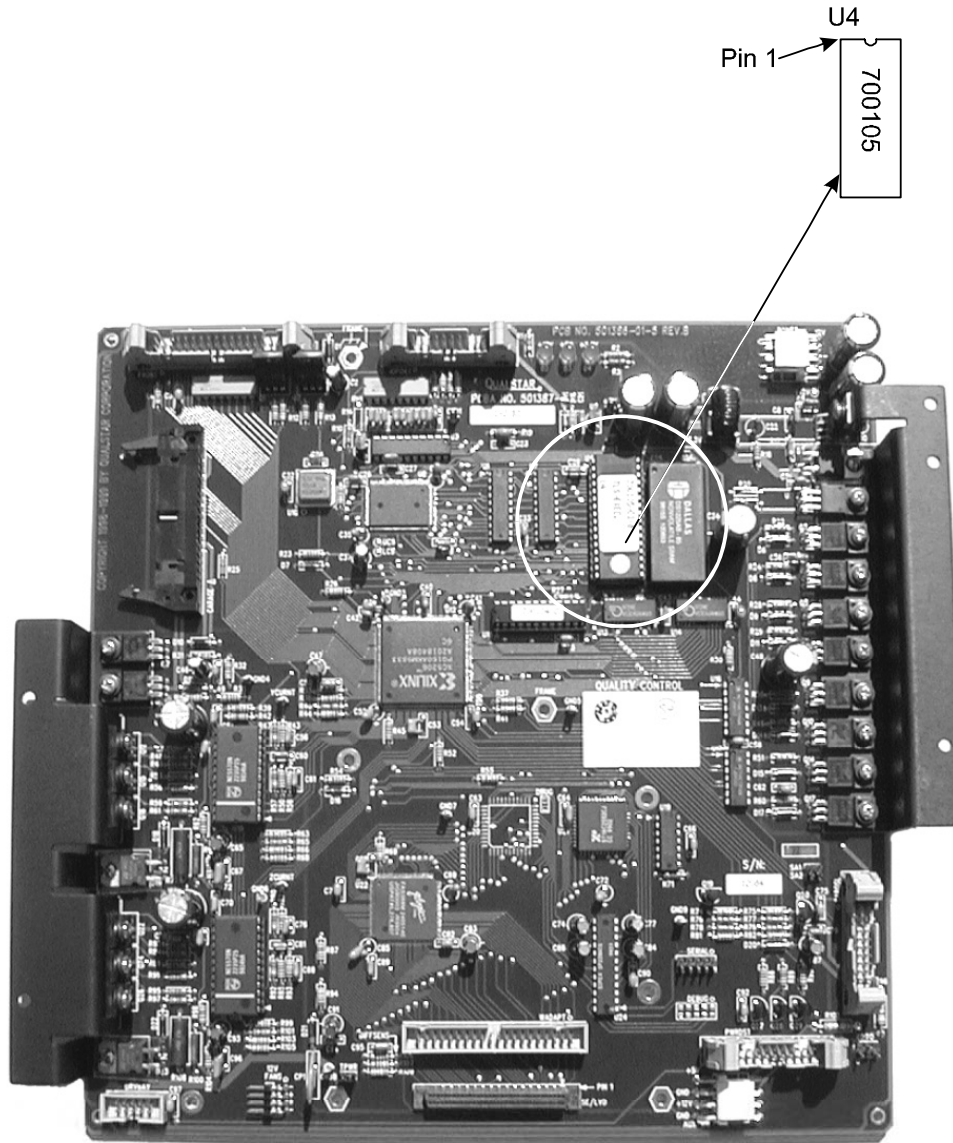
Figure 8-16   501387-01-8 Executive III or 501447-01-5 Executive IV PCBAs

9.   TLS Expansions

9.1   Introduction

This chapter contains installation instructions for each TLS expansion kit. To replace an existing FRU (Field-Replaceable Unit), follow the instructions in Chapter 7.

A number of expansion kits are available from Qualstar. Some expansion kits are used to increase the cartridge capacity of some TLS models, while other expansion kits are used to add a Barcode Reader (Section 7.7) and/or a High Voltage Differential SCSI Interface (Section 7.20) to any TLS model. Installing or removing an expansion kit changes the configuration of a unit. Therefore, after an expansion kit is installed, the unit must be reconfigured and, in some cases, recalibrated.

9.2   Model Expansions

Each kit should take less than 30 minutes to install.

Model Upgrade	Expansion Kit P/N	Capacity Increase	Section	Page
Model 5433 to 5466	500830-05-4	33 to 66 Cartridges	9.2.1.2	9-7
Model 58132 to 58264	500831-05-2	132 to 264 Cartridges	9.2.1.3	9-9
Model 6210 to 6220	500829-03-1	10 to 20 Cartridges	9.2.1.1	9-2
Model 6430 to 6460	500830-03-9	30 to 60 Cartridges	9.2.1.2	9-7
Model 68120 to 68240	500831-04-5	120 to 240 Cartridges	9.2.1.3	9-9
Model 8211 to 8222	500829-06-4	11 to 22 Cartridges	9.2.1.1	9-2
Model 8433 to 8466	500830-05-4	33 to 66 Cartridges	9.2.1.2	9-7
Model 88132 to 88264	500831-05-2	132 to 264 Cartridges	9.2.1.3	9-9

Figure 9-1   Available Model Expansion Kits

Installing an expansion kit is a five–step procedure:

1.   Install the new hardware.

2.   Enter `Update` for the password in the Private menu. (Reconfiguring the TLS model number and recalibrating the TLS are password-protected procedures.)

3.   Reconfigure the Library's model number to reflect the hardware changes.

4.   Recalibrate the Library.

5.   Clear the password (`Update`) to prevent unauthorized access to the Private menu.

9.2.1   Installing a Model Expansion Kit

This procedure requires one expansion kit (described in Figure 9-1), plus a number 2 Phillips screwdriver to install the hardware.

9.2.1.1   Model 6210 to 6220 or Model 8211 to 8222 Expansion

This procedure replaces the Midplate, and adds a Carousel and two Receivers.

9.2.1.1.1 Removal of Receiver Assembly

1.   Turn off the TLS power and remove the power cord.

2.   Open the cabinet door.

3.   Remove the Top Panel and both Side Panels (Section 7.4).

4.   Gently turn the I/O port leadscrew by hand to move the I/O port slot forward (towards the cabinet door).

5. Remove the four Receiver mounting screws, then remove the Receiver and An-
   chor (Blue in color) (Figure 9-2).

6. From the left and right side of the TLS remove the four Upper Receiver Bracket
   mounting screws, then remove the Upper Receiver Bracket (Figure 9-3).

7. From the left and right side of the TLS remove the six Midplate mounting screws
   (Figure 9-3).

8. From the inside of the TLS remove the six Midplate mounting screws
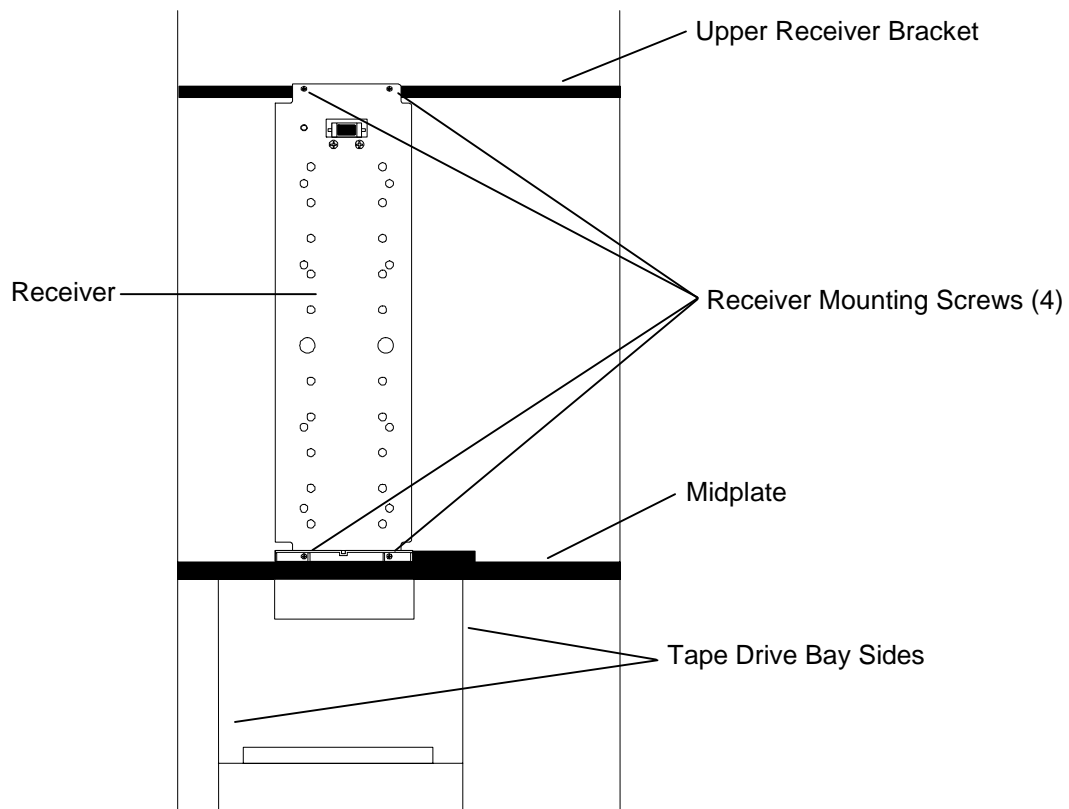   (Figure 9-4), then remove the Midplate from the TLS.
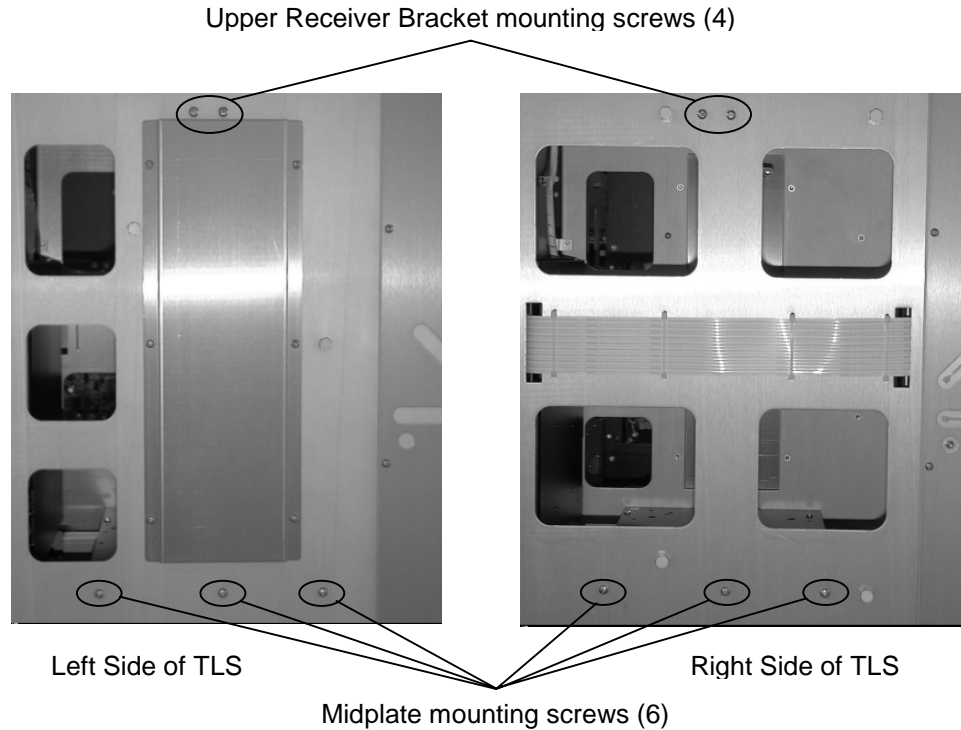

Figure 9-2   6210 Receiver

Upper Receiver Bracket mounting screws (4)

Left Side of TLS   Right Side of TLS

Midplate mounting screws (6)

Figure 9-3   Upper Receiver Bracket mounting screws

9.2.1.1.2 Adding the Carousel Midplate

1. The Carousel PCBA must be removed before the Carousel Midplate can be installed in the TLS.

2. Detach the Carousel Motor Cable from the Carousel PCBA (Figure 9-5).

3. Using a Phillips screwdriver remove the three Carousel PCBA mounting screws, then remove the PCBA (Figure 9-4).

4. Place the Carousel Midplate in the TLS and align it with the six mounting holes in the top of the tape drive bay sides.

5. With a Phillips screwdriver install all six Midplate screws that were removed earlier.

6. From the right and left sides of the TLS, use a Phillips screwdriver to install the six Midplate screws that were removed earlier (Figure 9-3).

7. Fit the PCBA down over the PCBA Alignment Pin and align the PCBA mounting screw holes.

8. Use a Phillips screwdriver to install all three 6/32 x 7/16 PCBA mounting screws, then tighten the screws until they are snug.

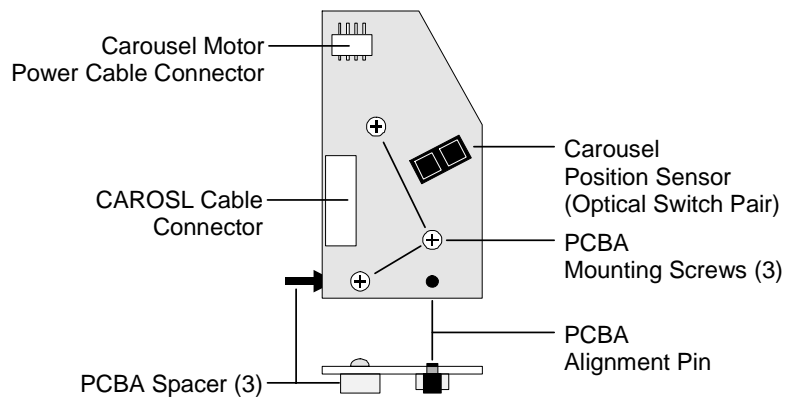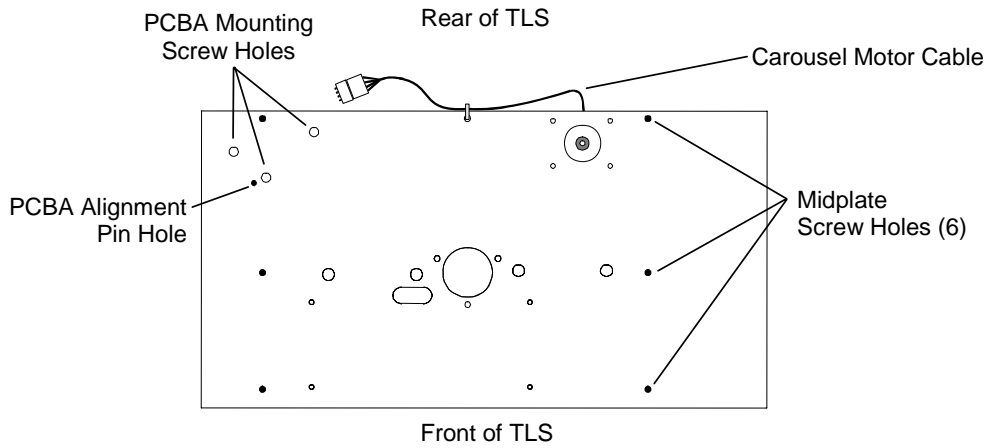9. Connect the Carousel Motor Cable to the Carousel PCBA.

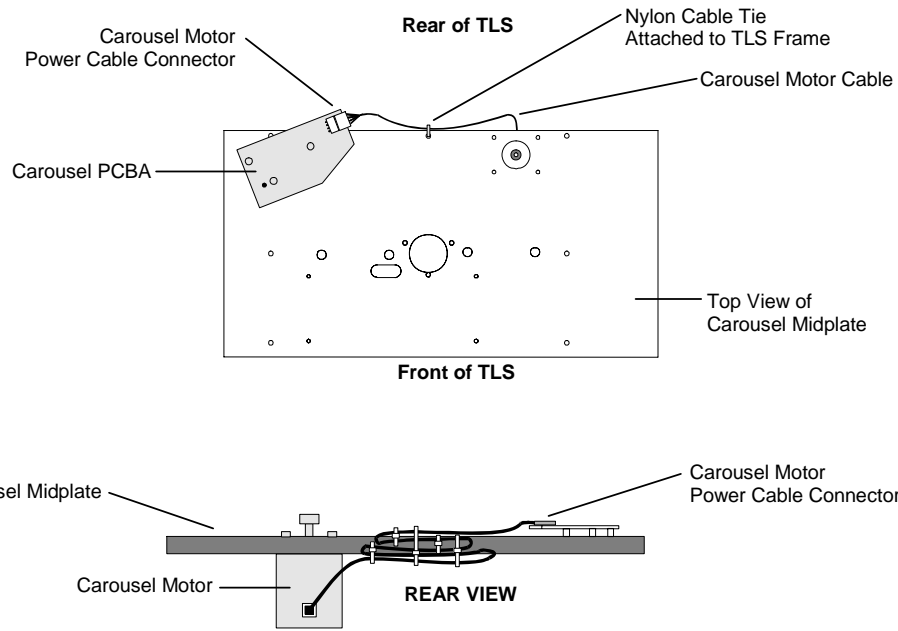**Figure 9-4   The Midplate and Carousel PCBA**

Figure 9-5   Carousel PCBA Installed on Midplate
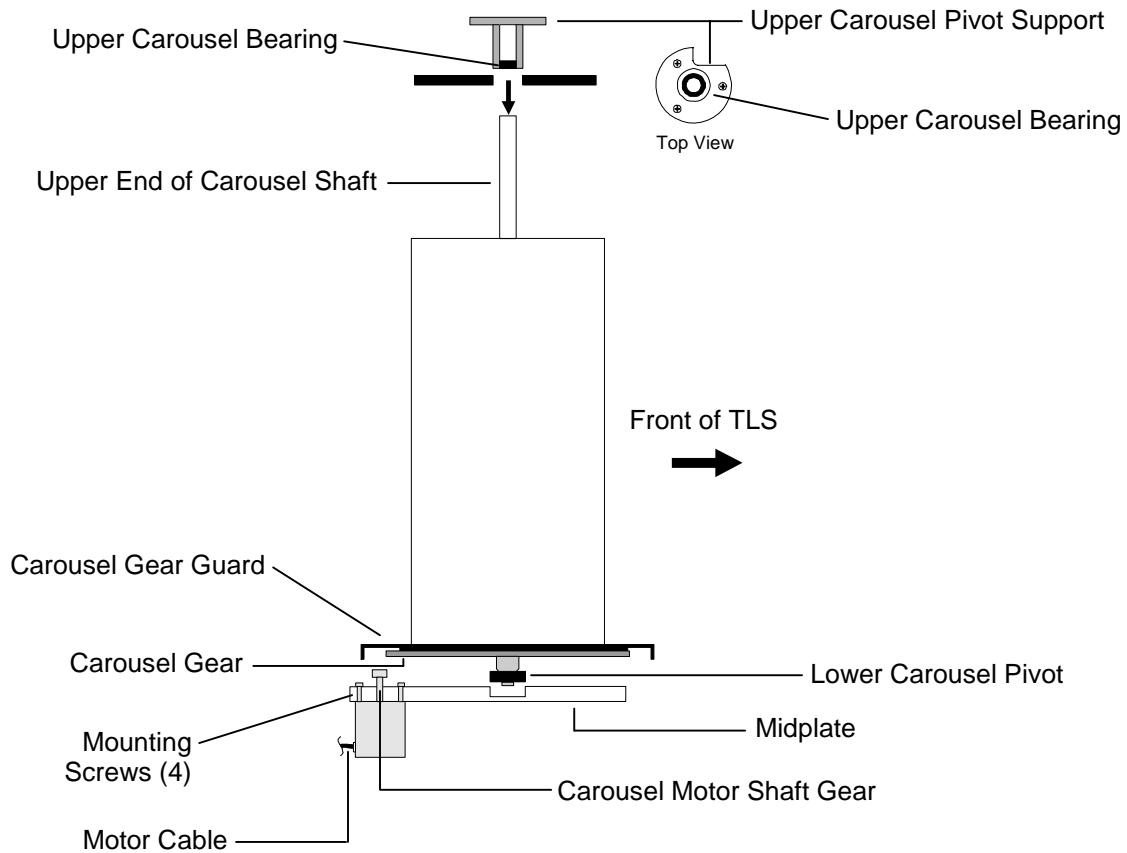
9.2.1.1.3 Adding the Carousel

Figure 9-6   The Carousel Assembly

CAUTION

> ***Be careful not to damage the Carousel Position Sensor with the Carousel Gear Guard when you install the Carousel (Figure 9-4 and Figure 9-6).***

1. Insert the Carousel through the open cabinet door.

2. Align the lower Carousel Bearing with the Midplate, then lower the Carousel down into place (Figure 9-6). Use caution as to not damage the Carousel Gear or the gear on the Carousel Motor shaft as you lower the Carousel into position.

3. Align the upper end of the Carousel Shaft with the Upper Carousel Pivot Support (Figure 9-6), and then lower the Upper Carousel Pivot Support down through the top of the TLS onto the upper Carousel Pivot (Figure 9-7).

4. Align the mounting screw holes in the Upper Carousel Pivot Support with the mounting screw holes in the TLS, then use a number 2 Phillips screwdriver to

install all three 10/32 x 1/2 Upper Carousel Pivot Support mounting screws. Tighten the screws securely (Figure 9-7).

5.   Reinstall the Side Panels (Section 7.4.4), then reinstall the Top Panel (Section 7.4.2).

6.   Proceed to Section 9.2.2 of this chapter.

Handler
Power Supply

Upper Carousel
Pivot Support
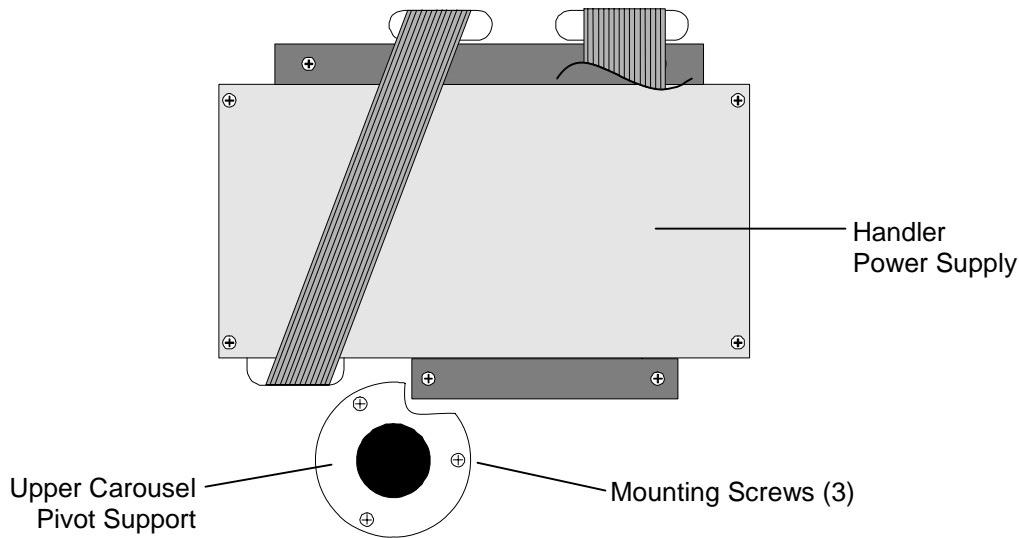
Mounting Screws (3)

Figure 9-7   TLS Top View

9.2.1.2   Model 5433 to 5466, 6430 to 6460 or 8433 to 8466 Expansion

This procedure adds one Receiver Assembly to each of the three empty carousel faces.

Refer to Figure 9-8.

1.   Turn off the TLS power and remove the power cord.

2.   Open the cabinet door.

3.   Reach in through the cabinet door and rotate the Carousel by hand until an empty Carousel face (one without Receivers) faces you.

4.   Position a Receiver over the empty Carousel face and align the mounting screw holes.

5.   Insert two 6-32 x 3/8-inch screws (with integral lock washers) into the top set of Receiver Mounting Screw holes, then securely tighten with a number 2 Phillips screwdriver.

6.   Position a Magazine Anchor (Blue color) at the bottom of the receiver and align the mounting screw holes.

7.   Insert two 6-32 x 1/2-inch screws through the Magazine Anchor and into the bottom set of Receiver Mounting Screw holes, then securely tighten with a number 2 Phillips screwdriver.

8. Rotate the Carousel by hand to access the next empty Carousel face.

9. Repeat steps 4 through 7 to install two more Receivers.

Top view of Carousel with 3 Receivers mounted

6/32 x 3/8 Receiver Mounting Screws with Integral Locking Washers (2)

6/32 x 1/2 Receiver Mounting Screws (2)

Magazine Anchor (Light Blue Color)

Front view of Receiver   Side view of Receiver
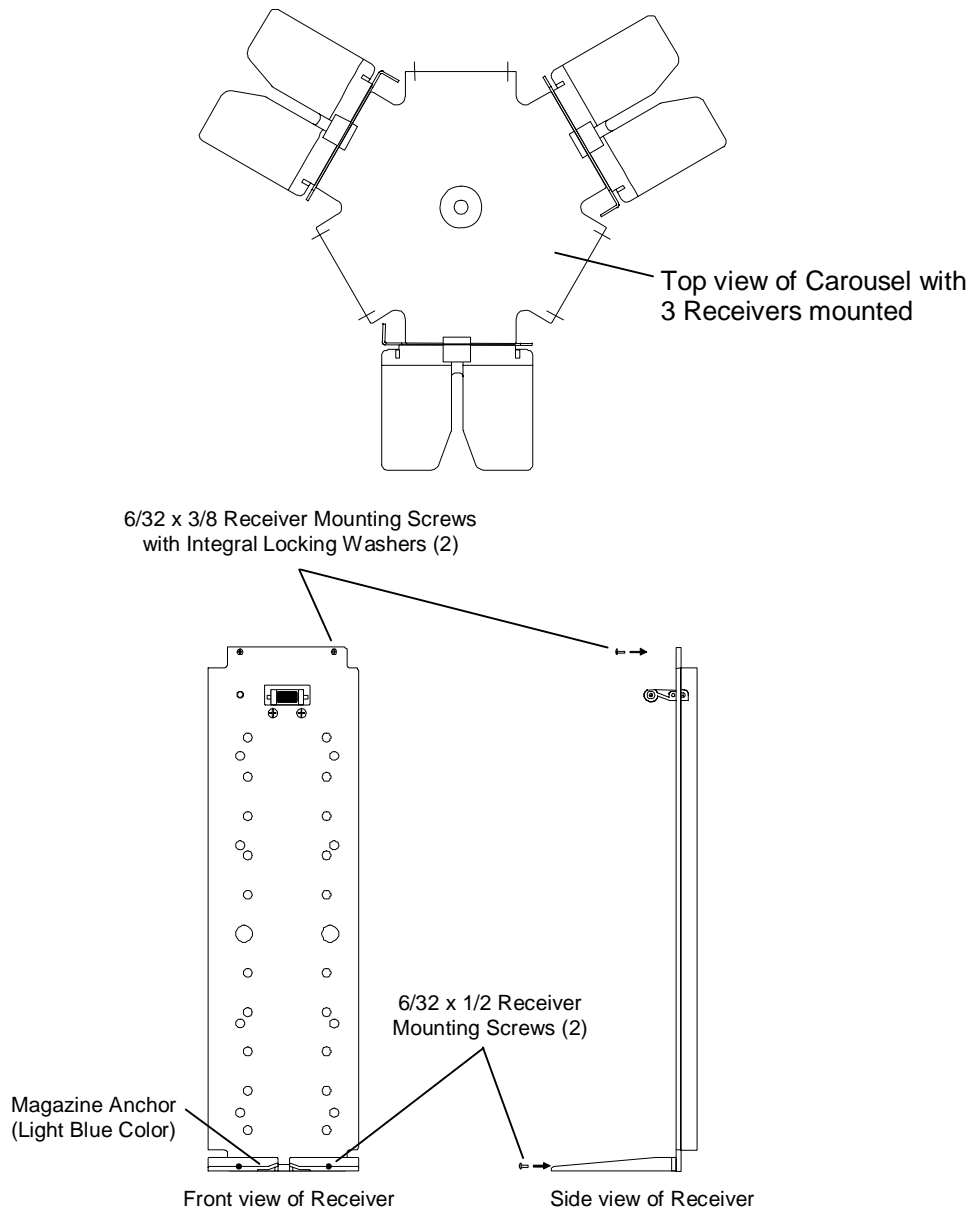
Figure 9-8   Receiver Assemblies

9.2.1.3 Model 58132 to 58264, 68120 to 68240 or 88132 to 88264 Expansions

This procedure adds one Receiver Assembly to each of the three empty carousel faces on each carousel [6 Receiver Assemblies total].

Refer to Figure 9-9.

Top view of Carousel with 3 Receivers mounted

6/32 x 3/8 Receiver Mounting Screws with Integral Locking Washers (2)

6/32 x 1/2 Receiver Mounting Screws (2)

Magazine Anchor (2) (Light Blue Color)

6/32 x 1/2 Receiver Mounting Screws (2)

Front view of Receiver
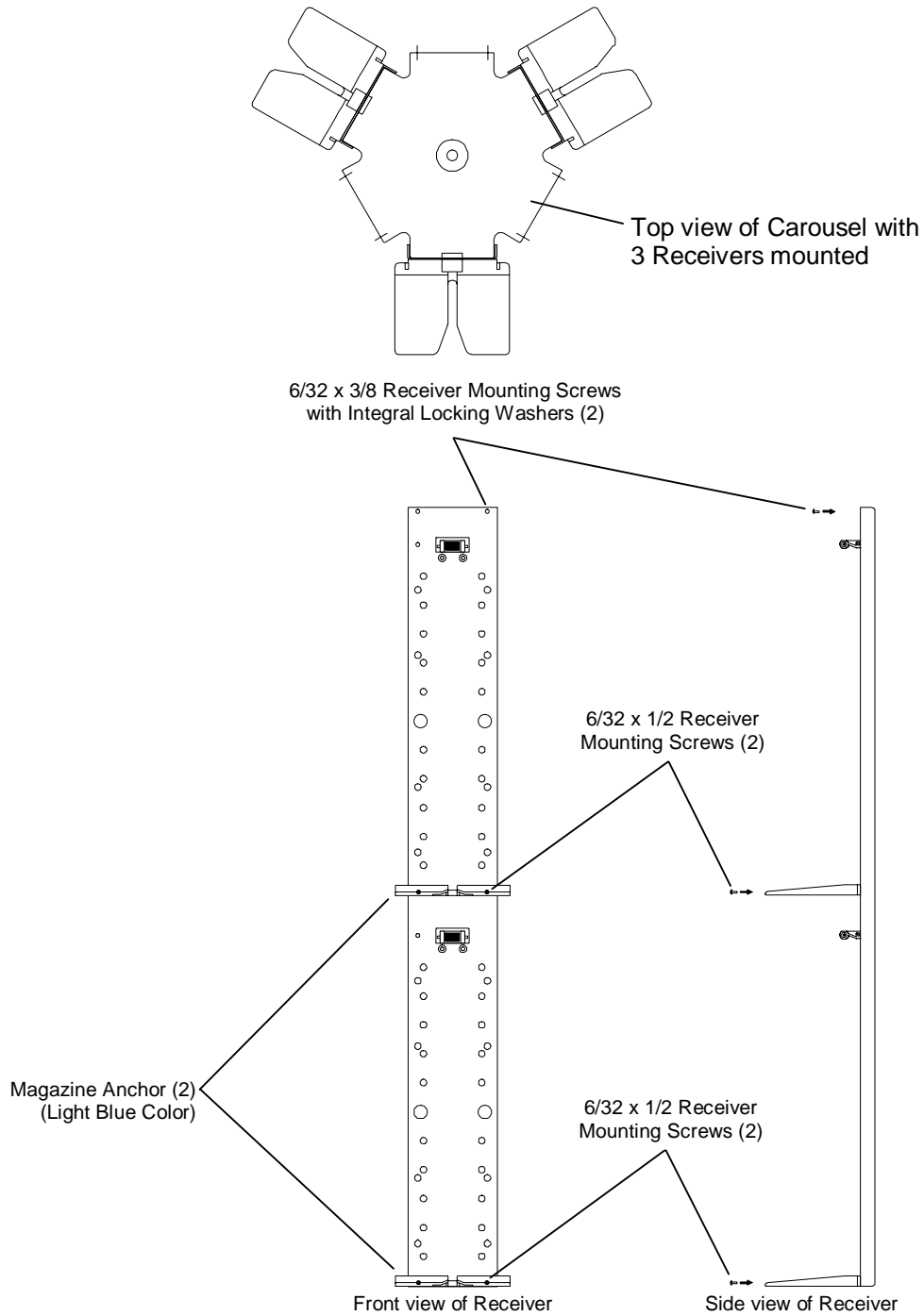
Side view of Receiver

Figure 9-9   Receiver Assemblies

1. Turn off the TLS power and remove the power cord.

2. Open the cabinet door.

3. Reach into the cabinet and rotate the right side Carousel by hand until an empty Carousel face is facing you.

4. Position a Receiver over the empty Carousel face and align the mounting screw holes.

5. Insert two 6-32 x 3/8-inch screws (with integral lock washers) into the top set of Receiver mounting screw holes, then securely tighten with a number 2 Phillips screwdriver.

6. Position a Magazine Anchor (Blue color) at the bottom of the receiver and align the mounting screw holes.

7. Insert two 6-32 x 1/2-inch screws through the Magazine Anchor and into the bottom set of Receiver mounting screw holes, then securely tighten with a number 2 Phillips screwdriver.

8. Position a Magazine Anchor (Blue color) in the middle of the Receiver and align the mounting screw holes.

9. Insert two 6-32 x 1/2-inch screws through the Magazine Anchor and into the middle set of Receiver mounting screw holes, then securely tighten with a number 2 Phillips screwdriver.

10. Rotate the Carousel by hand 60 degrees to access the next empty Carousel face.

11. Repeat steps 4 through 9 until three Receiver Assemblies are installed on all six Carousel faces of both Carousels.

12. Proceed to Section 9.2.2. of this chapter.

CAUTION

Do not apply power at this time.

9.2.2   Entering the Update Password

CAUTION

After installing new hardware to change the configuration of a library, to prevent possible damage to the unit, open the cabinet door before applying power. When the cabinet door is open, the carriage will not move when power is applied. The unit must be reconfigured for the new hardware, before the carriage is allowed to move under its own power.

---

1. Open the cabinet door.

2. Reconnect the power cord and turn on the TLS power.

3. Follow the instructions in Section 5.3.1 to enter `Update` as the password.

4. Follow the instructions in Section 9.2.3 to reconfigure the TLS.

9.2.3   Reconfiguring the Model Number

NOTE

If the TLS is restricted, it may not be possible to change the TLS model number in the `Configuration\Advanced\Changer\Mechanics` *menu. See Section 5.1 for details about restricted units.*

1. Press the MENU key once to display the `Top Menu`, with the pointer in the left margin of the LCD pointing to `Configuration`.

2. Press the ENTER key to enter the `Configuration` menu.

NOTE

See the TLS-5000/6000/8000 Installation and Operation Manual (Qualstar document number 501450) for complete details about the `Configuration` *menu.*

3. Press the ENTER key to enter the `Configuration\Advanced` menu.

4. Press the ENTER key to enter the `Configuration\Advanced\Changer` menu.

5. Press the ▼ (DOWN) key repeatedly to move the pointer to `Mechanics`, then press the ENTER key to enter the `Configuration\Advanced\Changer\Mechanics` menu. If necessary, press the ▼ (DOWN) key to move the pointer to Model.

6. Make sure that the cabinet door is open, then press the ENTER key to begin editing the model number.

7. Press the ▲ (UP) or ▼ (DOWN) key repeatedly to change the model number to match the new hardware configuration (e.g. from `TLS-6210` to `TLS-6220`).

8. Close the cabinet door. (The Carriage remains stationary.)

9. Press the MENU key, then press the EXIT key to exit the menu system. (The display indicates that the unit must be recalibrated.)

Press the MENU key to return to the `Top Menu`.

9.2.4   Recalibrating the Unit

Follow the instructions in Section 5.3.2 to execute the `Private` menu's `CALIBRATE` command, to update the TLS configuration to match the newly-installed hardware.

9.2.5   Clearing the Password

Follow the instructions in Section 5.3.3 to execute the `Private` menu's `CLEAR AC-CESS` command, to remove the password (`Update`) and prevent unauthorized access to the `Private` menu.

9.3   Barcode Reader

Barcode readers are standard on all dual bay libraries and on single bay models 5433, 5466, 6430, 6460, 8433 and 8466. Barcode readers may be added to all other models. Adding a barcode reader should take less than 30 minutes.

Installing a barcode reader is a six-step procedure:

1.   Install the Barcode Reader hardware.

2.   Enter `Update` for the password in the Private menu.

3.   Edit the `BCR` value in the `Configuration\Advanced\Changer \Mechanics` menu.

4.   Clear the password (`Update`) to prevent unauthorized access to the `Private` menu.

5.   Edit the `LabelCheckChar` value in the `Configuration\Advanced \Changer` menu.

6.   Test the Barcode Reader.

9.3.1   Required Parts and Tools

- **One Barcode Reader Kit:**
  Qualstar P/N 500983-04-4 for TLS-6000 and 68xxx Models
  Qualstar P/N 500983-05-1 for TLS-5000, 58xxx, 8000 and 88xxx Models

- **One Number 1 Phillips Screwdriver**

- **One TLS-5000/6000/8000 Installation and Operation Manual (Qualstar Document number 501450)**

NOTE

A barcode reader expansion kit contains a Barcode Reader, with attached Mounting Plate and cable, and three 4-40 x 1/4-inch pan-head screws.

9.3.2   Barcode Reader Installation

Follow the instructions in this Section to add a barcode reader to a TLS that currently does not have one (first-time installation). The Barcode Reader mounts on the underside of the Carriage Assembly (Figure 9-10).

NOTE

It is not necessary to remove the Carriage Assembly from the TLS before installing a Barcode Reader.

Do not remove the bracket from the Barcode Reader. If the bracket is removed, it will not be obvious how to replace it properly.
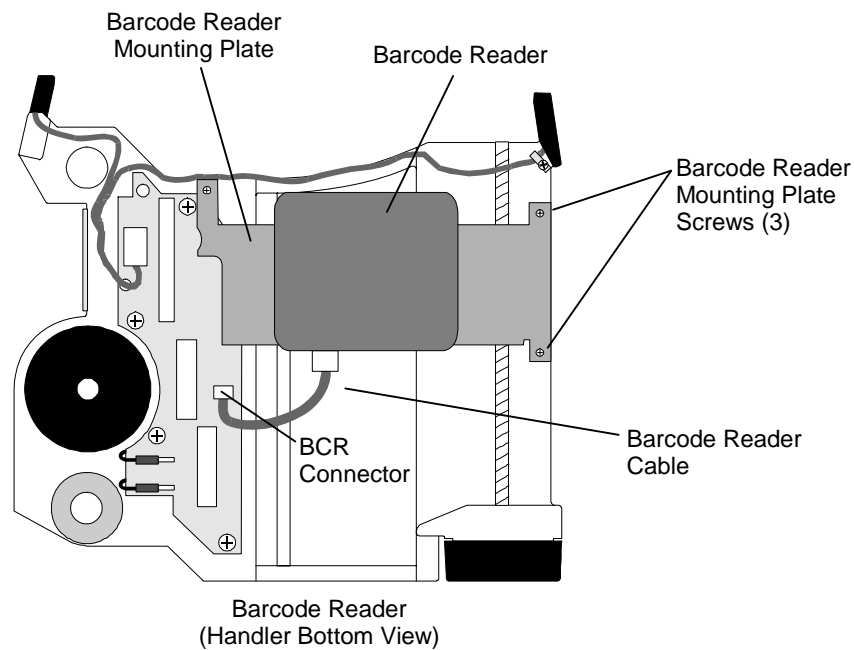
Barcode Reader
Mounting Plate

Barcode Reader

Barcode Reader
Mounting Plate
Screws (3)

BCR
Connector

Barcode Reader
Cable

Barcode Reader
(Handler Bottom View)

Figure 9-10   Barcode Reader

9.3.2.1 Installing the Barcode Reader Hardware

Refer to Figure 9-10.

1. Turn off the TLS power and remove the power cord.

2. It may be necessary to manually lower or raise the Carriage Assembly so that it is approximately 6 inches from the top of its vertical range of motion. Gently grasp the Carriage Assembly and lift it, or push down, to move it.

3. Position the Barcode Reader under the Carriage Assembly, with the mounting holes in the Mounting Plate facing up, and the Barcode Reader's cable jack facing the cabinet door.

4. Align the mounting screw holes in the Barcode Reader Mounting Plate with the mounting screw holes in the Carriage Assembly.

5. Install all three 4-40 x 1/4-inch pan-head Barcode Reader Mounting Plate screws. Use a number 1 Phillips screwdriver to securely tighten the mounting screws.

6. If the supplied cable is not already connected to the Barcode Reader, connect it to the cable jack on the rear of the Barcode Reader. The cable's connector is keyed, but make certain that all pins are engaged.

7. Connect the Barcode Reader cable to the BCR connector on the underside of the Carriage Assembly (Figure 9-10). The cable's connector is keyed, but make certain that all pins are engaged. (It may be necessary to manually lift the Carriage Assembly to see the BCR connector on the Carriage Assembly PCBA).

9.3.2.2 Disabling the Master Security Lock

Follow the instructions in Section 5.2 to disable the Master Security Lock.

9.3.2.3 Entering the Password

Follow the instructions in Sections 5.3.1 to enter the `Update` password.

9.3.2.4 Editing the BCR Value

NOTE

If the TLS is restricted, it may not be possible to change the BCR value in the `Configuration\Advanced\Changer\Mechanics` menu. See Section 5.1 for details about restricted units.

1. Press the MENU key to display the `Top Menu`. The pointer in the left margin of the LCD should be pointing to `Configuration`.

2. Press the Enter key to enter the `Configuration` menu.

3. Press the Enter key to enter the `Configuration\Advanced` menu.

4. Press the Enter key to enter the `Configuration\Advanced\Changer` menu.

5. Press the ▼ (DOWN) key repeatedly to move the pointer to `Mechanics`.

6. Press the Enter key to enter the `Configuration\Advanced\Changer\Mechanics` menu.

7. Use the ▼ (DOWN) key to move the pointer to `BCR`.

8. Open the cabinet door to defeat the DOOR security lock.

9. Press the Enter key to begin editing the `BCR` value.

10. Press the ▲ (UP) or ▼ (DOWN) key to change the `BCR` value from `NONE` to `TLS: WA3700/B-2221`.

11. Close the cabinet door.

12. Press the MENU key to return to the `Top Menu`.

9.3.2.5   Clearing the Password

Follow the instructions in Section 5.3.3 to execute the Private menu's `CLEAR AC-CESS` command, to remove the password (`Update`) and prevent unauthorized access to the Private menu.

9.3.2.6   Barcode Label Check Characters

Follow the instructions in Chapter 7 of the TLS-5000/6000/8000 Installation and Operation manual (501450) to properly configure the `LabelCheckChar` value.

9.3.2.7   Testing the Barcode Reader

1. Turn the TLS power off, then open the cabinet door.

2. Insert a labeled tape in location A01 (1A01 for carousel units).
Refer to the end of Chapter 3 in the Installation and Operation Manual (Qualstar document number 501450) for tape cartridge location diagrams.

3. Close the cabinet door, then turn the TLS power on.
If the Barcode Reader is not correctly connected to the Carriage Assembly, the error message "Barcode Reader Failure" appears on the front panel display. If this occurs, turn the TLS power off, open the cabinet door, check the connections at both ends of the Barcode Reader cable, then repeat this step.

4. Wait for the Handler to stop moving.

5. Press the MENU key to display the `Top Menu`.

6. Use the ▼ (DOWN) key to move the pointer to `Operation`.

7. Press the ENTER key to enter the `Operation` menu.

8. Use the ▼ (DOWN) key to move the pointer to `Element Status`.

9. Press the ENTER key to enter the `Operation\Element Status` menu.
(The pointer should be pointing at `Display`.)

10. Press the ENTER key to enter the
    `Operation\Element Status\Display` menu.

11. Use the ▼ (DOWN) key to move the pointer to `Location`.

12. Press the ENTER key to start editing the `Location` value.

13. Enter A01 (1A01 for carousel units) as the `Location` value.
    If you are unfamiliar with the value editing process, refer to the Editing Values
    section of Chapter 6 in the Installation and Operation Manual (Qualstar Docu-
    ment number 501450).

14. Press the EXIT key to stop editing the `Location` value.

15. Use the ▼ (DOWN) key to move the pointer to `Primary Tag`.

16. Verify that the `Primary Tag` value is set to YES.

17. Verify that the `Tag` value (immediately below the `Primary Tag` value) is the
    same as the label on the tape. If the `Tag` value is incorrect, try changing the `La-
    belCheckChar` value in the `Configuration\Handler` menu to its other
    option (YES or NO), then repeating this step.

18. Press the MENU key, then press the EXIT key to exit the menu system.