TL82X/TL893/TL896 Automated Tape Library for DLT™ Cartridges

Facilities Planning and Installation Guide

EK-TL820-PG

Revision C01

EK-TL820-PG, Revision C01, March 14, 1997, Made in USA.

FCC STATEMENT

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.

Any changes or modifications made to this equipment may void the user's authority to operate this equipment.

Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA (DIGITAL APPARATUS)
Interference-Causing Equipment Standard
ICES-003 Issue 2

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cer apparcil numerique de la classe A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

CISPR-22 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.

ACHTUNG!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmassnahmen verantwortlich ist.

ATTENTION!

Ceci est un produit de classe A. Dans un environment domestique, ce produit peat causer des interférences radio lectriques. Il appartienl alors a l'utilisateur de prendre les mesures appropriées.

NOTICE FOR USA AND CANADA ONLY

If shipped to USA, use the UL LISTED power cord specified below for 100-120 V operation. If shipped to CANADA, use the CSA CERTIFIED power cord specified below for 100-120V operation.

Plug Cap	Parallel blade with ground pin (NEMA 5-15P Configuration)
Cord	Type: SJT, three 16 or 18 AWG wires
Length	Maximum 15 feet
Rating	Minimum 10 A, 125 V

ATTENTION

LIRE LA REMARQUE DANS LE MODE D'EMPLOI

REMARQUE

CETTE REMARQUE NE CONCERNE QUE LES ÉTATS-UNIS ET LE CANADA.

En cas d'envoi aux États-Unis, utiliser le cordon d'alimentation certifié UL et convenant pour 100-120 V.

En cas d'envoi au CANADA, utiliser le cordon d'alimentation CERTIFIÉ CSA et convenant pour 100-120 V.

Fiche	Broches paralléus avec une broche de mise à la terre (configuration NEMA 5-15P)
Cordon	Type: SJT, trifilaire 16 ou 18 AWG
Longeur	Maximum 15 pieds
Capacité	Minimum 10 A, 125 V

ZU IHRER SICHERHEIT

Vorsicht

Um Feuergefahr und die Gefahr eines elektrischen Schlages zu vermeiden. darf das Gerät weder Regen noch Feuchtigkeit ausgesetzt werden.

Um einen elektrischen Schlag zu vormeiden, darf das Gehäuse nicht geöffnet werden. Überlassen Sie Wartungsarbeiten stets nur einem Fachmann.

Achtung

Da der interne Laserstrahl in lhre Augen eindringen und Verletzungen verursachen kann, darf das Gehäuse nicht selbst geöffnet werden. Überlassen Sie Wartungearbeiten stets nur einem Fachmann.

Die Verwendung von Brillen, Kontaktlinsen usw.vergrössert die Gefahr.

Zur besonderen Beachtung

Zur Sicherheit

Sollte ein fester Gegenstand oder Flüssigkeit in das Geräteinnere gelangen, trennen Sie das Gerät von der Wandsteckdose ab und lassen Sie es von einem Fachmann überprufen, bevor Sie es weiter verwenden.

Zum Abziehen des Kabels fassen Sie stets am Stecker und niemals am Kabel selbst an.

Zur Aufstellung

Stellen Sie das Gerät weder auf einer weichen Unterlage (z. B. Decke, Teppich) noch in der Nahe von Vorhangen, Tapeten usw, auf, da hierdurch die Ventilationsöffnungen blockiert werden können.

Zur Reiningung

Verwenden Sie zur Reiningung des Gehäuses, des Bedienungspultes und der Bedienungselemente ein trockenes, weiches Tuch oder ein weiches, leicht mit mildem Haushaltsreiniger angefeuchtetes Tuch. Lösemittel wie Alkohol oder Benzin dürfen nicht verwendet werden, da diese die Gehäuseoberfläche ungreifen.

LASER STATEMENT

CLASS 1 LASER PRODUCT

CAUTION - This product contains a Class II laser. Laser light - DO NOT stare into beam. Avoid Exposure - Laser Light is emitted from the bar code scanner.

CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous exposure.

LASER KLASSE 1

VORSICHT : Dieses Produkt Enthdlt Einen Laser Der Kategorie II. Laserstrahlen - Der Strichcode-scanner Gibt Laserstrahlen aus. VERMEIDEN SIE jeden Blickkontakt und direkten kvrperlichen Kontakt mit diesen Strahlen.

VORSICHT : Ein nicht ordnungsgemd_er (siehe hier enthaltene Anweisungen) Einsatz bzw. Dnderungen der Betriebsleistung kvnnen einen gesundheitsgefdhrdenden Kontakt zur Folge haben.

APPAREIL À LASER DE CLASSE 1

ATTENTION : ce produit relhve de la classe laser II. Rayonnement laser - NE PAS fixer des yeux le rayon. Eviter les expositions - Le rayonnement laser est imis‘ partir du lecteur optique de code barre.

ATTENTION : L’utilisation de contrtles ou d’ajustements de performance des procidures autres que ceux indiquis ici peut entranner une exposition dangereuse.

PRODUCTO LÁSER DE CLASE 1

¡ATENCIÓN! Este producto contiene laser de clase II. Luz de laser - NO mire el rayo. Evite el contacto con la luz: la luz de laser se emite desde el explorador de código de barras.

¡ATENCIÓN! El uso de los controles o ajustes para realizar procedimientos que no son especificados puede provocar una situación peligrosa.

LUOKAN 1 LASERLAITE

ATTENZIONE: questo prodotto emette una luce laser di Classe II. NON guardare il facsio di luce ed evitare di esporsi alla fonte del laser. Il fascio di luce laser h emesso dal dispositivo di scansione del codice a barre.

ATTENZIONE: l’uso di comandi o regolazioni per eseguire le procedure che non siano quelli specificati in questa documentazione pur causare rischi all ‘incolumit’ delle persone.

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Introduction 1

Purpose

This manual describes facility preparation and first-time installation of a TL820, TL822, TL826, TL893, or TL896 automated tape library. These libraries are identical except for the model and number of Digital Linear Tape (DLT™) drives installed, and the DLT™ cartridge capacity. Libraries with more tape drives have less cartridge capacity.

The term TL82X / TL893 / TL896 refers to all five models of libraries.

The *TL82X/TL893/TL896 Facilities Planning & Installation Guide* is divided into the following sections:

- Chapter 1, "Introduction," describes the purpose of this manual, provides a list of its contents and a list of related documentation.
- Chapter 2, "Library Site Requirements," provides a description of the library, and flooring, power, humidity, and cabling requirements.
- Chapter 3, "Shipping and Handling," provides shipping dimensions, and describes how to unpack and move the library to its final installation area.
- Chapter 4, "Installing the TL82X / TL893 / TL896 Library," lists the tools required, and provides the procedures necessary for installing and testing the library prior to operation.

Conventions Used in this Guide

WARNING ***When the warning icon accompanies text, it indicates that a potential hazard to your personal safety exists and is included to help prevent injuries.***

CAUTION ***When the caution icon accompanies text, it indicates that a potential hazard to equipment or data exists and is included to help prevent damage.***

The abbreviation lb. is used to indicate U.S. pounds for measurement of weight. Metric equivalents are also included for any measurement of weight.

The symbol ° is used to indicate measurement of temperature in degrees and measurement of angles in degrees. Measurements of temperature are provided in both Fahrenheit and Centigrade.

The symbol " is used to indicate a measurement of distance in inches, and the symbol ' is used to indicate a measurement of distance in feet. Metric equivalents are also included for any measurement of distance.

References

Documentation and Contacts

To obtain further information and / or copies of documentation on this product, contact:

U.S. Software Supply Business
Digital Equipment Corporation
10 Cotton Road
Nashua, New Hampshire 03063-1260

The part number of each document will be required at the time of order.

Table 1: Related Documentation

Document No.	Document Title	Document Description
EK-TL820-OP	TL82X / TL893 / TL896 Operator's Guide	Defines the control functions, operational procedures and end user maintenance procedures for the libraries.
EK-TL820-SM	TL82X / TL893 / TL896 Diagnostic Software User's Manual	Describes how to install and use the TL82X / TL893 / TL896 Diagnostic Software Package, developed for field service personnel.
EK-TL820-IG	TL82X / TL893 / TL896 Software Interface Guide	This guide is for software engineers and programmers developing applications that control the libraries.
EK-TL820-SV	TL82X / TL893 / TL896 Field Service Manual	Contains procedures for repair / replacement of faulty components and guidelines for periodic maintenance.
6207125	TL82X / TL893 / TL896 IOD Installation Instructions	This document describes how to install the Inport / Outport Device (IOD).
6207217	TL82X / TL893 / TL896 Cabinet to Cabinet Mounting Instructions	This document describes how to install a multi-unit library system.
EK-TZ87-OM	TZ87 Tape Subsystem Owners Manual	This document describes the TZ87 tape drive and provides operating and troubleshooting procedures.
EK-TZ88-OM	TZ88 Tape Subsystem Owner's Manual	This document describes the TZ88 tape drive and provides operating and troubleshooting procedures.
EK-TZ89N-UG	TZ89 DLT™ Series Tape Drive User's Guide	This document describes the TZ89 tape drive and provides operating and troubleshooting procedures.

On-Line Documentation

On-line documentation for the TL82X/TL893/TL896 libraries is available from the Digital Equipment Corporation, Shrewsbury MA world wide web site, in portable document format (.pdf) at:

http://www.shr.dec.com

SCSI 2 Specification

This Small Computer System Interface (SCSI) 2 communications specification is the proposed American National Standard for information systems, dated March 9, 1990. Copies may be obtained from:

Global Engineering Documents
2805 McGaw
Irvine, California 92714
(800) 854-7179 or (714) 261-1455

2 Library Site Requirements

TL82X/TL893/TL896 Library Description

The TL820, TL822, TL826, TL893, and TL896 libraries are automated tape libraries for DLT™ cartridges. These libraries are identical except for the model and number of Digital Linear Tape (DLT™) drives installed, and the DLT™ cartridge capacity. Libraries with more tape drives have less cartridge capacity.

The term TL82X / TL893 / TL896 refers to all five models of libraries.

Table 2 describes the different library configurations.

Table 2: Library Models

Library Model #	Number of Drives	DLT™ Drive Type	DLT™ Cartridge Capacity
TL820	3	TZ87	264
TL822	3	TZ88	264
TL826	6	TZ88	176
TL893	3	TZ89	264
TL896	6	TZ89	176

Table 3 describes the DLT™ tape drive specifications.

Table 3: Tape Drive Specifications

Model Number	Native Mode		With 2:1 Compression	
	Transfer Rate	Capacity	Transfer Rate	Capacity
TZ87	1.25 Mbytes / s	10 Gbytes	2.5 Mbytes / s	20 Gbytes
TZ88	1.5 Mbytes / s	20 Gbytes	3.0 Mbytes / s	40 Gbytes
TZ89	5 Mbytes / s	35 Gbytes	10 Mbytes / s	70 Gbytes

The basic library uses a SCSI or EIA / TIA-574 (RS-232 for 9-pin connector) serial link to interface with the host computer. The Multi-Unit Controller (MUC) allows up to five units to be connected together and driven by a single host. The Pass Through Mechanisms (PTMs) transfer cartridges between units.

Figure 1 through Figure 3 show the dimensions and major components of the TL82X / TL893 / TL896 libraries. The library has a front door that can be opened for easy bulk loading of bin packs, each containing a maximum of 11 cartridges. The bin packs are arranged on an eight-sided carousel providing two or three, bin packs per face, each containing multiple cartridges.

Each library also contains a robotic controller and a bar code reader for obtaining quick and accurate inventories. The Inport / Outport Device (IOD) allows single cartridges to transfer in and out of the library without interrupting operation.

The tape drives are mounted in the housing above the carousel and in-line with the carousel front face. A gripper moves horizontally on an extension axis which in turn is attached to vertical rails in the front door.

Upon receipt of the appropriate command from the host computer, the control electronics command the robotic mechanism to remove a cartridge from a storage bin, raise it up in front of a tape drive, and insert the cartridge into the drive. The host computer, also directs the tape drives by issuing commands such as read, write, unload and clean.

Note ***An automatic drive cleaning feature is available and can be enabled/disabled via the host or diagnostic software. Refer to Document EK-TL820-SM, TL82X/TL893/TL896 Diagnostic Software User's Manual, and read the discussion of this feature in the "Glossary."***

Figure 1: Library Front View

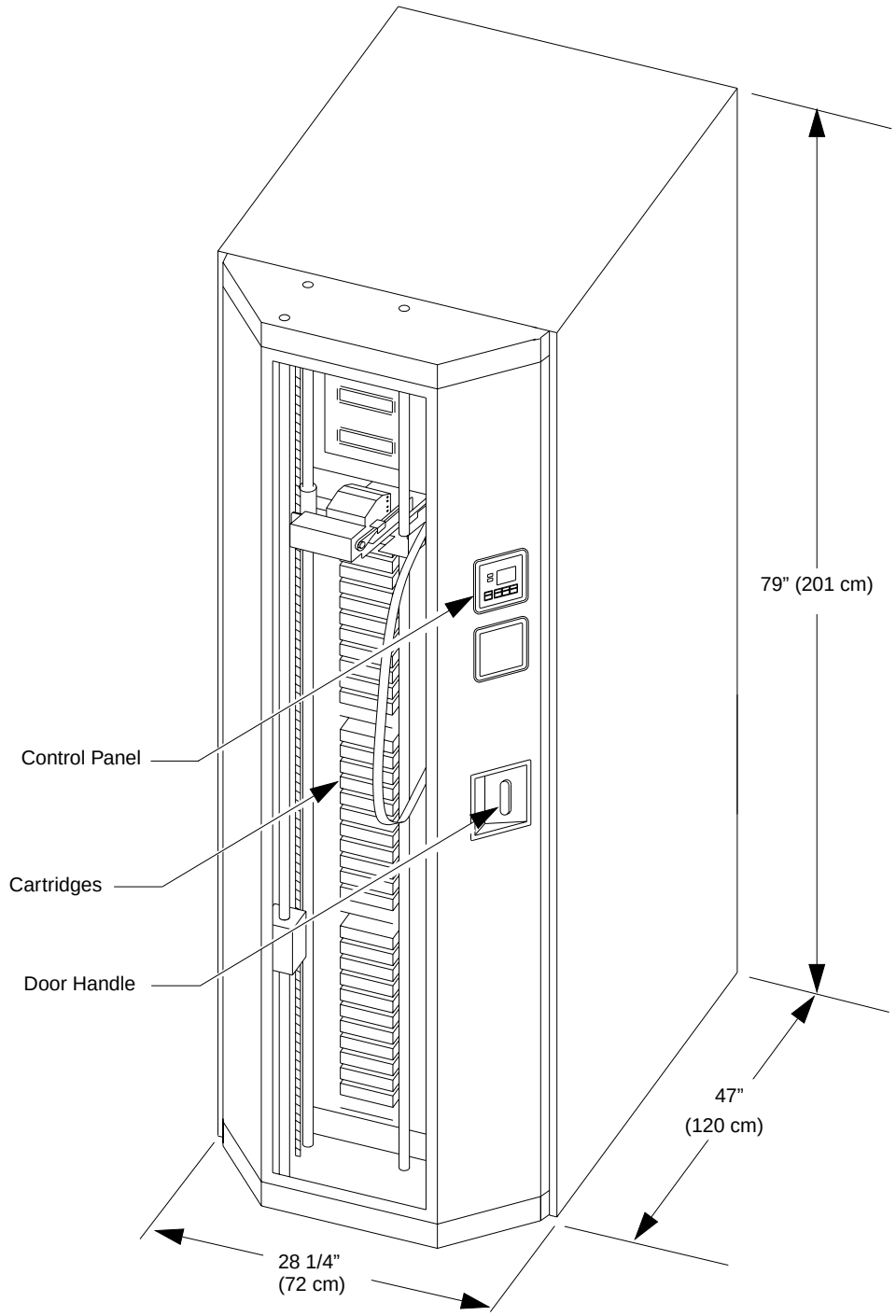


Figure 2: Library with Door Open

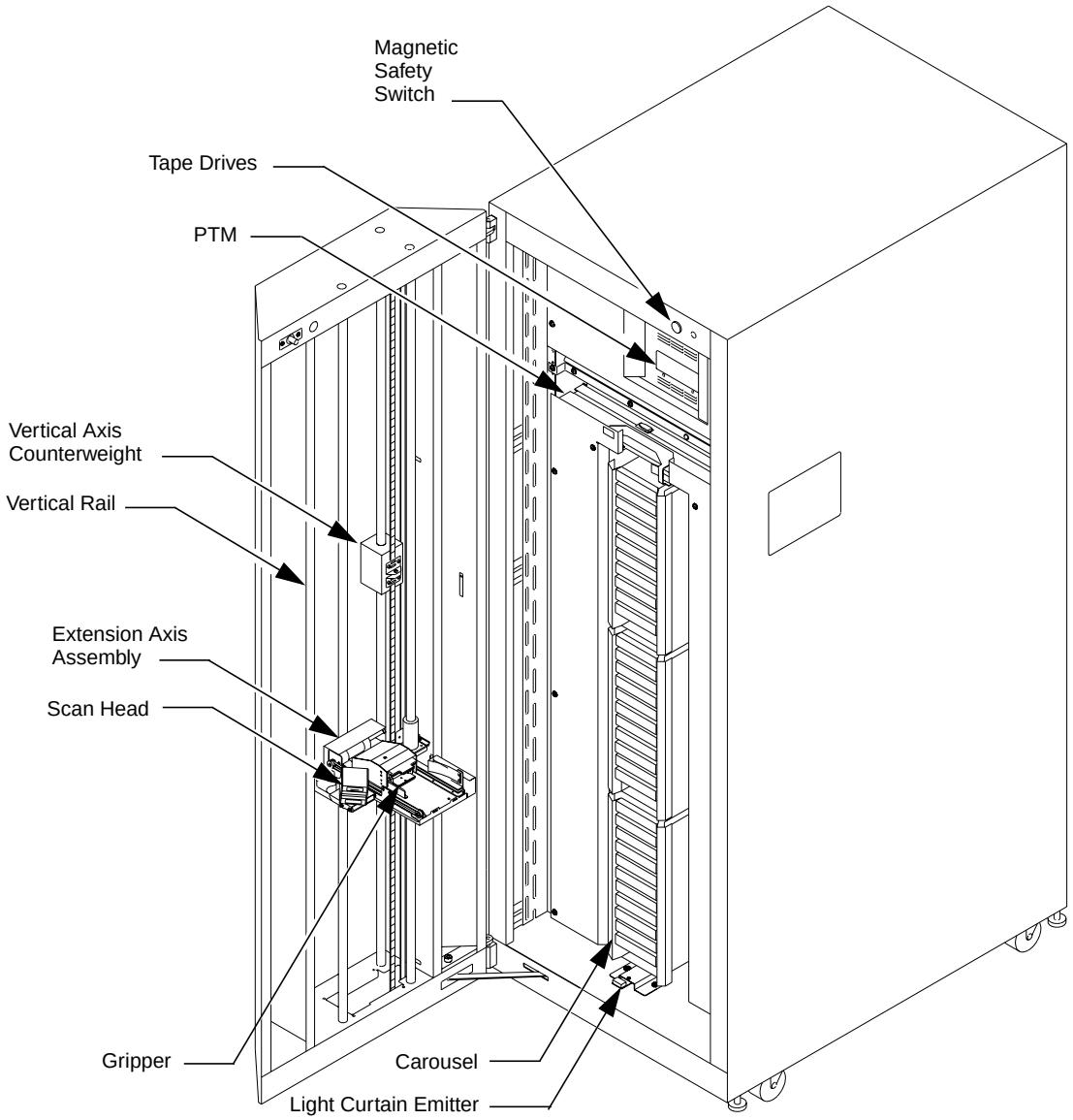
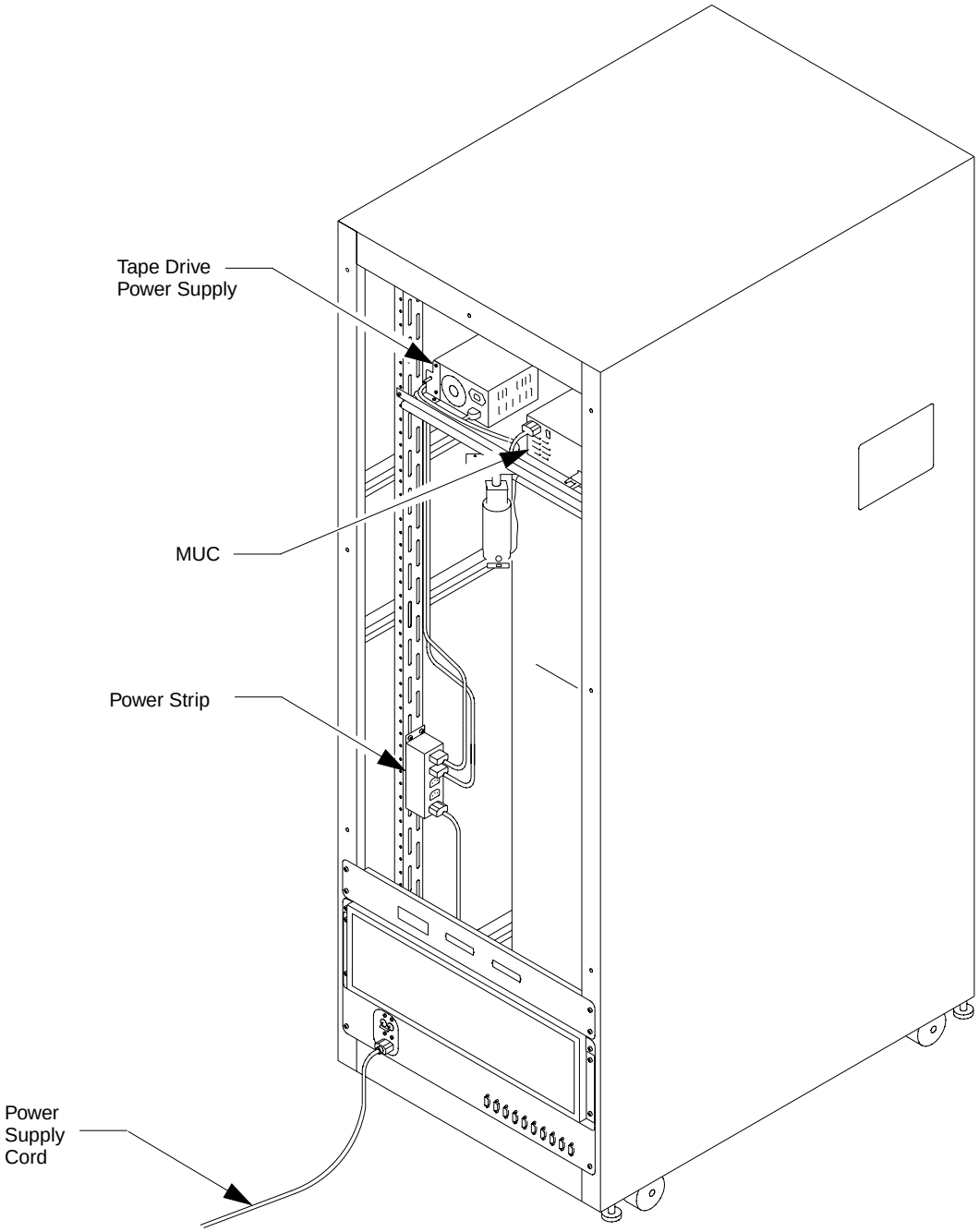


Figure 3: Library Rear View



(Note: TL820 Library Shown)

Floor Space Requirements

Single Unit

The minimum floor space requirement for a library is shown in Figure 4. Space needs to be allocated around the cabinet for access by an operator or service person.

Figure 4: Single-Unit Floor Layout

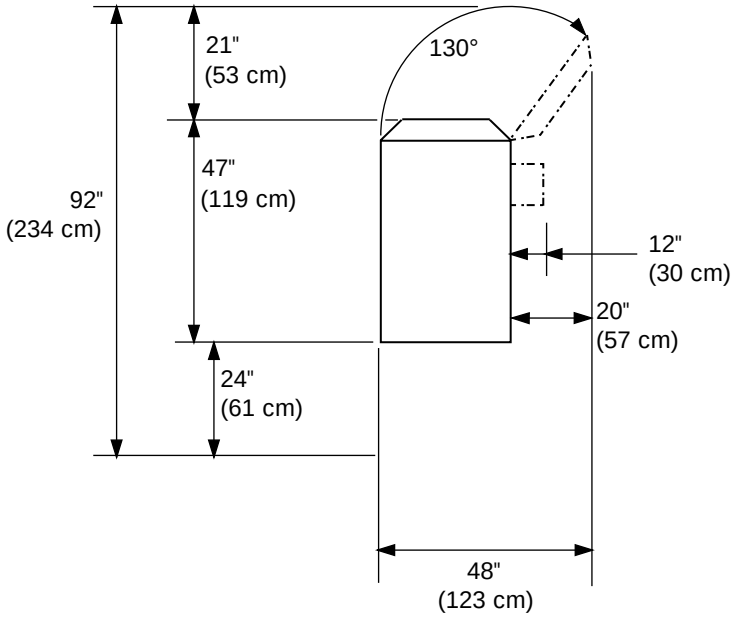


Table 4: Single-Unit Floor Space Requirements

Requirement	Floor Space Description and Location
21" (53 cm)	In front of the cabinet for the front door to open.
20" (51 cm)	Additional space needed to allow the door to open to its full 130°.
24" (61 cm)	Allows adequate air circulation for cooling the library.
12" (30 cm)	On the left side of the cabinet for IOD placement.

Multiple Units

The minimum floor space requirement for the multi-unit configuration is shown in Figure 5. Space needs to be allocated around the cabinets for access by an operator or service person.

Figure 5: Multi-Unit Floor Layout

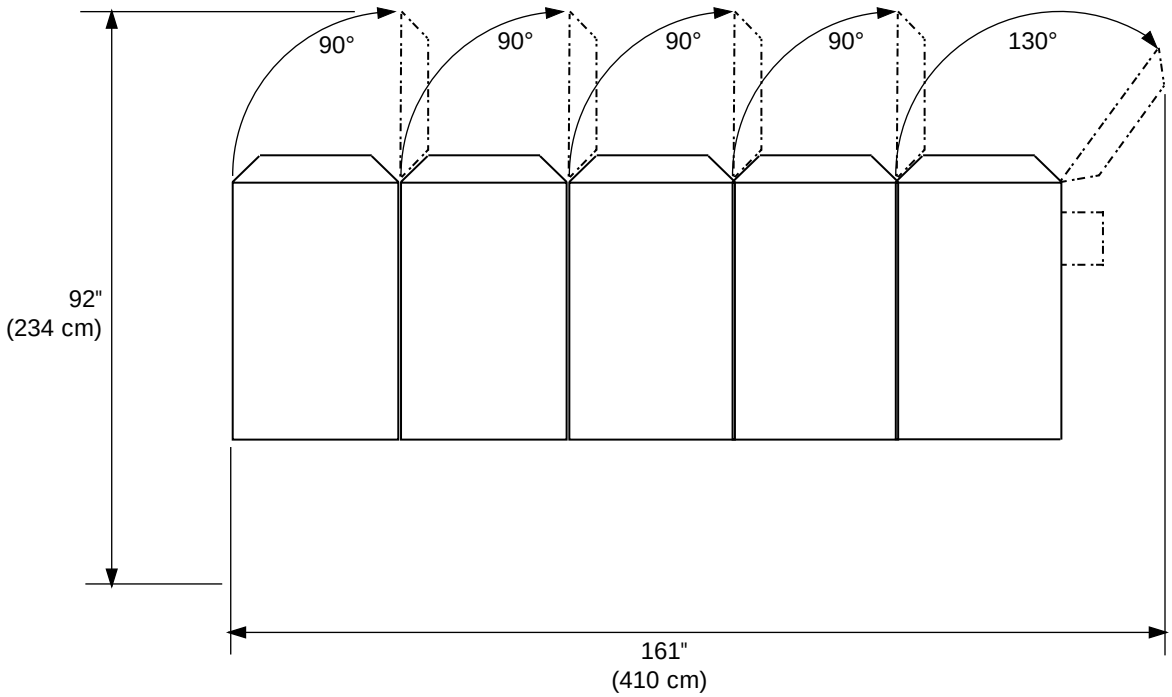


Table 5: Multi-Unit Floor Space Requirements

Requirement	Floor Space Description and Location
161” x 92” (410 x 234 cm)	Space required to accommodate five units in addition to the extra space needed for the IOD and to provide for opening the left-most front door to 130^{o}.

Floor Type

Any type of flooring is acceptable for the library as long as the following guidelines are taken into consideration:

- The floor must be reasonably level, not too compliant, and capable of supporting the weight of single or multi-unit configurations, such as typical computer room raised flooring.
- Carpeted flooring must have antistatic mats for each library and work areas at the front and rear of each unit. The antistatic mat, carpeting, and padding combined should not compress more than the library unit ground clearance of 0.75" (19 mm).
- If multiple units are to be attached, the floor must be reasonably flat to accommodate attachment and alignment of the units in a series.

Floor Loading

The floor must be able to support the full weight of a loaded cabinet. The combined weight includes the following:

- 800 lb. (360 kg) for the library.
- 132 lb. (60 kg) for the tape cartridges.

The weight is distributed on either the four casters or the four feet of the unit.

Floor Clearance

The cabinet has a nominal floor clearance of 0.75" (19 mm).

Note ***Do not attempt to move the library on carpeting that depresses more than the nominal clearance.***

Place stiff plastic or rubber mats on top of carpet prior to rolling the unit over it.

Doorway Clearance

The crated library has dimensions of 84.75” high by 36.88” wide by 56.38” deep (215.27 x 93.68 x 143.21cm). When moving the crated library, ensure that the hallways, doorways and rooms have adequate clearances.

WARNING ***Do not tilt the unit more than 10°.***

The uncrated library has dimensions of 79” high by 28.25” wide by 47" deep (201 x 72 x 120cm). When moving the library, ensure that the hallways, doorways and rooms have adequate clearances.

Since the uncrated library is 79" (2.01 m) high, it will clear a typical doorway when being moved on its own casters.

The cabinet is best able to go over inclines and door jambs when it is pushed from the front. When rolling the unit over cracks and door jambs, a sheet of stiff metal placed over the crack or door jamb may help it roll more easily.

Any side can be used to push the library, however, the preferred way is from the front or back. Special care should be taken to avoid pushing on the following non-structural portions:

- front door control panel
- front door window
- front door handle
- rear connector panel
- rear access panel

Power Requirements

AC power requirements for the maximum configuration are ~120VAC, 10A, 60 Hz nominal or ~230V, 5A, 50Hz nominal.

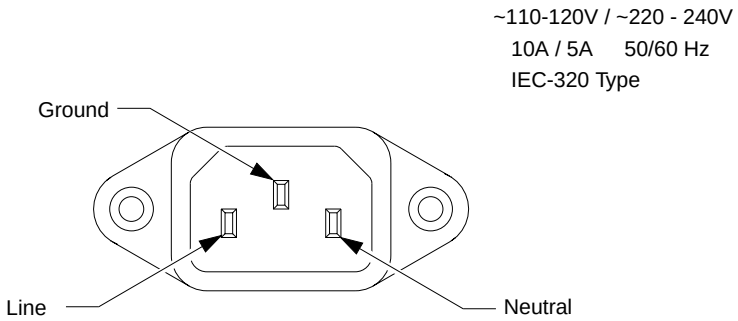
The library does not supply spike suppression or power factor correction. The unit needs to be on a power bus separate from any equipment which can cause large inrush currents (such as heavy manufacturing equipment).

The power distribution box contains a 10A circuit breaker (medium time-delay, magnetic, two pole) for overload protection of robotics branch outlets.

The library's autoranging motor and logic power supplies will accept single phase, 90 - 264VAC input power at 47 to 63 Hz. The fans are switchable between ~120V and ~230V via a voltage selection switch on the power distribution box.

The power inlet connector is a IEC-320 connector. For international applications you must replace the power cord set with a harmonized 3x2.0mm^2 power cord set that is approved by the country where used.

Figure 6: Library AC Power Receptacle



Humidity Requirements

For operation of the library, the room humidity must be kept between 30% and 85%, non-condensing. Refer to the specifications for the tape drives and cartridges for information about their humidity requirements.

Cabling

Power Cabling

The IEC-320 connector for connecting to a ~120V, 10A, 60 Hz line or a ~230V, 5A, 50Hz line extends through the rear connector panel on each library.

WARNING ***The library must be connected to an AC outlet that is properly grounded.***

Host SCSI Cabling

The TL820 SCSI port and SCSI addressing, and the rear panel cabling is shown in Table 6, and Figure 7 on page 2-14

The TL822 SCSI port and SCSI addressing, and the rear panel cabling is shown in Table 7, and Figure 8 on page 2-15

The TL826 SCSI port and SCSI addressing, and the rear panel cabling is shown in Table 8, and Figure 9 on page 2-16

The TL893 SCSI port and SCSI addressing, and the rear panel cabling is shown in Table 9, and Figure 10 on page 2-17

The TL896 SCSI port and SCSI addressing, and the rear panel cabling is shown in Table 10, and Figure 11 on page 2-18

Table 6: TL820 SCSI Port/ID

Library SCSI Port	Device	SCSI ID
B	TZ87 Tape Drive 2 (top)	5
	TZ87 Tape Drive 1 (middle)	4
A	TZ87 Tape Drive 0 (bottom)	3
	MUC	2

Figure 7: TL820 Rear Connector Panel Cabling

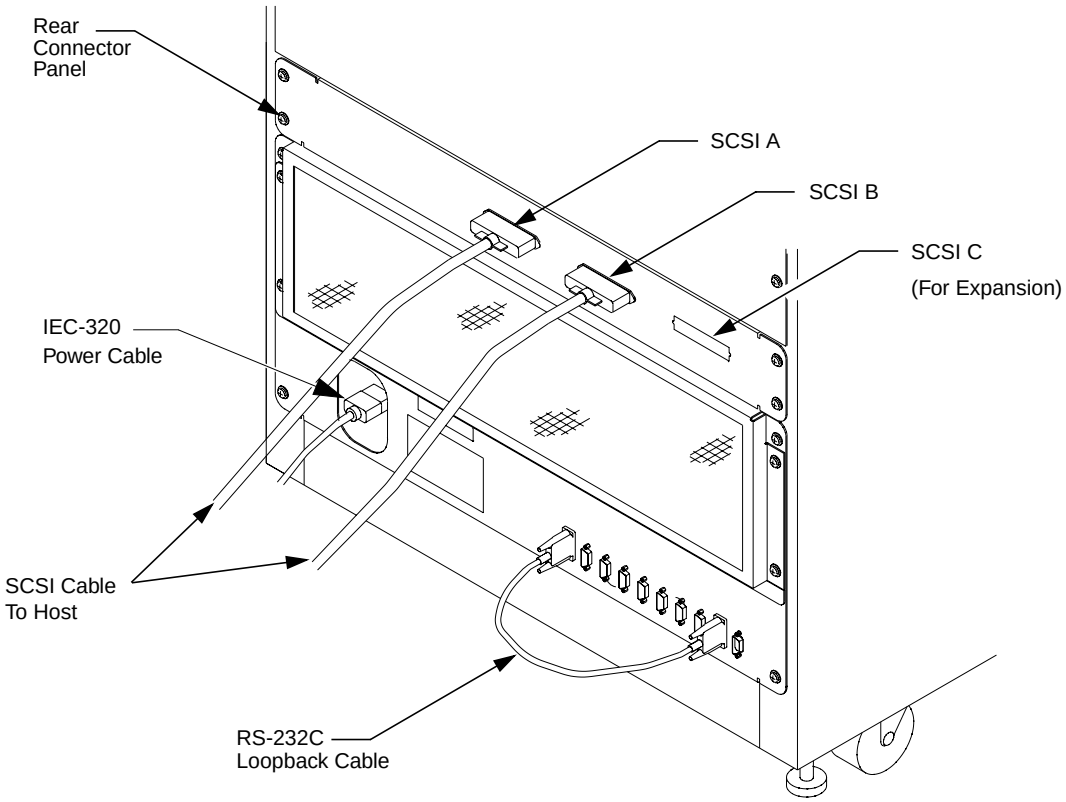


Table 7: TL822 SCSI Port/ID

Library SCSI Port	Device	SCSI ID
C	TZ88 Tape Drive 2 (top)	5
B	TZ88 Tape Drive 1 (middle)	4
A	TZ88 Tape Drive 0 (bottom)	3
	MUC	2

Figure 8: TL822 Rear Connector Panel Cabling

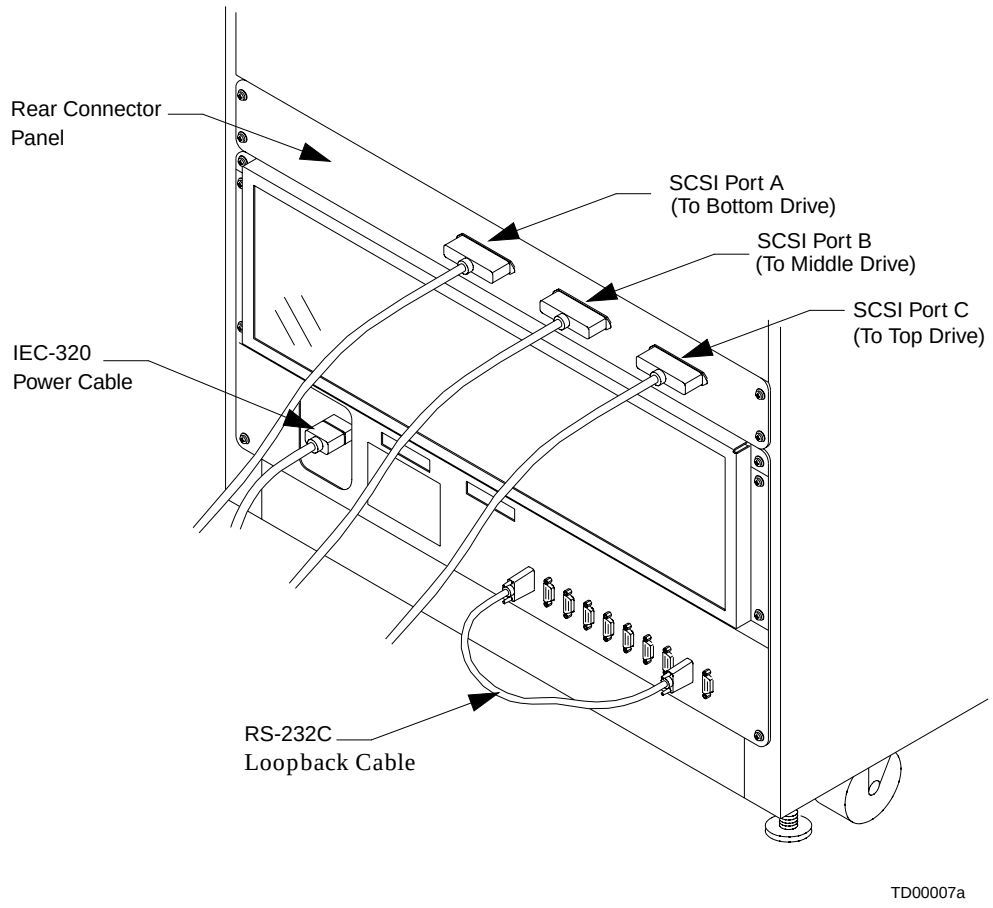


Table 8: TL826 SCSI Port/ID

Library SCSI Port	Device	SCSI ID
D	MUC	2
	TZ88 Tape Drive 5 (top)	5
E	TZ88 Tape Drive 4	4
F	TZ88 Tape Drive 3	3
A	TZ88 Tape Drive 2	5
B	TZ88 Tape Drive 1	4
C	TZ88 Tape Drive 0 (bottom)	3

Figure 9: TL826 Rear Connector Panel Cabling

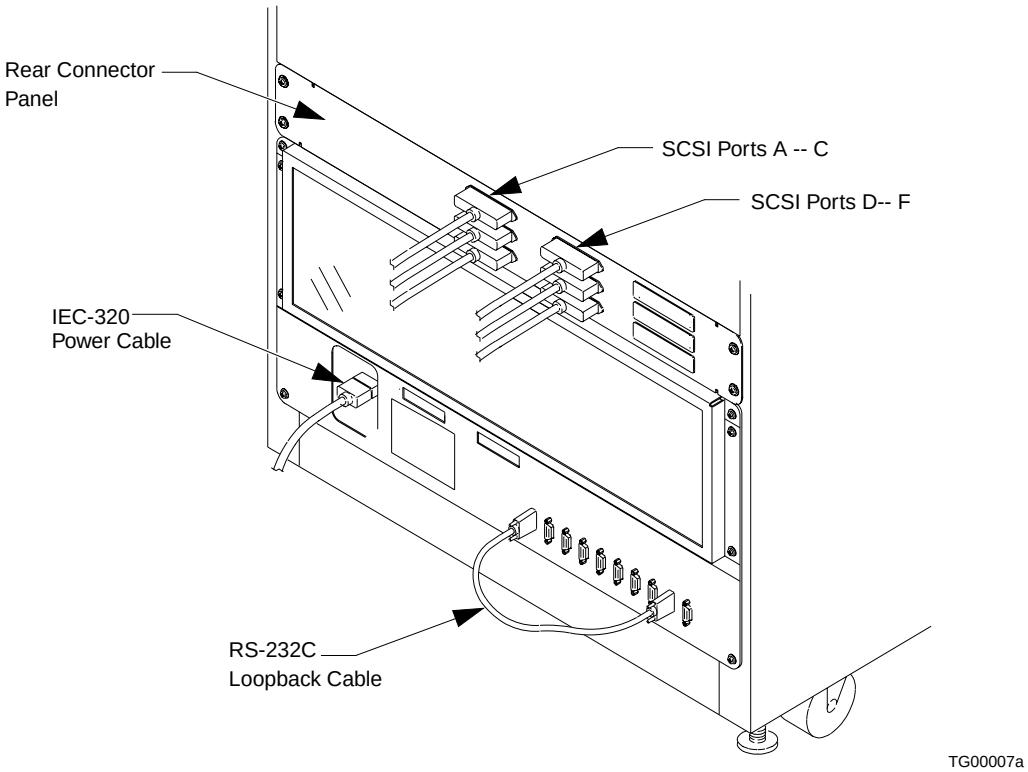


Table 9: TL893 SCSI Port/ID

Library SCSI Port	Device	SCSI ID
C	TZ89 Tape Drive 2 (top)	5
B	TZ89 Tape Drive 1 (middle)	4
A	TZ89 Tape Drive 0 (bottom)	3
	MUC	2

Figure 10: TL893 Rear Connector Panel Cabling

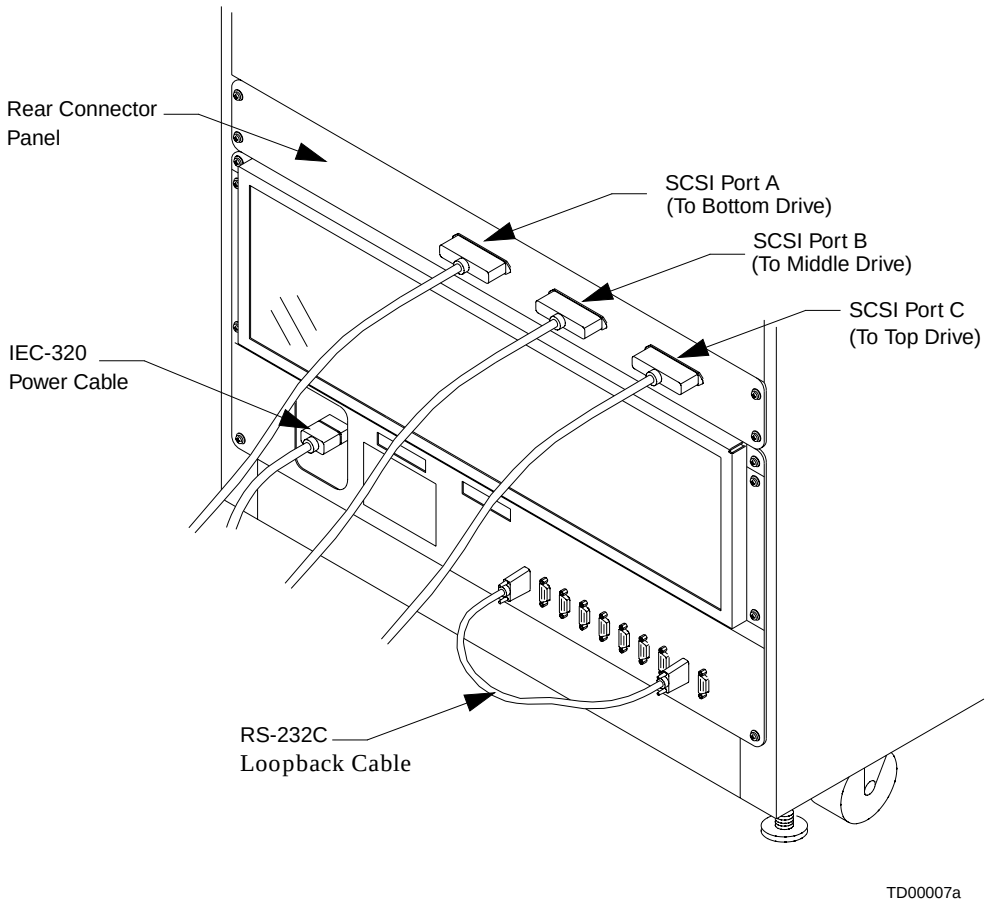
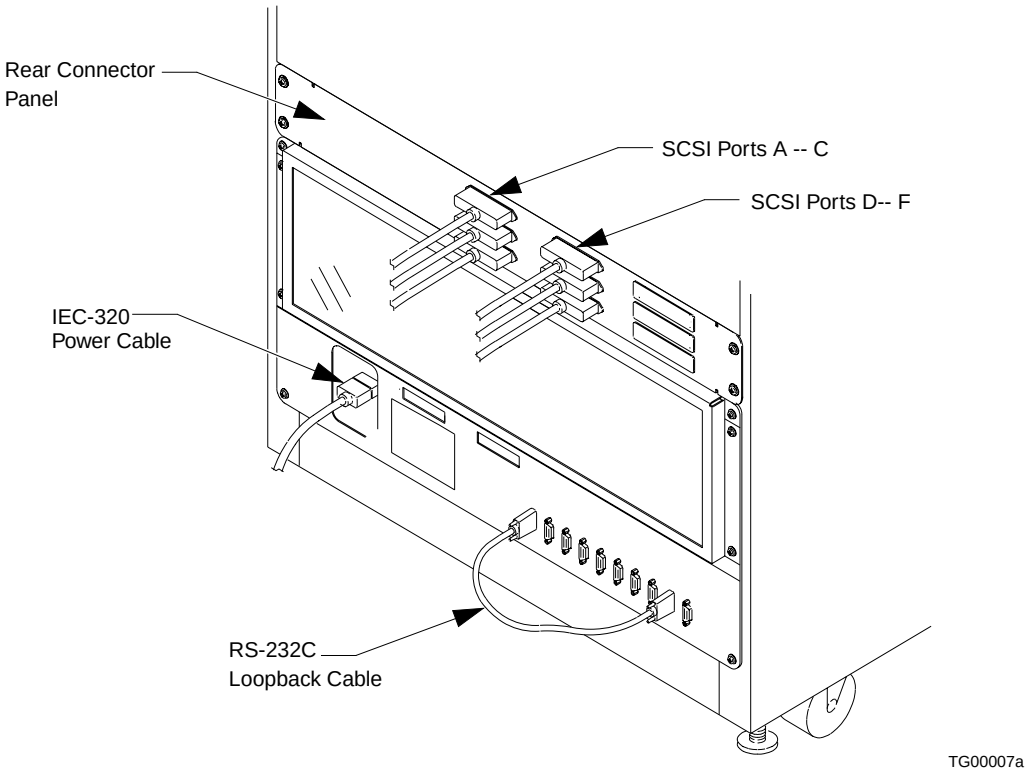


Table 10: TL896 SCSI Port/ID

Library SCSI Port	Device	SCSI ID
D	MUC	2
	TZ89 Tape Drive 5 (top)	5
E	TZ89 Tape Drive 4	4
F	TZ89 Tape Drive 3	3
A	TZ89 Tape Drive 2	5
B	TZ89 Tape Drive 1	4
C	TZ89 Tape Drive 0 (bottom)	3

Figure 11: TL896 Rear Connector Panel Cabling



Host Computer Communications

Two types of communications are possible to the host computer: EIA / TIA-574 serial (RS-232 for 9-pin connectors) and SCSI. Either method, when used with a MUC, allows a single cable from the host computer to control up to five units.

If the Multi-Unit Single Lun (MUSL) option is enabled (via the Diagnostic Software "CONFIG" menu), the set of units operate as a single library from the host perspective, with no distinction made between the component units.

Note ***Refer to the TL82X/TL893/TL896 Diagnostic Software User's Manual for more information on MUSL configuration.***

SCSI Communications with a MUC

Multi-unit configurations and single-unit configurations can use SCSI commands to communicate with the host.

Multi-Unit Configuration

With SCSI communications both control signals and data flow between the host computer and TL82X / TL893 / TL896 library are transmitted using the same SCSI cable. The SCSI cable is connected from the host computer to the library.

Note ***Host-to-library SCSI cabling is not supplied with the library.***

Single-Unit Configuration

For stand-alone units an RS-232 loop-back cable must be connected to the rear connector panel (see Figure 11 on page 2-18). The loop-back cable connects the MUC to the robotics control electronics.

SCSI Cabling

The TL820, TL822, and TL826 Libraries use 50-pin SCSI cables to connect to the host computer.

The TL893 and TL896 Libraries use 68-pin SCSI cables to connect to the host computer.

For reliable operation, all SCSI cabling and connectors must be shielded. This protects the bus integrity as well as minimizing electromagnetic interference emissions.

Chapter 4 of this manual provides more information on connecting the library to the host computer. The communications protocols and robotic command set for the TL82X / TL893 / TL896 library are based on the SCSI 2 specifications. See the SCSI 2 specifications and the *TL82X/TL893/TL896 Software Interface Guide* for more information.

Serial Communications

For serial communications, two cable connections are required between the TL82X / TL893 / TL896 library and the host computer:

- An EIA / TIA-574 serial cable is used to control communications between the host computer and the library,
- Separate SCSI cables are used for data flow between the host computer and the tape drives within the library.

The serial cable is connected from the host computer directly to the library. The SCSI cable is connected as described in "SCSI Communications with a MUC" on page 2-19.

Note ***The host-to-library serial cable is not supplied with the library.***

The shielded serial connection between the host and the TL82X / TL893 / TL896 library uses only three wires. The library has a female 9-pin D-type connector labeled "INPUT" on the rear connector panel for this purpose. The pinouts for the connector are listed in Table 11. The library communicates with the host at 9600 baud.

Note ***Switch position 7 on the MUC must be in the up position for serial communication.***

Table 11: Library RS-232 Port Pinouts

Pin No.	Function
2	transmit
3	receive
5	serial ground

Shipping and Handling 3

Shipping Considerations

This section describes receiving, unpacking and moving to the final installation area a TL820, TL822, TL826, TL893, or TL896 automated tape library. It also describes re-packaging the library to prepare it for further shipment.

Note ***The procedures listed below must be performed in the order that they appear in this chapter.***

Crated Dimensions

The library crate has dimensions of 84.75” high by 36.88” wide by 56.38” deep (215.27 x 93.68 x 143.21cm). When moving the crated library, ensure that the hallways, doorways and rooms have adequate clearances.

Uncrated Dimensions

The uncrated library has dimensions of 79” high by 28.25” wide by 47" deep (201 x 72 x 120cm). When moving the library, ensure that the hallways, doorways and rooms have adequate clearances.

Shipping List

Table 12 lists items that should be received with each model of library. Depending on options and spares selected when the order was placed, additional items may be shipped. Review the contents list that comes with the library.

Table 12: Shipping List

Item	TL820	TL822	TL826	TL893	TL896
Library cabinet with crating and ramp	1	1	1	1	1
Bin packs	24	24	16	24	16
Bar code scanner (inside cabinet)	1	1	1	1	1
Extension axis assembly (inside cabinet)	1	1	1	1	1
Accessories box with the following items:	1	1	1	1	1
TL82X/TL893/TL896 Operator's Guide	1	1	1	1	1
TL82X/TL893/TL896 Facilities Plng & Inst Guide	1	1	1	1	1
TL82X/TL893/TL896 Diagnostic S/W User's Manual	1	1	1	1	1
3.5" Diagnostic Software Diskette	1	1	1	1	1
TZ87 Series Cartridge Tape Subsytem Owner's Manual	1				
TZ88 Series Cartridge Tape Subsytem Owner's Manual		1	1		
TZ89 DLT™ Series Tape Drive User's Guide				1	1
PTM Cutout Cover	1	1	1	1	1
AC Power Cord (US)	1	1	1	1	1
RS-232 Cables	2	2	2	2	2
Set of Bar Code Labels (1,056 quantity)	1	1	1	1	1
DLT™ Cleaning Cartridge	1	1	1	1	1
DLT™ Data Cartridge	1	1	1	1	1
Set of Fuses	1	1	1	1	1
Lubrication Kit	1	1	1	1	1
Media Robot Utility Kit	1	1	1	1	1
SCSI Test Software				1	1

Uncrating the Library

To uncrate the library, use the procedure listed below and Figure 12 on page 3-6.

Note ***Save all crating and packaging material for possible later use.***

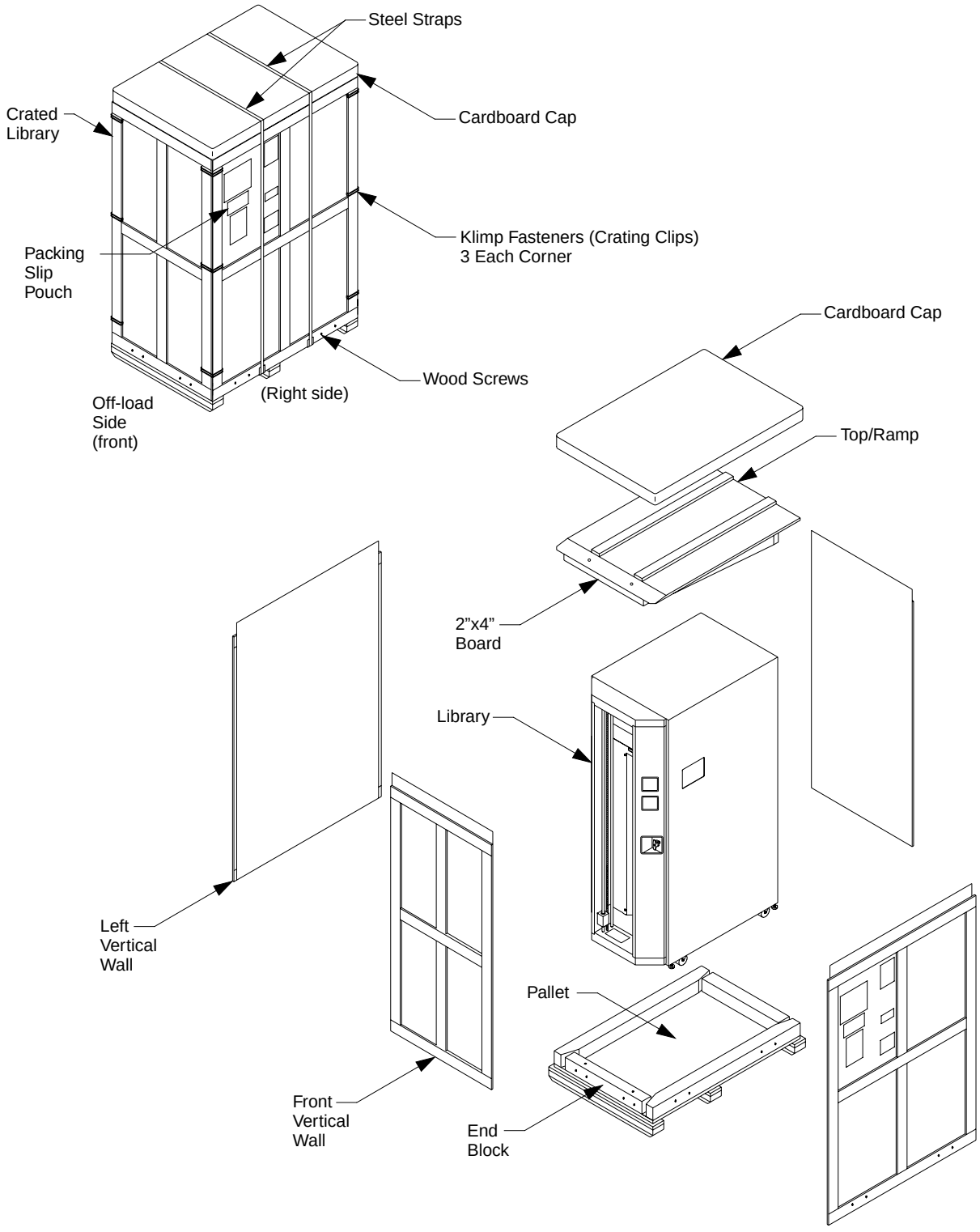
1. Move the crated equipment to a flat level area and allow a minimum of 6' in front of the off-load side of the crate. (Observe that the packing slip pouch is located on the right side of the crate. Also, the distance of 6’ ensures that there is enough room to set up the ramp and remove the library from the pallet.)

WARNING ***Exercise care when cutting the steel straps that secure the library and crating material to the pallet. These straps are under tension and will snap away when cut.***

This procedure requires at least two people.

2. Cut all steel straps securing the library and crating material to the pallet.
3. Lift the cardboard cap up and off of the top / ramp.
4. Lift the top / ramp up and off of the library top.
5. The crate is comprised of four (separate) vertical walls. Choose one wall and remove the three Klimp Fasteners (crating clips) from one of its corners.
6. At the opposite corner of the same wall, remove the other three crating clips.
7. At the bottom of the same wall, remove the four wood screws securing this wall to the pallet.
8. Repeat steps 5, 6 and 7 for the other three walls.
9. Verify that the contents of the crate match the contents of the packing slip.

Figure 12: Uncrating the Library

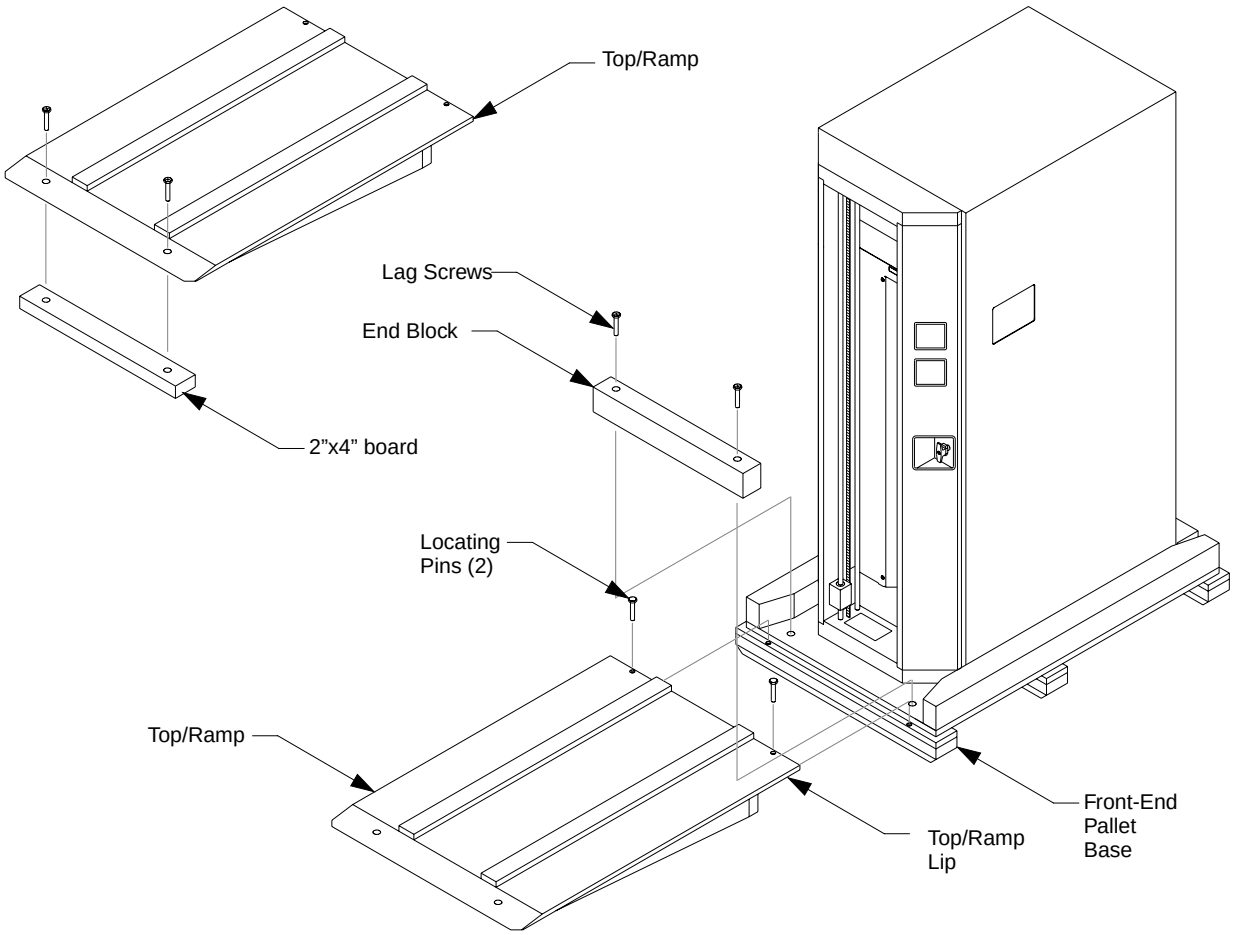


Connecting the Top/Ramp to the Pallet

Figure 13 shows how to set up the top / ramp.

1. At the front of the top / ramp, remove the two hex head screws securing the 2”x4” board to the top / ramp and remove the board.
2. Remove the two lag screws and remove the end block from the pallet.
3. Remove the two locating pins from the right side block of the pallet.
4. Rest the top / ramp lip on the front-end of the pallet base.
5. Align the sides of the top / ramp flush with the sides of the pallet base.
6. Place the two locating pins through the top / ramp and into the front-end of the pallet base to securely connect the ramp to the pallet.

Figure 13: Connecting the Top/Ramp to the Pallet



Removing the Library from the Pallet

WARNING ***At least two people are required to move the library. Be aware that the cabinet is heavy. When moving the cabinet ensure your own safety. One person should guide the cabinet while one person pushes.***

1. Verify that the leveling feet (located on the underside of the cabinet at the four corners) are fully retracted. If the feet are not fully retracted, do the following:
   a. Remove the lip from the rear of the bottom pallet and raise the back feet by turning them clockwise until they are fully retracted.
   b. Repeat the same procedure for the front feet.

WARNING ***Do not tilt the unit more than 10 degrees.***

2. With one person on the ramp in front of the cabinet to control the speed, and one person pushing from the rear, slowly roll the cabinet down the ramp and onto the floor. When pushing the cabinet from the front, press against the angled sections on the outer portions of the front door.

CAUTION ***Any one side of the cabinet can be used to push the library, however, the preferred way is from the front or back. Special care must be taken to avoid pushing on the following non-structural portions of the cabinet:***

- front door control panel
- front door view window
- front door handle
- rear access panel

3. Once the library is on the floor it can be moved to its final destination.

Note ***The library has a nominal floor clearance of 0.75" (19mm). Do not attempt to move the library on carpeting that depresses more than the nominal clearance. Place stiff plastic or rubber mats on top of carpet prior to rolling the library over it. The floor clearance also imposes a restriction on how sharply the floor can begin to angle up, as it does when transitioning to a ramp.***

Moving the Library to its Final Destination

WARNING ***At least two people are required to move the library. Be aware that the cabinet is heavy. When moving the cabinet ensure your own safety. One person should guide the cabinet while one person pushes.***

The cabinet transitions over inclines and door jambs best when it is pushed from the front.

Note ***When rolling the cabinet over floor cracks and door jambs, place stiff plastic or mats over the floor crack or door jamb to help it roll more easily.***

Note ***Always move the library up and down ramps backward to minimize the effective distance between the front casters and the front door.***

WARNING ***Do not push the cabinet up or down a ramp with an incline greater than 10 degrees.***

Be sure the leveling feet at the four corners of the cabinet are fully retracted before moving the library. If they are not, turn each of them clockwise into the fully retracted position.

Removing Constraint Packaging

Once the library has been moved to its final destination, perform the following steps:

1. Remove the outer cellophane wrapping and cardboard protecting the library.
2. Remove the eye-bolt, located at the top of the library door. Store the eye-bolt for reshipment.
3. Open the front door of the library and remove the accessories box.
4. Remove the tie-wraps marked by yellow flags. The flagged tie-wraps can be found restraining the vertical belt and IOD cables.

Note ***The tie-wraps may be removed by using diagonal cutters. New tie-wraps will be required to immobilize the robotics during reshipment.***

CAUTION ***Note that the bottom bin pack on each face of the carousel has been turned upside down for shipping purposes. Hold the bottom bin packs securely when removing the tie-wraps to prevent a bin pack from slamming to the floor of the cabinet.***

5. Remove the tie-wraps that hold the bin packs in place.
6. Re-install the bottom bin pack on each face in the upright position.

Note ***Make sure the cartridge retention springs (metal pieces located on the sides of the bin packs) are properly positioned.***

Crating the Library for Reshipment

Before moving the library, perform the following steps:

1. Remove all cartridges from the bin packs, tape drives and PTM.
2. Remove the IOD if installed.

Securing the Bin Packs for Reshipment

1. Turn the bottom bin pack on each face upside down before installing tie-wraps.
2. Secure the bottom 2 bin packs together using tie-wraps. Refer to Figure 14 on page 3-12 for details.

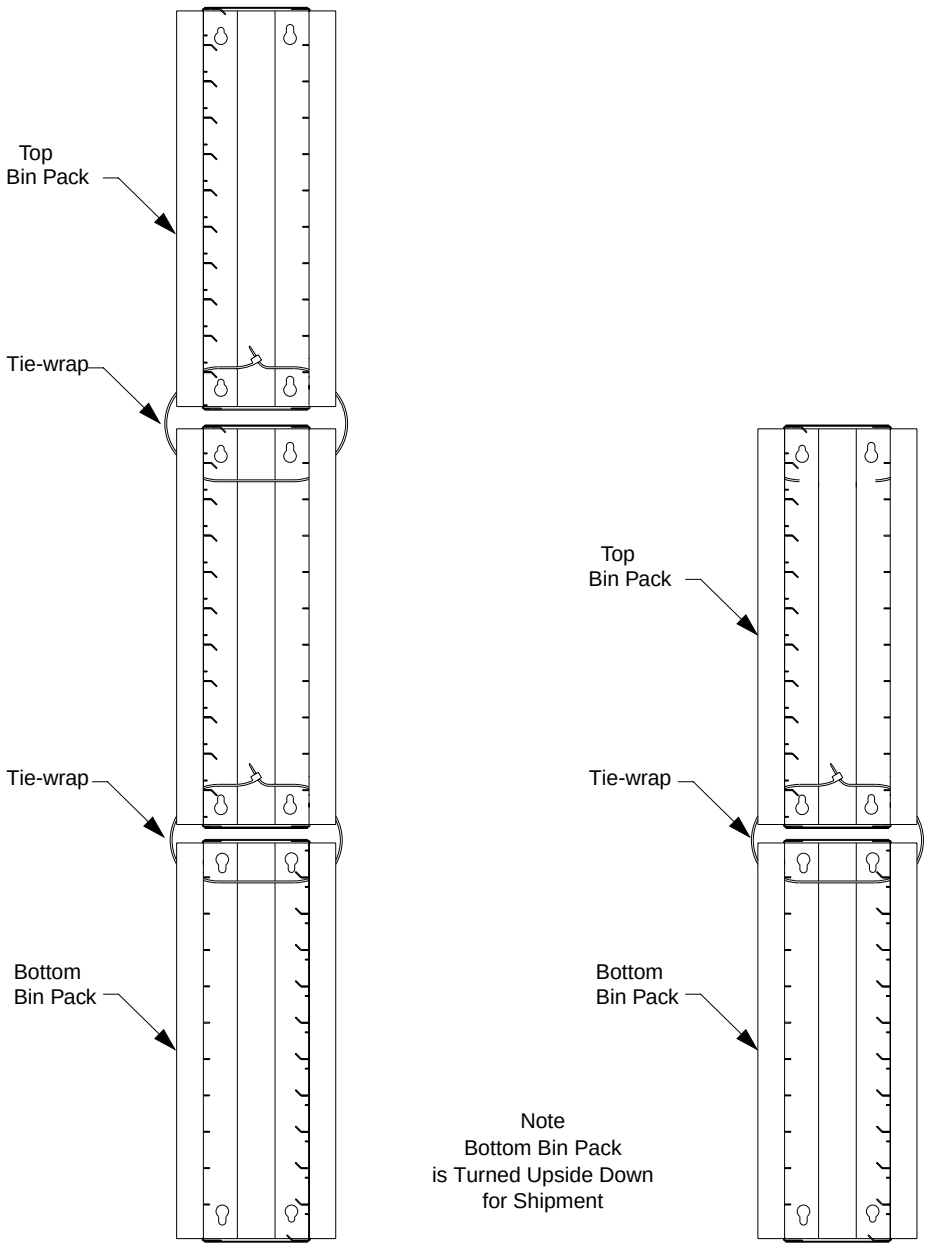
Note ***Route the tie-wraps through the bin pack slots as shown in Figure 14, using the 2nd slots.***

CAUTION ***Route the tie-wraps towards the front of the bin pack slots to prevent potential damage to the springs.***

CAUTION ***Tighten the tie-wraps so that bin packs do not come loose during shipment, but DO NOT overtighten.***

3. For libraries with 3 bin packs per face secure the top 2 bin packs of each face together using tie-wraps. Refer to Figure 14 on page 3-12 for details.

Figure 14: Securing the Bin Packs



TL820/TL822/TL893 Library Bin Packs

TL826/TL896 Library Bin Packs

TA00104a

Completing the Crating Procedure

1. Mount the eye-bolt at the top of the library door and restrain the free end of the vertical carriage to the eye-bolt.
2. With the counterweight resting at the bottom of the door, use a tie-wrap to restrain the vertical belt. Place the vertical belt tie-wrap around both sides of the vertical belt and tighten it so that the belt teeth are securely interleaved.
3. Use tie-wraps to secure the IOD cables on top of the PTM or the tape drive shelf.
4. Retract the feet of the cabinet (located on the underside of the cabinet at the four corners) so they do not cause obstruction when the unit is being moved. Tighten them clockwise to approximately 20 in-lb. (2.3 N-m) to assure that they are fully retracted.
5. Place cardboard over the front to protect the window, door, and front cabinet corners, and shrink-wrap the entire cabinet to hold the cardboard securely in place.
6. Perform the procedure “Removing the Library from the Pallet” in reverse order to place the library on the pallet.
7. Perform the procedure “Connecting the Top / Ramp to the Pallet” in reverse order to detach the top / ramp from the pallet.

WARNING ***It is recommended that the steel straps be tightened to approximately 200 lbs of tension.***

Keep the unit upright when moving. Do not tilt it more than 10°.

8. Perform the procedure “Uncrating the Library” in reverse order to crate the library for reshipment.

4 Installing the TL82X/TL893/TL896 Library

Installation Tools

- A 3/4” open-end wrench or medium-size (9" long) pair of channel locks, for adjusting the leveling feet, and a level are required for leveling the cabinet.
- A 40 oz. force gauge is required for checking the vertical axis belt tension.
- A flashlight and standard tools, such as screwdrivers, nutdrivers, wrenches, scales, and allen wrenches are also needed.
- A personal computer (PC) with the diagnostic software is required to perform powered testing of the library.
- An alignment tool kit (PN 29-31890-01) is required to align and calibrate the extension axis relative to the carousel and drives.

Host Computer

The customer is expected to furnish the host computer to be used with the TL82X/TL893/TL896 library. This also includes furnishing the host communications cabling.

The TL82X/TL893/TL896 library has been designed to easily attach to most computers. The host computer needs a SCSI communications interface to transfer data to and from the tape drives. The library robotics can be driven from the host using SCSI communications or a low-speed EIA/TIA-574 serial interface (RS-232 for 9-pin connectors) readily available on most computers.

On systems without a direct SCSI interface, external communications bus converters may be used.

Diagnostic PC and Software

An IBM-compatible personal computer (PC), running MS-DOS Version 5.0 or later is required for using the field engineer’s diagnostic software. Diagnostic software for testing the correct operation of each library is available. An EIA/TIA-574 serial cable (RS-232 for 9-pin connectors) is needed for connecting the PC to the library diagnostic port.

The Document EK-TL820-SM, *TL82X/TL893/TL896 Diagnostic Software User’s Manual*, provides detailed instructions on using the FE diagnostic PC to check out the library. It is essential for this checkout procedure.

Installing the TL82X/TL893/TL896 Library

CAUTION ***A trained, authorized Field Engineer is required to install a TL82X/TL893/TL896 library. The procedures listed below must be performed in the order that they appear in this section.***

Positioning the Library

For installation, it is recommended that the library be placed in an area with plenty of clearance around the cabinet for a field engineer to perform the inspection and alignment procedures. If the unit is being installed as part of a multi-unit configuration, repositioning may be required later. See “Cabinet-to-Cabinet Mounting” on page 4-28.

Leveling

The library needs to be leveled within ±1° of true horizontal.

Note ***The front door may be difficult to open until you have lowered the leveling feet to the floor and adjusted them so that the cabinet is level.***

If plans have been made for installing additional units in this location and this is the first library in the library system, it is important to level the unit so that additional units can be parallel to each other and still be within the leveling feet adjustment capabilities of the cabinets.

To secure the library cabinet and to allow the front door to close properly, be sure that all four feet (located on the underside of the cabinet at the four corners) are resting securely on the floor. Tighten each foot against the floor, taking the weight off the casters. If additional leveling is required, continue to raise or lower the individual foot as needed.

Opening the Doors

The door handle has a vertical orientation when the door is latched.

1. Unlatch the door by rotating the handle counterclockwise one-half turn. Use the door handle to open the door gently. The front door may not open easily until the cabinet has been leveled.

CAUTION ***Do not force the front door open wider than 130 degrees. Doing so will damage the door and cause installation or operational failures.***

Note ***When removing the rear access panel, remove the top middle screw last. When installing it, replace the top middle screw first.***

2. Remove the rear panel by removing the 11 screws that attach the panel to the cabinet.

Installing the Inport/Outport Device

If the library that you are currently installing is the master library, i.e., Logical Unit Number (LUN) 0, refer to the *TL82X/TL893/TL896 IOD Installation Instructions*. After installing the IOD, proceed to "Unpowered Visual Inspections".

If this unit is not the master library, continue to "Installing the PTM Cutout Covers".

Installing the PTM Cutout Cover

If the library that you are currently installing is not the master library and will not be part of a multi-library system, perform the following procedure. Otherwise, proceed to "Unpowered Visual Inspections".

1. Remove the PTM Cutout Cover (cover) from the Accessories Kit.
2. If applicable, power-down the library and open the front door.
3. Orient the cover so that the adjustable bracket is up and the fixed bracket is down.
4. Place the cover against the library so that the window's bottom-edge is in-between the cover and fixed bracket and then push the cover down so that the fit is snug.
5. From the inside of the cabinet, push the adjustable bracket up so that the window's top-edge is in-between the cover and adjustable bracket and then tighten the two thumbscrews so that the fit is snug.
6. Reverse this procedure to remove a PTM Cutout Cover.

Unpowered Visual Inspections

To conduct an unpowered visual inspection, refer to Figure 2 on page 2-6 and Figure 16 on page 4-9 and do the following:

1. Manually move the vertical axis up and down through its full range.
2. Manually rotate the carousel one revolution in each direction.

CAUTION ***To manually rotate the octagon with bin packs mounted, gently pull on the upper half of the top row of bin packs.***

3. Manually extend and retract the gripper on the extension axis.
4. Verify that everything moves smoothly. If a problem exists refer to the *TL82X/TL893/TL896 Field Service Manual*.
5. Reseat any electrical connections that appear loose or disconnected.
6. Check all visible cable connections on the door interconnect board, extension axis assembly, control panel board, and power supplies. The control board and door interconnect board are visible on the inside of the front door.
7. Verify that all power cables are plugged into the internal power distribution box, as shown in Figure 16 on page 4-9. Power cables should be connected to the logic power supply, motor power supply, and fans.
8. Set the 110/220 VAC fan voltage selection switch to the proper position (see Figure 16 on page 4-9).
9. Some important electronic connections are hidden by the library electronics assembly cover. (See Figure 21 on page 4-21.) Remove the cover and verify that the boards and PROMs are seated properly and that all connectors appear securely fastened. Leave the cover off until after the powered visual inspection (described in “Powered Visual Inspection” on page 4-16) is completed.

Multi-Unit Controller (MUC) SCSI ID Setting

Note ***When removing the rear access panel, remove the top middle screw last. When installing it, replace the top middle screw first.***

The factory setting for the MUC SCSI ID is 2. If the customer requires a different MUC SCSI ID, remove the rear access panel and locate the MUC ID CONFIG switch SW1. See Figure 15 on page 4-7 and refer to Table 13 and Table 14 on page 4-8 to set the correct MUC SCSI ID.

Figure 15: MUC Switch SW1

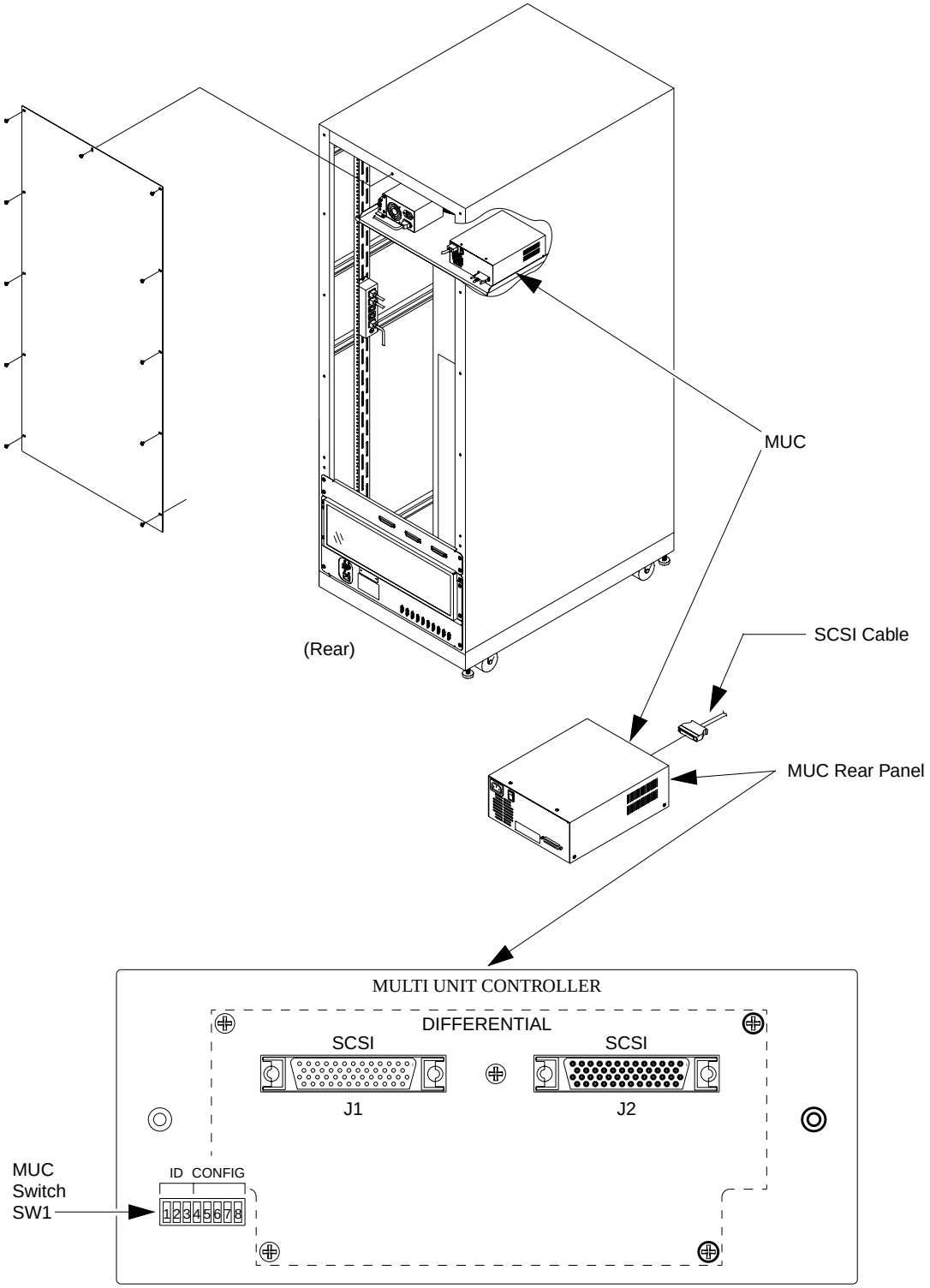


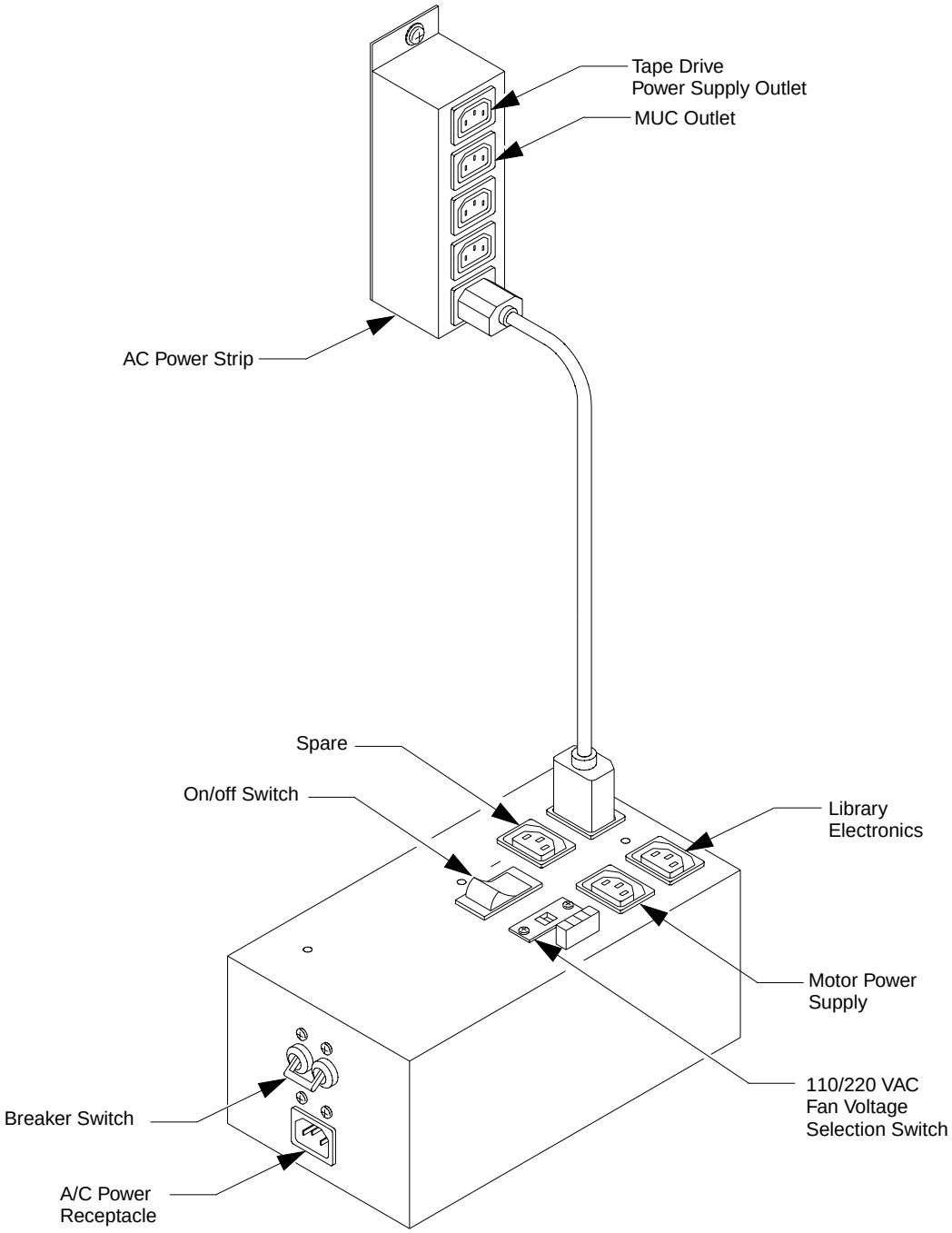
Table 13: MUC SW1 Microswitch Functions

Microswitch	Function
1, 2 & 3	SCSI ID (see Table 14)
4 & 5	Reserved for testing. (Must be in the DOWN position.)
6	Disable Bus Reset on Power-Up (Default=Disabled / UP)
7	Host Selection (DOWN=SCSI / UP=RS-232) **Note** When this microswitch is UP, Table 14 is not applicable.
8	Reserved for testing. (Must be in the DOWN position.)

Table 14: MUC SCSI ID

MUC SCSI ID	SW1	SW2	SW3
0	DOWN	DOWN	DOWN
1	UP	DOWN	DOWN
2	DOWN	UP	DOWN
3	UP	UP	DOWN
4	DOWN	DOWN	UP
5	UP	DOWN	UP
6	DOWN	UP	UP
7	UP	UP	UP

Figure 16: Internal Power Distribution Box



Adjusting Belt Tension

Belt tension must be checked and adjusted prior to activating the servos.

CAUTION ***Overtensioning the belts can result in damage to the belt and other drive components. Undertensioning can result in degraded performance and system failure.***

Vertical Axis Belt

To test the vertical axis belt tension, see Figure 17 and do the following:

1. Remove power from the library by turning off the circuit breaker switch, located on the lower left corner of the rear connector panel.
2. Open the front door of the library.
3. Move the counterweight to the top of the door; this will position the vertical carriage at the base of the door.
4. Using a force gauge press on one side of the belt midway up the door.
5. Measure the force required to push the belt together so that the two sides just touch with the belt teeth interleaved.
6. The force should be between 18 and 22 ounces (510-623 g). If the belt tension is outside of this range, an adjustment is needed.

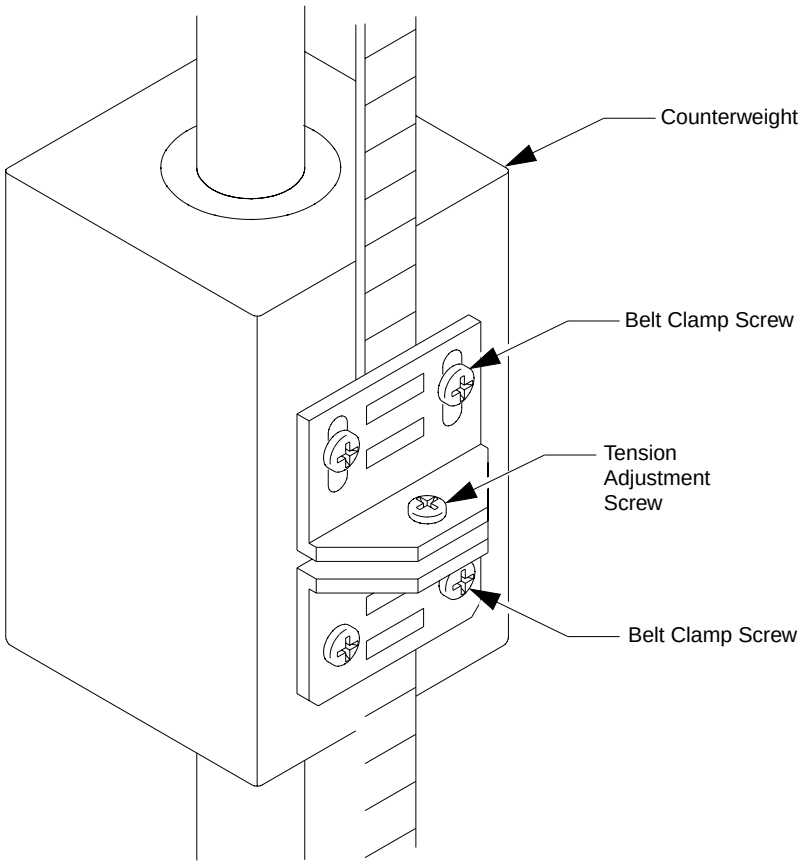
To adjust the vertical axis belt tension, see Figure 17 and do the following:

1. Move the counterweight to approximately eye-level.
2. Loosen by one-half turn the two top belt clamp screws holding the top side of the vertical belt to the counterweight.
3. Turn the tension adjustment screw clockwise to tighten the belt tension and counterclockwise to loosen the belt tension.

Note ***The adjustment screw will not normally need to be turned more than two revolutions.***

4. Move the counterweight back to the top of the door and recheck the belt tension.
5. When 18 to 22 ounces (510-623 g) of tension on the belt is achieved tighten the belt clamp screws to 30 in-lb. (3.39 N-m)

Figure 17: Vertical Axis Belt Tensioning



Extension Axis Belt

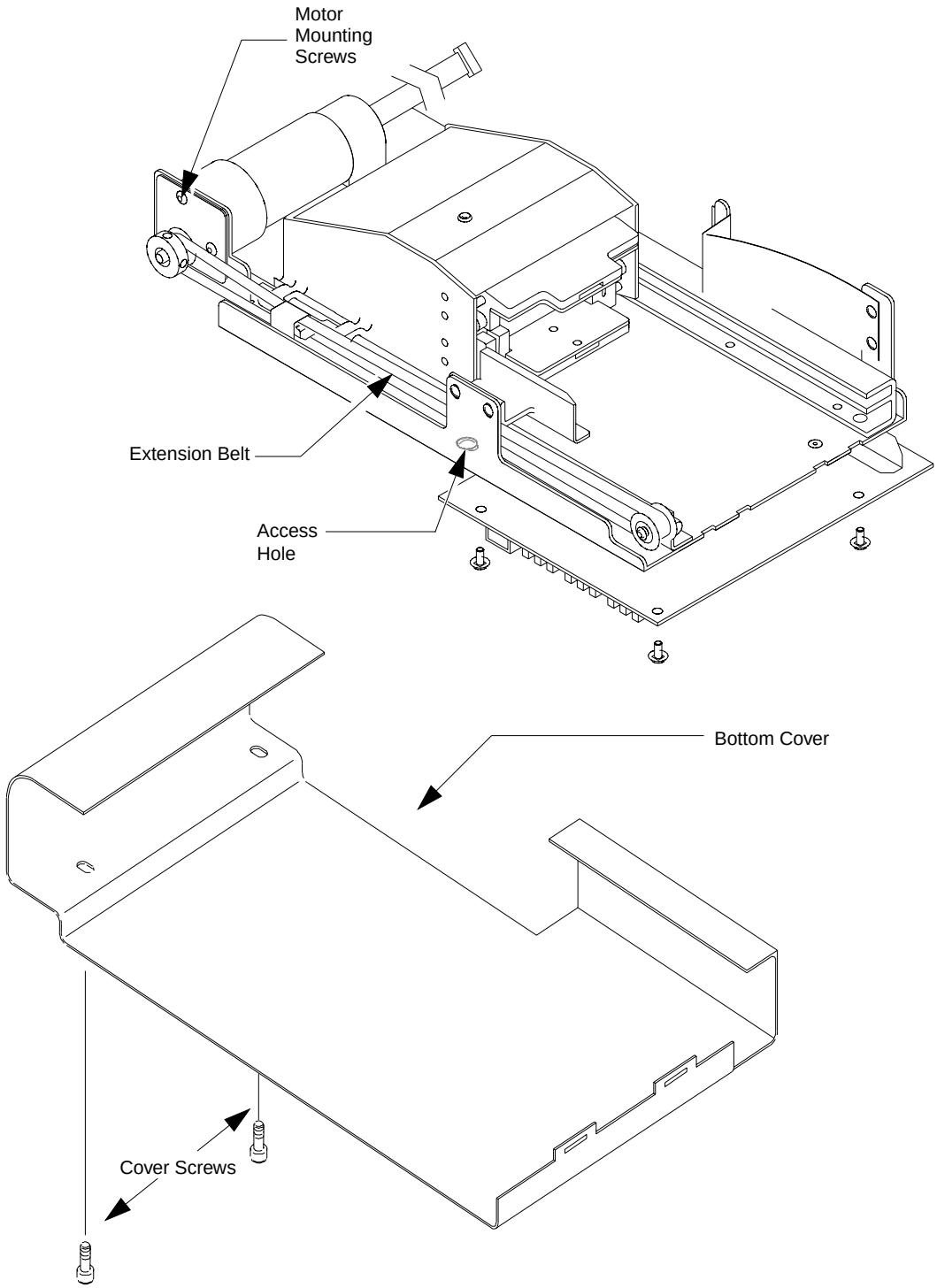
To test the extension axis belt tension, see Figure 18 and do the following:

1. Remove power from the library by turning off the circuit breaker switch located on the lower left corner of the rear connector panel.
2. Open the front door of the library.
3. Remove the two screws securing the bottom cover to the extension axis assembly.
4. With the screws removed, move the cover forward and then to the right approximately 1” (2.5 cm). Tilt the front of the cover down to the door window and then push it up between the extension axis motor and the door window.
5. Move the gripper to the middle of the extension travel, which will position the extension belt clamp directly over the access hole in the baseplate.
6. Insert a force gauge through the access hole and press up on the back of the bottom segment of the belt. Record the force reading with the belt just touching the bottom of the belt clamp.
7. The force should be between 2.7 and 3.7 ounces (76.6 - 105.0 g). If the belt tension is outside this range, an adjustment is needed.

To adjust the extension axis belt tension, see Figure 18 and do the following:

1. Loosen the three extension motor mounting screws one revolution.
2. Grasp the motor by looping one finger over the sheet metal of the baseplate and applying a light, steady force to tighten the belt. Snug the motor mounting screws while holding the motor.
3. Recheck belt tension and readjust if necessary.
4. When belt tension is correct, retighten the mounting screws to 6 in-lb. (.67 N-m) and recheck the tension.
5. Reinstall the extension axis cover and tighten the cover screws to 12 in-lb (1.36 N-m).

Figure 18: Extension Axis Belt Tensioning



Carousel Belt

To test the carousel belt tension, see Figure 19 and do the following:

1. Remove power from the library by turning off the circuit breaker switch located on the lower left corner of the rear connector panel.

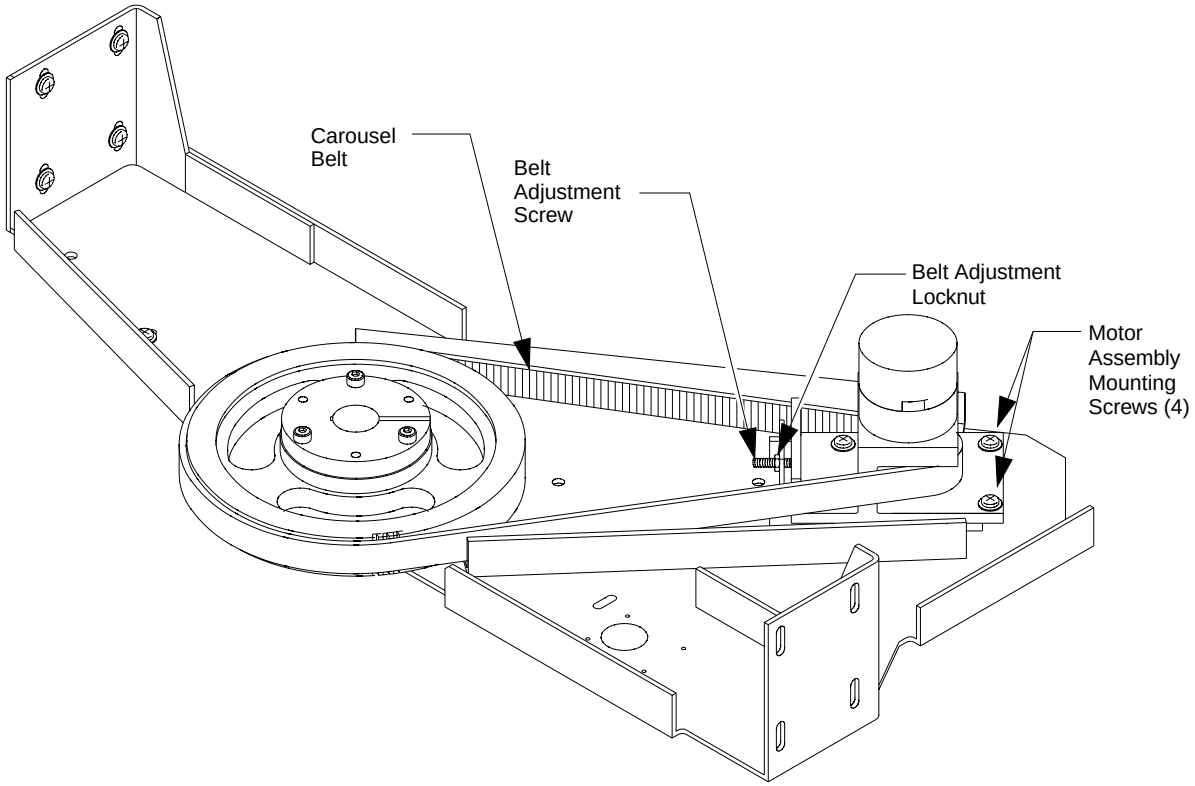
Note ***When removing the rear access panel, remove the top middle screw last. When installing it, replace the top middle screw first.***

2. Remove the rear access panel from the library.
3. Loosen the motor assembly mounting screws one revolution.
4. Loosen the carousel belt adjustment locknut.
5. Adjust the carousel belt adjustment screw so that a force of 26.60 ±2.0 ounces (754 ±56 g) applied at the center (±0.25 inches or 6.25 mm) of the belt span will deflect the belt 0.20 inches (5.08 mm).
6. Retighten the locknut to approximately 15 ±5 in-lb (1.7 ±.56 N-m).

Note ***When tightening the locknut, be sure to maintain the belt adjustment screw position.***

7. Retighten the motor assembly mounting screws to 35 ±3 in-lb (3.95 ±.33 N-m).

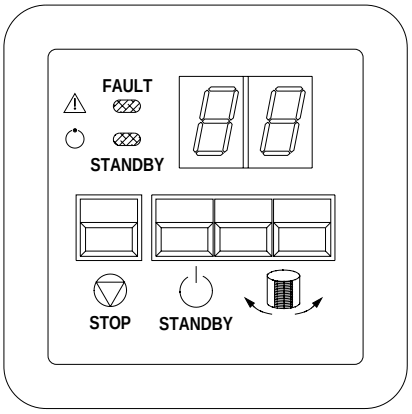
Figure 19: Carousel Belt Tensioning



Powered Visual Inspection

The library control panel shown in Figure 20 is located on the front door of the library. Make sure the STOP and STANDBY buttons on the control panel are pressed in preparation for applying power to the library.

Figure 20: Control Panel



1. Open the front door to activate the door safety switch, which provides further protection from unexpected power-up behavior.
2. Remove the rear access panel from the library.

Note ***When removing the rear access panel, remove the top middle screw last. When installing it, replace the top middle screw first.***

3. On the power distribution box, push the circuit breaker switch to the down position, the ON / OFF switch to O (off) and the fan voltage selection switch to the proper position (see Figure 16 on page 4-9).

CAUTION ***Be sure that the fan 120/220 voltage selection switch is in the correct position.***

4. Connect the power cable to the AC power receptacle and to facility power. Push the circuit breaker switch to the up position (see Figure 16 on page 4-9).

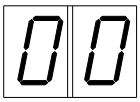
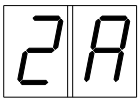
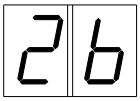
Note ***At this point, power is being supplied to the power distribution box and will be distributed to the rest of the library.***

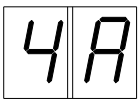
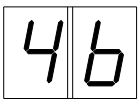
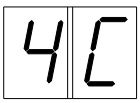
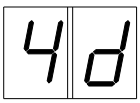
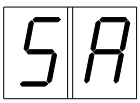
5. Set the power distribution box ON / OFF switch to "I" (on), and perform the following tests:

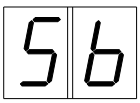
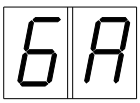
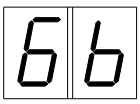
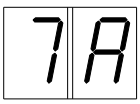
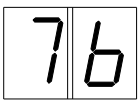
   a. With the STOP and STANDBY buttons released, the front door closed, and the rear panel removed, the control panel status display should read "2b" and the FAULT indicator should be lit.
   b. With the STOP and STANDBY buttons pressed, the front door closed, and rear panel installed, the control panel status display should read "2A" and the FAULT and STANDBY indicators should be lit.
   c. With the STOP and STANDBY buttons released, the rear panel installed, and the front door open, the control panel status display should read "2b" and the FAULT indicator should be lit.
   d. With the STANDBY button pressed, the STOP button released, and the front door closed, and rear panel installed, the control panel status display should read "01" and the FAULT indicator should be off.

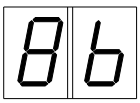
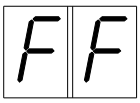
   If the control panel status display does not operate as indicated above, see Table 15 for a list of the possible display codes and refer to the *TL82X/TL893/TL896 Field Service Manual*.

Table 15: Front Control Panel Status Codes

Code	Code Description	Action to Resolve
	System is on-line and ready to accept host commands.	No action is needed.
	System is off-line and ready to accept diagnostic commands.	Release the STANDBY button by pressing it once. This places the library on-line.
	STOP button is pressed.	Release the STOP button by pressing it once.
	Either the front door is open or the rear panel is removed	Check the front door and rear panel.

Code	Code Description	Action to Resolve
	System is performing a power-up sequence.	This code should only be displayed for 5-10 seconds during the power-up sequence. If it continues to display, call for field service.
	System is initializing actuators and taking inventory.	If this code persists and the robotic equipment inside the library unit does not move, call for field service.
	Inventory failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, ask the system administrator to refer to the host error codes which will indicate the cause of the failure.
	Extension home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Extension test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carriage A / D failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carriage diagnostic test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Vertical home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.

Code	Code Description	Action to Resolve
	Vertical test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carousel home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carousel test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carousel A / D test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Carousel digital test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Gripper home failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Gripper test failed.	1) Press the STANDBY button to put the library off-line. 2) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.

Code	Code Description	Action to Resolve
	Light curtain test failed.	1) Press the STANDBY button to put the library off-line and open the front door. 2) Remove / replace any objects that may be in the way of the light beam, such as a tape partially ejected from a tape drive or a cartridge not properly seated in a bin pack. Close the front door. 3) Release the STANDBY button to put the library back on-line. 3) If the code still persists, call for field service.
	Light curtain broken.	1) Press the STANDBY button to put the library off-line and open the front door. 2) Remove / replace any objects that may be in the way of the light beam, such as a tape partially ejected from a tape drive or a cartridge not properly seated in a bin pack. Close the front door. 3) Release the STANDBY button to put the library back on-line. 4) If the code still persists, call for field service.
	Carousel is on face indicated (0-7).	These codes are only displayed for a few seconds when you press the ← and → to move the carousel. No action is needed.
	Missing or defective MPU firmware, or +5vdc logic power supply voltage is too low.	Call for field service.

Checking the Library Status LEDs

The Robotic Controller has twenty-eight status LEDs that can be used to help troubleshoot the library if any problem exists during library testing. Figure 21 and Figure 22 on page 4-23 shows the location of the LEDs and Table 16 on page 4-22 describes the function of each LED.

The extension axis assembly has nine status LEDs. Figure 23 and Table 17 on page 4-24 shows the location and describes the function of each extension axis LED.

Figure 21: Library Electronics Assembly

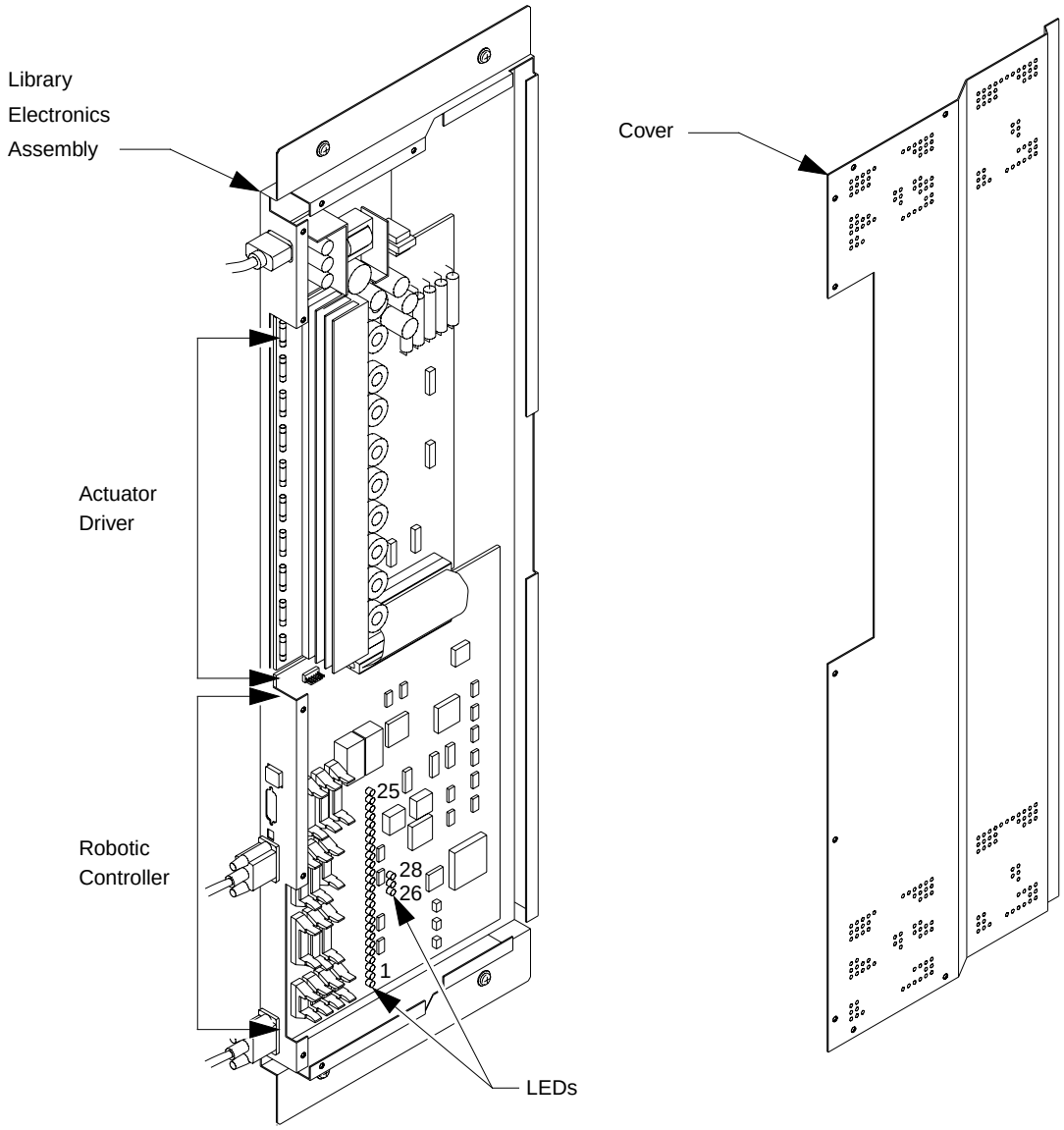


Table 16: Robotic Controller LEDs

LED	Color	Description	Function
1 (bottom)	yellow	vert home	The vertical carriage is at the HOME position.
2	yellow	vert limit	The vertical carriage is at the LIMIT position.
3	yellow	left tray	A cartridge is present on the PTM at the left tray position.
4	yellow	left gate	A cartridge is present on the PTM at the left gate position.
5	yellow	right gate	A cartridge is present on the PTM at the right gate position.
6	yellow	right tray	A cartridge is present on the PTM at the right tray position.
7	yellow	lift gate down	PTM lift gate is down.
8	yellow	lift gate up	PTM lift gate is up.
9	yellow	inport open	The IOD inport door is open.
10	yellow	inport present	A cartridge is present in the inport.
11	yellow	outport open	The IOD outport door is open.
12	yellow	inport registered	A cartridge is properly registered in the inport.
13	yellow	outport full	The IOD outport if full.
14	yellow	carousel home	The carousel is at the HOME position.
15	yellow	carousel face	The carousel is positioned on a FACE.
16	red	door open	The front door or rear panel is open.
17	yellow	diag receive	The RS-232 diagnostic port is receiving.
18	green	controller transmit	The RS-232 controller port is transmitting.
19	green	diag transmit	The RS-232 diagnostic port is transmitting.
20	yellow	controller receive	The RS-232 controller port is receiving.
21	green	bar code transmit	The RS-232 bar code port is transmitting.
22	yellow	bar code receive	The RS-232 bar code port is receiving.
23	yellow	actuator driver fault	A FAULT condition exists on the actuator driver board.
24	yellow	standby	The system is in STANDBY mode.
25 (top)	red	system stopped	The front panel STOP button is pressed.
26 (bottom)	red	fault	The front door or rear panel is open, STOP button is pressed, or some other FAULT condition exists.
27	red	MPU error	The microprocessor has a bus error.
28 (top)	green	+5V	+5VDC is present on the robotic controller.

Figure 22: Robotic Controller Board LED Locations

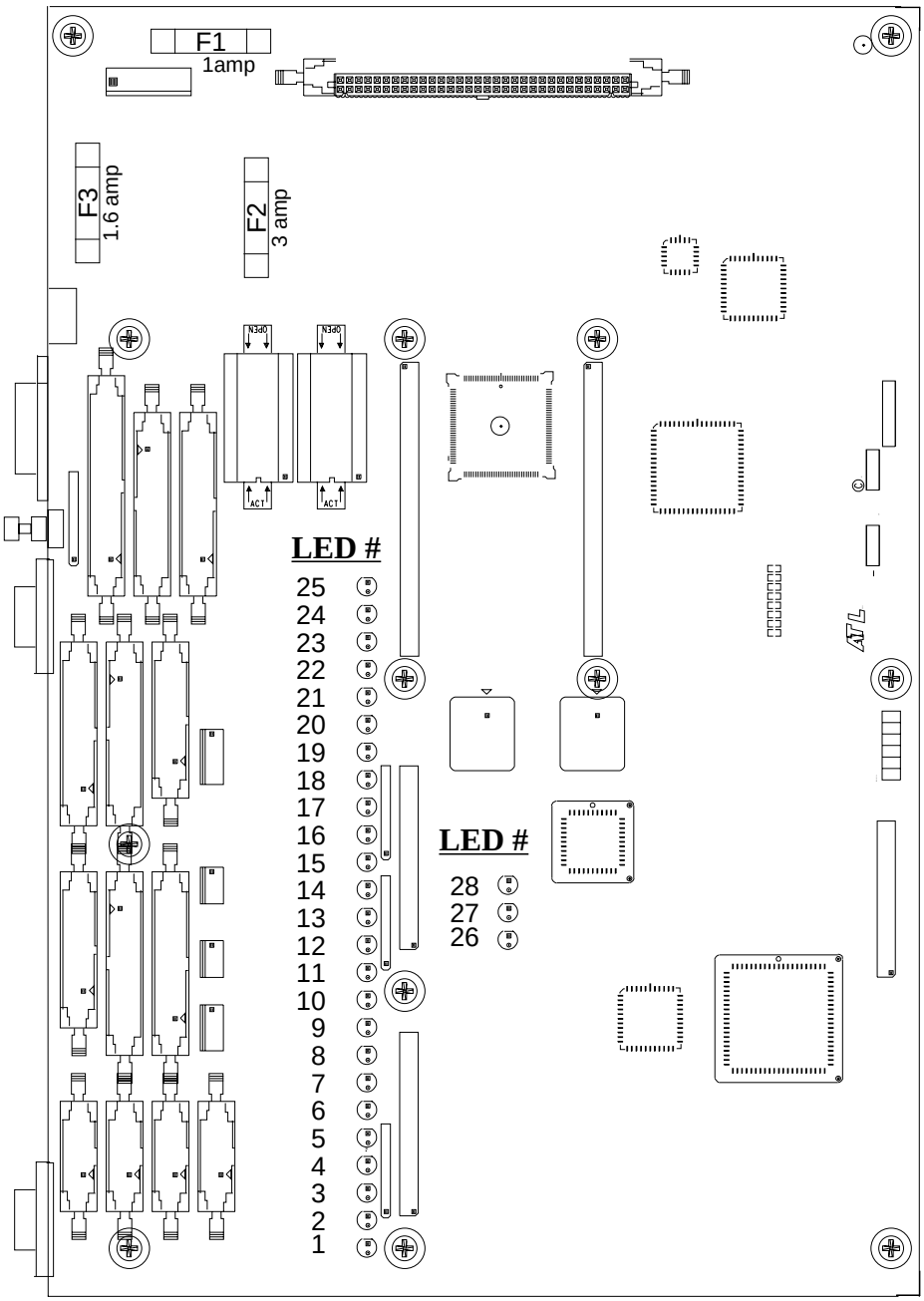
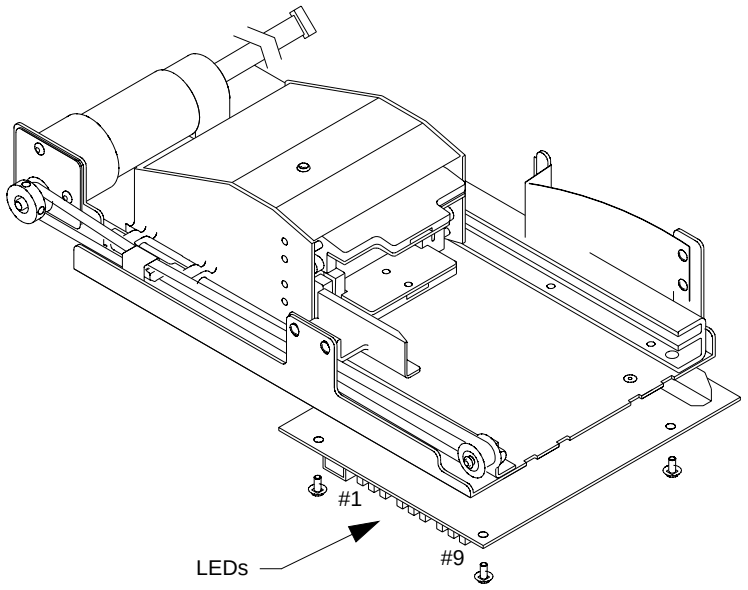


Table 17: Extension Axis LEDs

LED	Color	Description	Function
1	green	+5V	LED 1 should be on when there is +5VDC present.
2	green	ex CIG #1	LED 2 (Rear Cartridge-in-Gripper) should be on when a cartridge is in the gripper.
3	green	ex CIG # 0	LED 3 (Front Cartridge-in-Gripper) should be on when a cartridge is in the gripper.
4	green	ext hall effect 0	LED 4 should be on when the gripper jaws are closed.
5	green	ext hall effect 1	LED 5 should flash on and off as the gripper jaws open and close.
6	red	motor err 2	LED 6 should be on when a failure in the gripper motor circuitry occurs.
7	green	ext limit	LED 7 should be on when the extension axis is at the forward limit position.
8	green	extension home	LED 8 should be on when the extension axis is at the home position.
9	red	mot err #1	LED 9 should be on when a failure in the extension motor circuitry occurs.

Figure 23: Extension Axis LEDs



Horizontal Alignment and Vertical Calibration

The gripper and all tape drives must be horizontally aligned. Additionally, the vertical location (calibration) of each bin slot, tape drive and the Pass Through Mechanism (PTM) must be identified prior to any diagnostic testing. An Alignment / Calibration Tool Kit (PN 29-31890-01) is required to perform alignment and calibration. Refer to Document EK-TL820-SV, *TL82X/TL893/TL896 Field Service Manual*.

Testing the Library

For the following procedures refer to Document EK-TL820-SM, *TL82X/TL893/TL896 Diagnostic Software User's Manual,* and Figure 24 on page 4-27.

1. With library power applied, press and release the control panel STOP switch and then the STANDBY switch.
2. Verify that the control panel status display shows "01" (standby).
3. Connect the diagnostic PC cable to the rear connector panel as shown in Figure 24.
4. Open the front door of the library and place test cartridges in one or more bins of each face.

Note ***The customer's System Administrator must be present for the next step.***

5. Use the "Config" menu of the diagnostic software to configure the library. To configure the library, refer to "Config Menu" in Section 4 of the Document EK-TL820-SM, *TL82X/TL893/TL896 Diagnostic Software User's Manual.*

CAUTION ***Verify that the actuator paths are clear of obstructions.***

6. Using the diagnostic software, run a self-test on the system. (This provides a limited check on the operation of the system without moving any of the axes significantly. If the unit does not pass this self-test or any of the following tests, refer to Document EK-TL820-SV, *TL82X/TL893/TL896 Field Service Manual*.
7. After successfully completing a self-test, home all actuators.

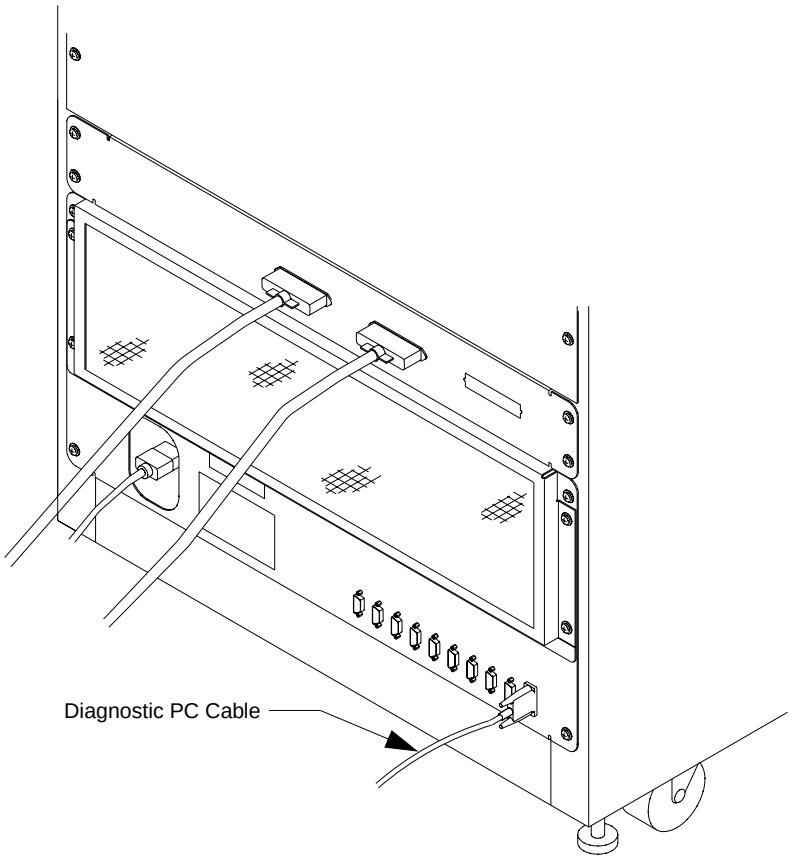
Note ***Observe all "place" procedures carefully to verify that cartridges are inserted properly.***

8. Use the diagnostic software to pick a cartridge and then place it in the bin slot of a different face. Repeat this step for every face in the carousel.
9. Use the diagnostic software to place a cartridge into each tape drive.
10. Observe the "Tape in Use" LEDs, they will be blinking as the tape is being positioned.
11. When the LEDs are solidly illuminated, use the "Unload" function of the diagnostic software to spin down the tape. The "Operate Handle" LED will illuminate when this operation is complete.
12. Remove the test cartridges from each tape drive and then return them to empty bin slots using the diagnostic functions, "Pick from Drive" and "Place to Bin."
13. Use the diagnostic software to verify the operation of the PTM by placing and picking a cartridge to it. Repeat this step several times.
14. If applicable, use the diagnostic software to verify the operation of the IOD by importing and exporting a cartridge from / to it. Repeat this step several times.
15. After successfully completing the above tests:
    - Press the control panel STOP switch.
    - Open the library door and remove all test cartridges, then close and latch the door.
    - Press and release the control panel STOP switch.

Note ***If this is a stand-alone library, proceed to "Loading the Library" on page 4-30.***

If this library is part of a multi-unit configuration, proceed to "Cabinet-to-Cabinet Mounting" on page 4-28.

Figure 24: Diagnostic PC Cable Connection



(Note: TL820 Library shown)

Cabinet-to-Cabinet Mounting

If you have multiple units attached to one another, you must cable each of them to the MUC. The required cabling is in the Cabinet-to-Cabinet Attachment Kit (P/N 6205016) and is purchased separately.

To prepare the library for mounting, disconnect the diagnostic PC and power down the library as follows:

1. Press the STOP button on the control panel. The FAULT light will illuminate and "2A" will be displayed.
2. Remove power from the library by turning off the circuit breaker switch, which is located on the lower left corner of the rear connector panel.
3. Disconnect the diagnostic PC serial cable from the rear of the library.

Note ***Robotic power also must be shut down for all units to be attached. Contact your System Administrator prior to removing power. Shut down robot power only as described in the previous steps.***

4. Remove the PTM cover plates on the side of each unit for each side that is to be mated with another cabinet.

   Multiple units may be attached in any order. The units will be addressed left to right (when viewed from in front of the units) with logical unit 0 being on the left. Cabling from the distribution panel must reflect this order, see "Multi-Unit Library Cable Connections" on page 4-40 for cabling instructions.

   Refer to Document 6207217, *TL82X/TL893/TL896 Cabinet to Cabinet Mounting Instructions*, for instructions on how to mount the cabinets in a multi-unit configuration.

Note ***The physical setup of the multi-unit single LUN (MUSL) is identical to that of the standard multi-unit configuration, requiring alignment of the passthrough mechanism (PTM) and correct cabling of the "multi-unit controller ports" at the rear of the units. Logical setup is similar, requiring all units "logical unit" value to reflect its physical position in the set and agree with the MUC cabling.***

Aligning PTMs from Library to Library

The PTM is mounted to the cabinet retma rails with mounting brackets that provide adjustment in three directions (up / down, forward / back, and left / right). When configuring two or more units side by side in a multi-unit configuration, it is important that the PTM for each unit be properly aligned with the PTM for the adjacent unit(s) so that cartridges can move between units.

After each unit has been leveled and the cabinet-to-cabinet mounting brackets (front and rear) have been installed, use the up / down and front / back adjustments in the PTM mounting brackets by loosening the respective two screws for each adjustment and moving the PTM so that it aligns with the PTM in the adjacent cabinet.

Note ***The left/right adjustment (which is critical to proper gripper-to-PTM operation) is made at the time of installation of the PTM and should not be disturbed.***

The cabinet-to-cabinet PTM alignment can be observed and adjusted by inserting a cartridge on the conveyor and gently pushing it from one PTM across to a PTM in an adjacent cabinet. Adjust each adjacent PTM up / down and forward / back so that cartridges will move freely from one PTM to the next. Ensure the cartridge moves smoothly in both directions. A PTM-PTM alignment tool, (PN 6208336) which is the size of two side-by-side DLT™ cartridges is also available for aligning PTMs in adjacent libraries.

Refer to Document 6207217, *TL82X/TL893/TL896 Cabinet to Cabinet Mounting Instructions*, for instructions on how to mount the cabinets in a multi-unit configuration.

Loading the Library

The library is capable of supporting TZ87, TZ88, or TZ89 tape drives. The library is also capable of supporting DLTtape™ III, DLTtape™IIIXT, and DLTtape™ IV cartridges, which are dark gray, white, and black, respectively. When loading the library with cartridges, observe the compatibility of cartridges and tape drives as defined in Table 18.

Table 18: Cartridge/Tape Drive Compatibility

Cartridge Type	TZ87 Tape Drive	TZ88 Tape Drive	TZ89 Tape Drive
DLTtape™ III	compatible	compatible	compatible
DLTtape™ IIIXT	not compatible	compatible	compatible
DLTtape™ IV	not compatible	compatible	compatible

CAUTION ***DO NOT USE*** DLTtape™ I or DLTtape™ II ***cartridges in this library.***

Bar code labels are supplied in the library accessories kit for labeling your DLT™ tape cartridges. To speed the library inventory process, install the bar code labels on all tape cartridges before placing the cartridges in the library. With a completely full carousel, the inventory process takes approximately four minutes if bar code labels are installed on all tape cartridges and over fifty minutes if bar code labels are not installed.

Note ***Bar code labels will speed the inventory process even if the bar code information is not used by the application software driving the library. Also, removing empty bin packs will speed the library inventory process.***

CAUTION ***Examine all cartridges before loading them into the library or tape drives. Look for label stock or other foreign material that may be clinging to them.***

Note ***Your facility may have its own requirements regarding the order of cartridges in bin packs. Refer to these requirements when loading cartridges.***

Figure 25 on page 4-32 shows how to insert a bin pack onto the carousel.

To load a cartridge into a bin pack that is already mounted on the carousel, do the following.

1. Place the library off-line, by pressing the STANDBY button. The STANDBY indicator lights and “01” displays.
2. Rotate the carousel by pressing the right and left arrow buttons until the desired carousel face is at the front.
3. Open the front door.
4. Insert tape cartridges into the bin pack with the bar code label slot facing out and the cartridge spindle facing down.

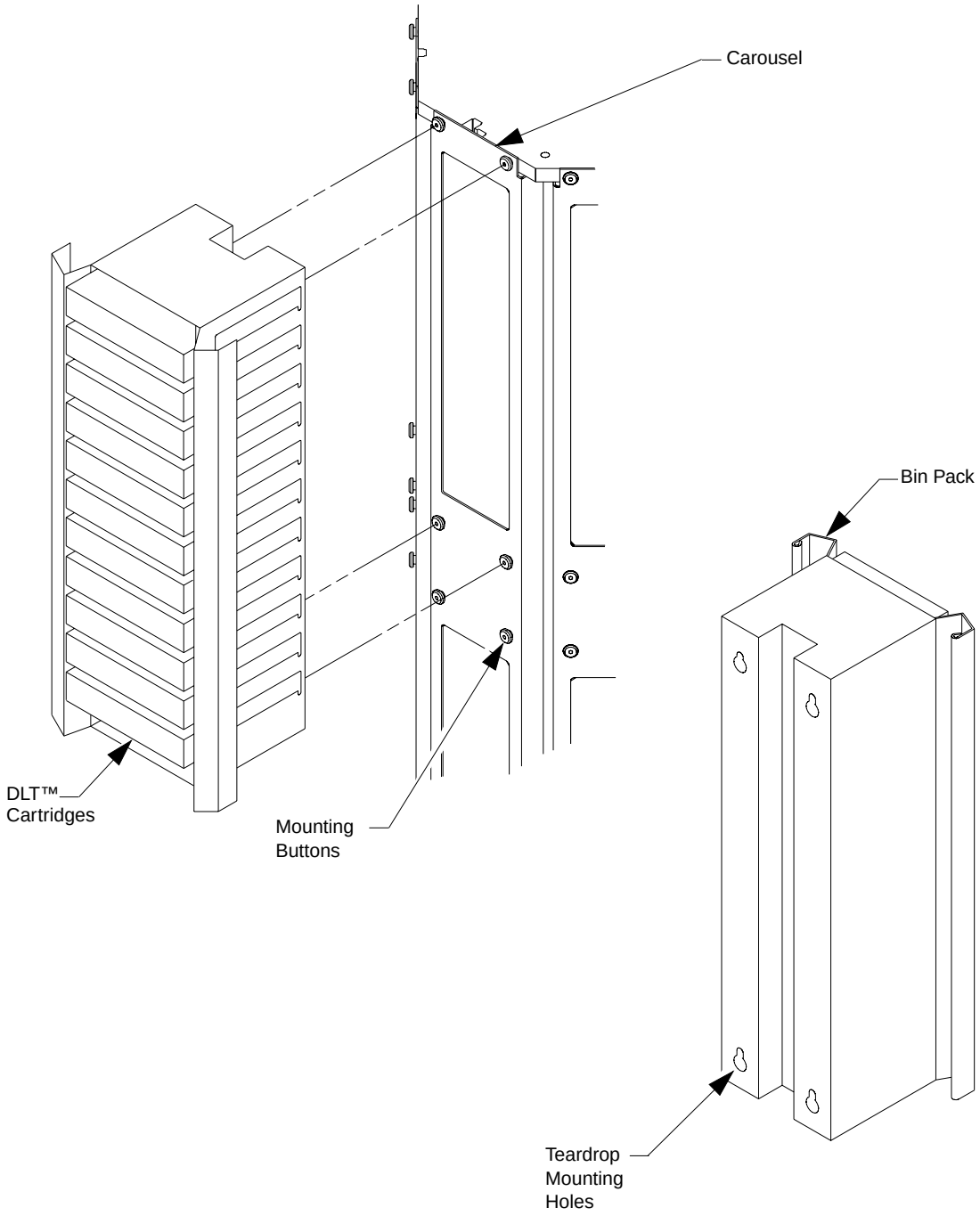
Note ***Since a cartridge cannot be fully inserted into a bin pack incorrectly, you will notice if the cartridge does not fit into the cartridge slot completely.***

5. Run your hand down the front face of the cartridges on the exposed carousel face to make sure they are seated properly. (Do not run your hand up the front face of the cartridges since this can cause them to become seated incorrectly.)
6. Close the front door.
7. Verify that the STOP button is released.
8. Place the library on-line by releasing the STANDBY button.

   Once the front door is closed and the library is on-line, it will re-inventory the following:

   - The front face of the carousel.
   - Any other faces that were exposed while the door was open.
   - The tape drives.
   - The PTM if a cartridge is detected on the tray.

Figure 25: Loading the Library



Tape Drive Cabling

Internal Power Cabling

The single power distribution box within the TL82X / TL893 / TL896 library has two sets of outlets (see Figure 16 on page 4-9). The two outlets on the right side are dedicated to the unit's internal robotics, and are controlled by the On / Off Switch. The two outlets on the left side are controlled by the master Breaker Switch and provide power to the AC Power Strip which in turn supplies power to the tape drive power supplies and the MUC.

The receptacles on the power distribution box and the power strip accept IEC-320 style plugs and are rated at 10A each.

CAUTION ***Make sure the switch on the power supply connected to the tape drives is OFF while you hook up the tape drive cabling.***

Internal Library SCSI Cabling

The DLT™ tape drives and the MUC in the TL82X / TL893 / TL896 are internally connected to the rear library bulkhead using double-shielded SCSI-2 cables. TL820, TL822, and TL826 libraries use 50-pin SCSI cables. TL893 and TL896 libraries use 68-pin SCSI cables.

The cabling diagrams in Figure 26 through Figure 30 show the standard SCSI cabling for the TL820, TL822, TL826, TL893, and TL896 respectively. Additional cables are included in the accessories kit shipped with the library. Use these cables to reconfigure the library as desired. Note that in accordance with the SCSI specification, all devices on a single bus must have unique SCSI IDs, and both ends of every bus must be terminated.

Figure 26: TL820 SCSI 2-Bus Configuration

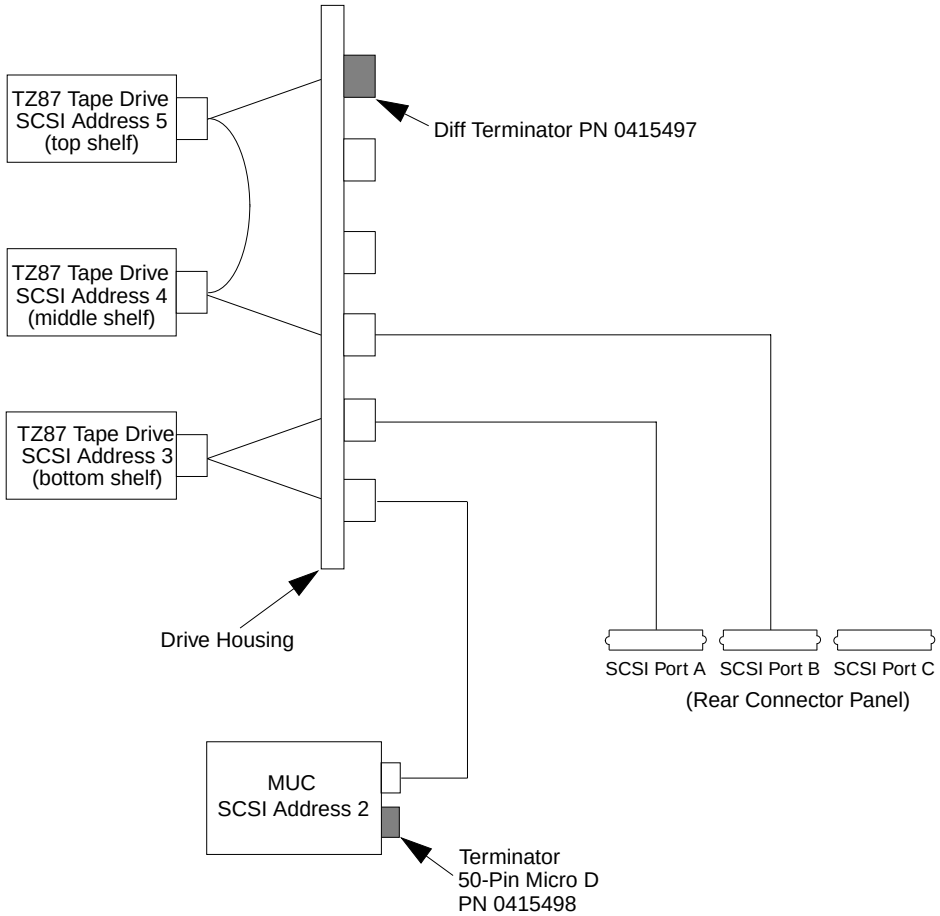


Figure 27: TL822 SCSI 3-Bus Configuration

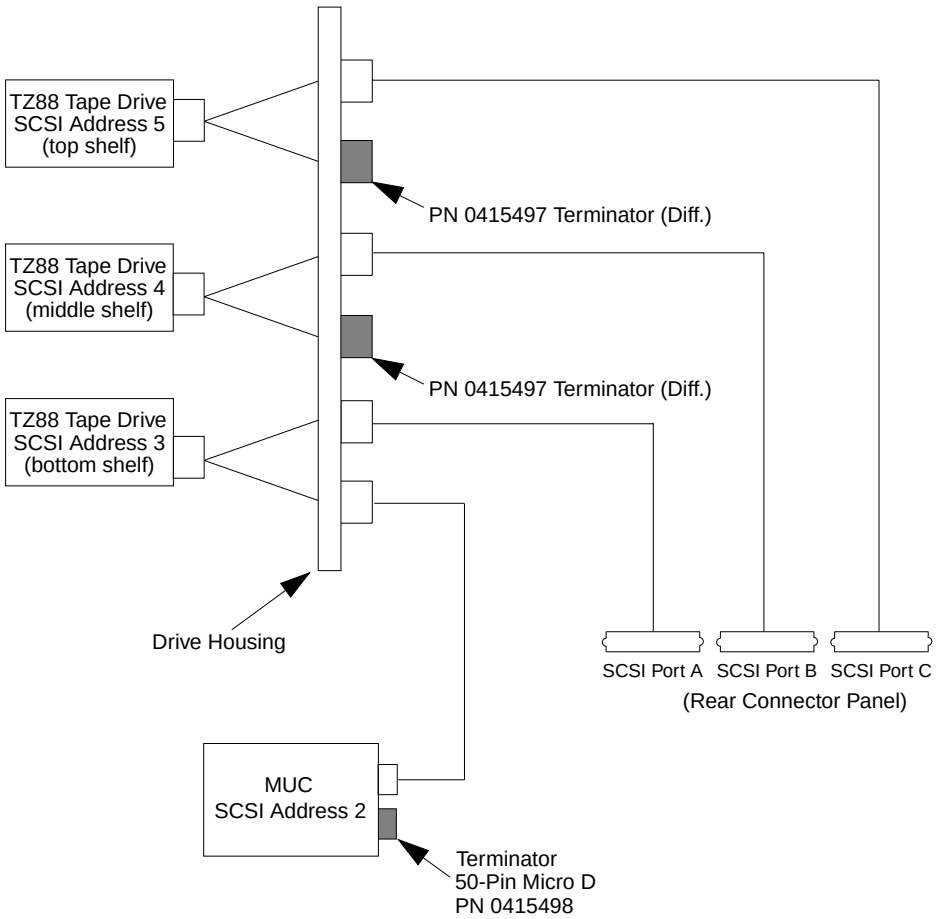


Figure 28: TL826 SCSI
6-Bus Configuration

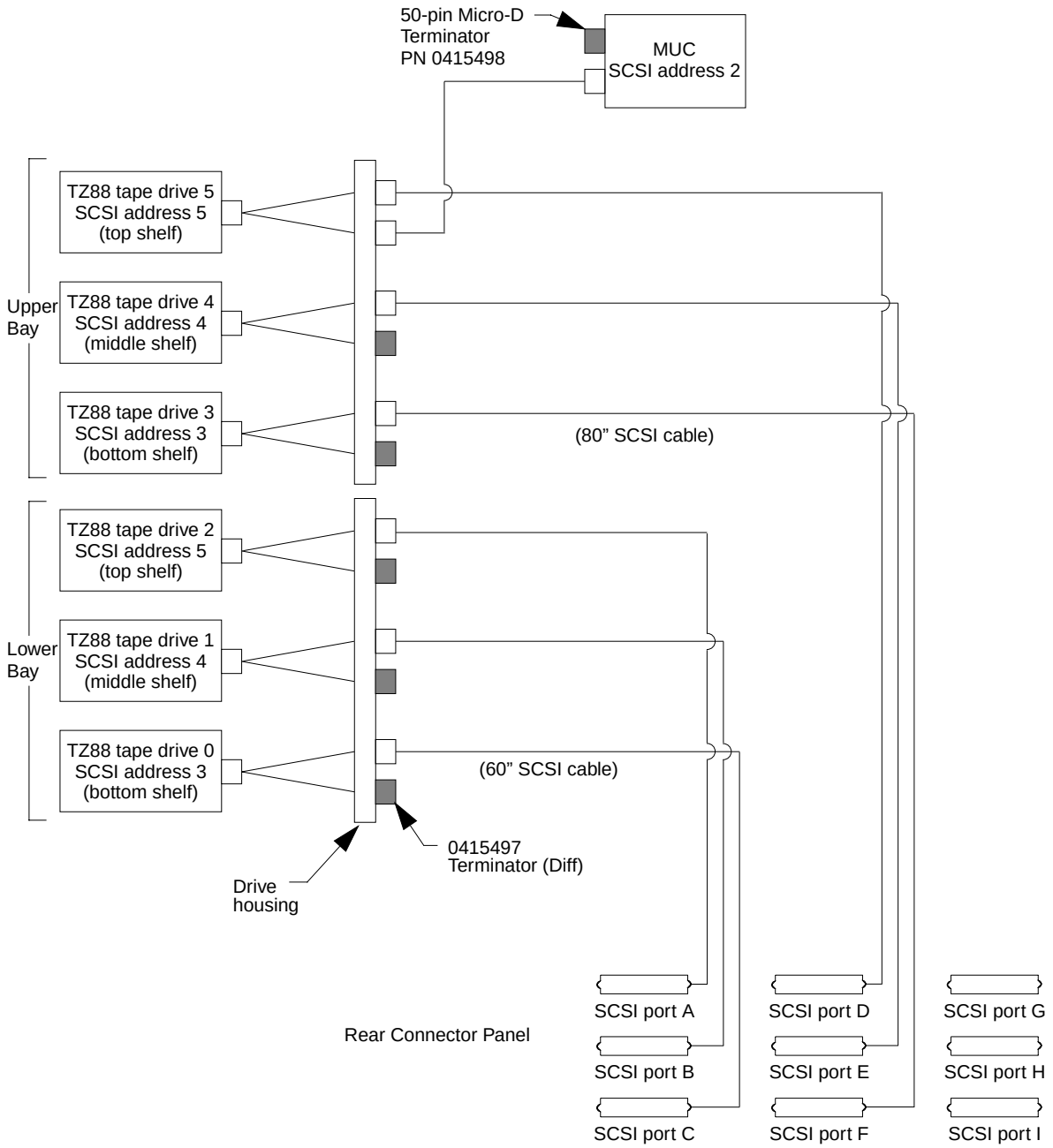


Figure 29: TL893 SCSI
3-Bus Configuration

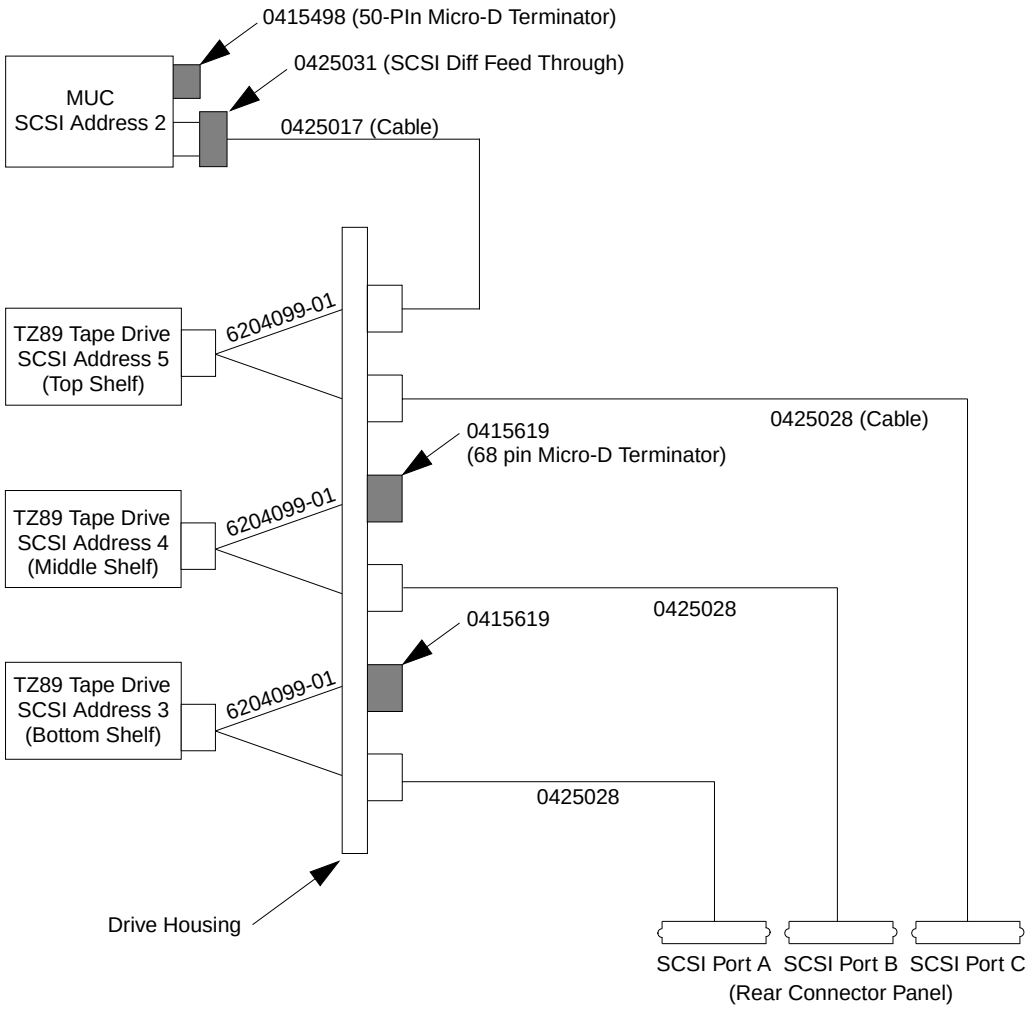
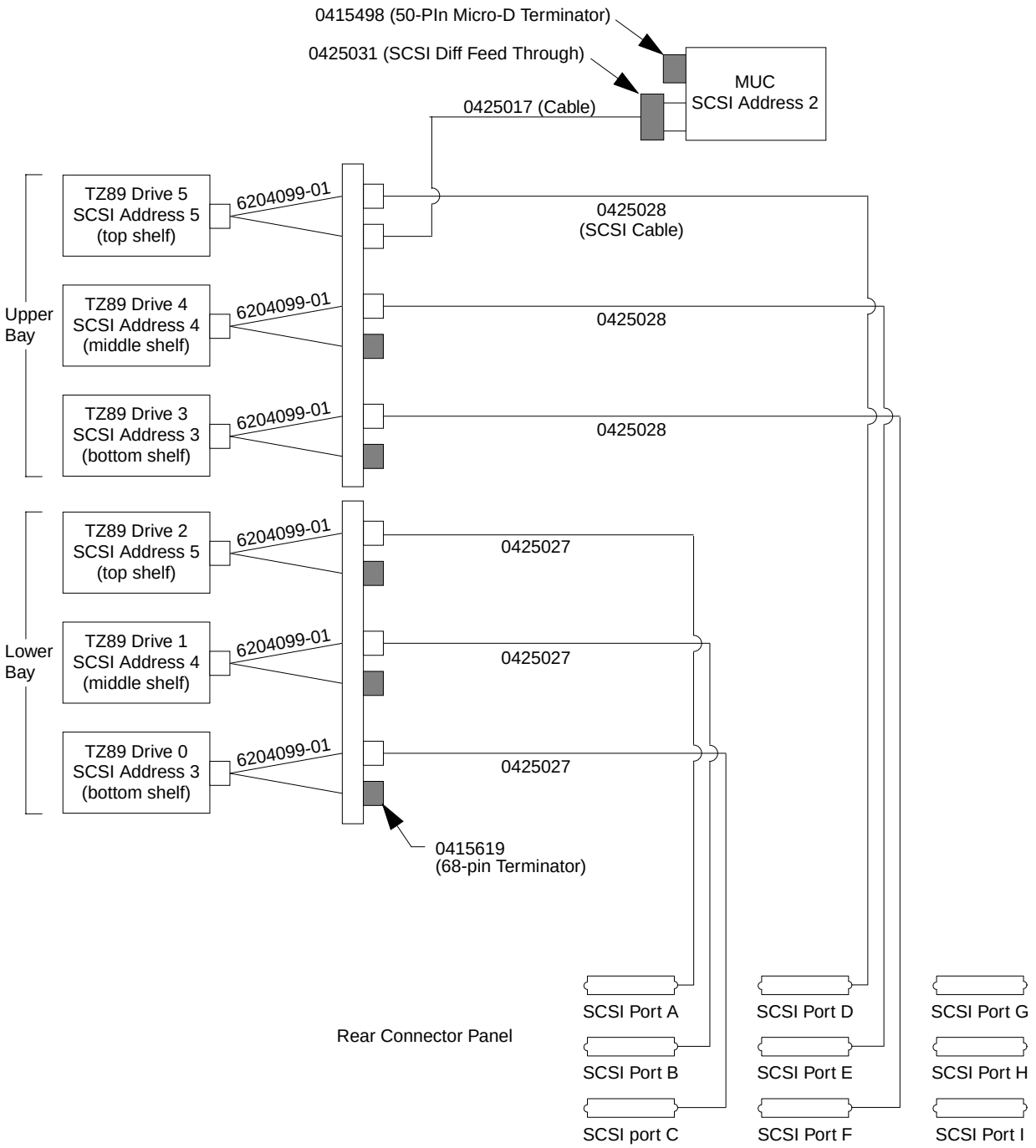


Figure 30: TL896 SCSI
6-Bus Configuration

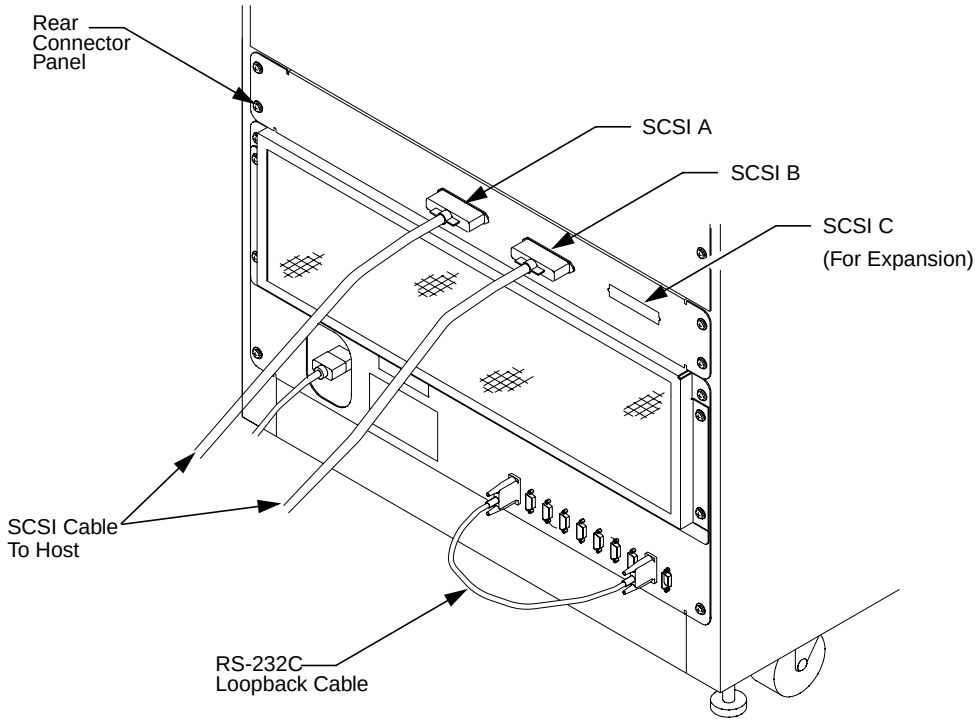


External Library Cabling

MUC Cable Connections

Figure 31 shows the external cable connections for the TL820 library. External cable connections for the TL822, TL826, TL893, and TL896 are similar, with additional SCSI ports available. Note that the SCSI bulkhead receptacles are located just above the fan panel. Below the fan panel are the AC power receptacle and RS-232C receptacles for the library robotics and diagnostics.

Figure 31: External MUC Cable Connections



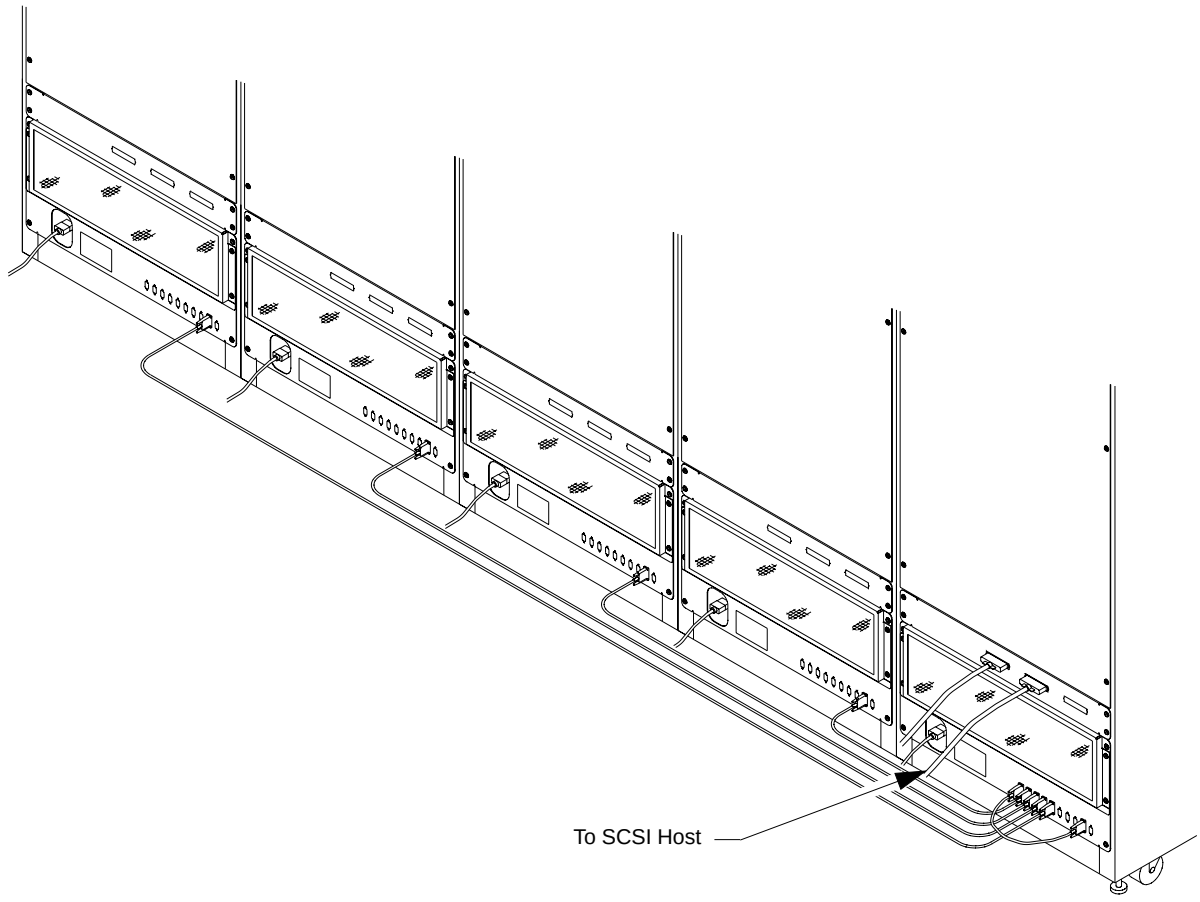
(Note: TL820 Library Shown)

For single library installations, a shielded RS-232C loopback cable (supplied in the accessories kit) must be connected between the Robotic Controller Port labelled “INPUT” and the Multi-Unit Controller Port labelled “UNIT 0.” This creates a link between the MUC and the library control electronics.

Multi-Unit Library Cable Connections

For multi-unit configurations, the single-unit configuration communications connection procedure is simply extended. Figure 32 and Table 19 on page 4-41show the communications connections between units in a multi-unit library system.

Figure 32: Multi- Unit Cable Connections



Note ***The cabinet-to-cabinet RS-232 9-pin connector cables are not supplied with the basic library, but are supplied with an expansion library.***

The multi-unit library system connection functions as follows:

- Provides paths for all necessary control signals.
- Identifies a unique connection pattern to the MUC software to identify both the number of units in the multi-unit configuration and where each of them are in relation to the others.

Note ***The location of the unit housing the MUC is not critical and can be based on proximity to the host computer. For libraries with a MUC that use serial host control, connect the EIA/TIA cable to the Multi Unit Controller host port.***

To set the MUC SCSI ID refer to "Multi-Unit Controller (MUC) SCSI ID Setting" on page 4-6.

For the multi-unit library system to function properly, it is important the left unit (viewed from the front) be configured as logical unit 0, the second unit as logical unit 1, the third unit as logical unit 2 etc.

To connect units in multi-unit library system, do the following:

1. Connect a cable between the robotic controller port marked "INPUT" on the left-most (as viewed from the front of the library system) cabinet's rear connector panel and the multi-unit controller port marked "UNIT 0" on the rear connector panel of the library with the MUC.
2. Connect a cable between the robotic controller port marked "INPUT" on the second left-most cabinet and the multi-unit controller port marked "UNIT 1" on the library with the MUC.
3. Continue this process for the third left-most cabinet, the fourth left-most cabinet, and the right-most cabinet. See Table 19 below.

Table 19: Multi-Unit Cable Connections

Library (viewed from front)	LUN #	RS-232 Cable Connection	
		From: RS-232 Port (unit w/MUC)	To: Robotics Controller Port
Left-most	0	Unit 0	Input
2nd	1	Unit 1	Input
3rd	2	Unit 2	Input
4th	3	Unit 3	Input
Right-most	4	Unit 4	Input

Multi-Unit Single-LUN Cable Connections

The multi-unit single-LUN (MUSL) library cable configuration is identical to that of the standard multi-unit communications setup. The MUSL mode must be enabled for the MUC to record the number of units in the MUSL set and the element configuration of each unit. Refer to the "Config Menu" in section 4 of the *TL82X/TL893/TL896 Diagnostic Software User's Manual.*

Note ***All the units in the set must be configured and operational when this command is issued.***

Additionally, this command must be issued whenever the library configuration changes, such as when a drive is added. Since the MUC does not contain non-volatile storage, the set configuration is saved in the non-volatile storage of all the units in the set.

Completing the Installation

Once the units have been configured and tested, the communications cable between the TL82X / TL893 / TL896 library and the host computer can be connected on the host side.

CAUTION ***Consult your host computer system administrator or host computer manuals for information before completing the communications connection.***

1. Connect the host interface cable(s) to the host.
2. Release the STANDBY button on the control panel so the library is communicating with the host computer.
3. Release the STOP button on the control panel so that the library is fully enabled. (This will start an automatic inventory sequence. When complete, the host will be able to send commands to the library.)

Note ***At this point the library should be operational. For information on operating the library, refer to Document, EK-TL820-OP TL82X/TL893/TL896 Operator's Guide. For information on interfacing the library to host computer software, refer to Document EK-TL820-IG, TL82X/TL893/TL896 Software Interface Guide.***

Glossary

alignment — In the context of this manual, alignment refers to the mechanical adjustments required for successful operation of the TL82X library.

alignment toolkit — A set of alignment aids available to authorized field service personnel.

auto-clean — This term refers to the Automatic Drive Cleaning feature. Two modes of drive cleaning support are available on the TL82X / TL893 / TL896 libraries: Host Initiated and Fully Automatic.

In Host Initiated Cleaning Mode, drive cleaning is enabled by your System Administrator at the host computer. Although the library unit will internally track cleaning cartridge movement and use, the library unit provides no cleaning support in this mode. The host is responsible for all cleaning functions such as detecting when a drive requires cleaning, tracking and selecting cleaning cartridges, initiating media movement of the cleaning cartridge to the drive and determining when a cleaning cartridge has been "used up."

Drive cleaning in the Fully Automatic Cleaning Mode is also enabled by your System Administrator at the host computer. However, in this mode, the library unit monitors each drive's status to determine when a drive requires cleaning and initiates action when that determination is made. In this case, the library unit selects an available cleaning cartridge, handles media movement of the cleaning cartridge to and from the drive and supervises the cleaning operation in the drive. The library unit tracks cleaning cartridges within the library, monitors cleaning cartridge use and determines when a cleaning cartridge has been "used up." A "used up" cleaning cartridge is exported from the library under control of the library.

Note — ***The library is shipped with Automatic Drive Cleaning disabled. The Automatic Drive Cleaning feature can be enabled using the Diagnostic Software Package. However, when the library power is cycled, the feature is disabled. If the Automatic Drive Cleaning feature is enabled from the Host Controller via the Mode Select command, then the feature will remain enabled even if power is cycled.***

automated cartridge library — A robotic storage and retrieval system for cartridges.

bar code — In the context of this manual, the machine-readable label on

	DLT™ cartridges.
bar code scan head	The portion of the bar code scanner which senses the bar code and is mounted on the vertical carriage.
bin pack	A removable rack that attaches to the carousel and stores up to eleven DLT™ cartridges inside a library.
calibration	Electrically identifying the vertical position of each bin slot, and tape drive, and PTM within a library.
carousel	The eight-sided rotating prism in the center of the library which holds bin packs with DLT™ cartridges.
carousel belt	The drive belt connecting the carousel motor / gearbox to the carousel.
carousel face	One side of the eight-sided carousel.
control panel	The panel containing the display, fault light, and control buttons on the front door of a library.
door interconnect board	The electronics board located on the front door to which the cables crossing the hinge are connected.
EIA/TIA-574	A serial communications cabling and protocol standard for nine-pin connectors, sometimes referred to as RS-232.
electronics module	The metal enclosure holding the logic power supply and the robotic control and actuator driver electronics.
extension axis assembly	Mounted onto the vertical axis, the extension axis assembly consists of the gripper assembly and the horizontal axis on which the gripper assembly is mounted.
extension axis belt	The drive belt connecting the extension motor / gearbox to the gripper.
FCC Class A	Standard established by the U.S. Federal Communications Commission governing electromagnetic emissions.
FSE	Field Service Engineer, a.k.a., FE (Field Engineer).
gripper assembly	The assembly which mounts on the extension axis and grips cartridges; sometimes called the gripper.
host	Host computer.
host computer	The computer which issues high-level pick and place commands to control a library.
IOD	The Inport / Outport Device, located at the cutout on the left side of a library, allows insertion and removal of single cartridges into and out of the library.

LED	Light Emitting Diode.
library	A single TL82X / TL893 / TL896 cabinet and the robotics within.
mounting kit	Kits supplied with libraries for installing tape drive systems in the unit.
MTBF	Mean Time Between Failures.
MTTR	Mean Time To Repair.
MUC	The Multi-Unit Controller serves two functions. It is a SCSI adapter and it permits the library host computer to control up to five attached basic or expansion libraries.
MUSL	The Multi-Unit Single-LUN is a software selected feature to externally interface up to five mid-range libraries units as a single logical unit.
on-line	Ready for communication with a host computer.
PC	Personal Computer.
pick	The act of removing a cartridge from one location in preparation for placing it in another location.
place	The act of placing a cartridge in a location after it has been picked from another location.
power distribution box	A box located in the left rear of the library which contains receptacles for providing power to the various components of the library and switches for turning the power on and off.
PTM	The Pass Through Mechanism is the motor-driven, high-speed conveyor that transports cartridges between adjacent libraries in a multi-unit tape library. It is used in conjunction with the IOD when importing or exporting single cartridges.
PROM	Programmable Read-Only Memory.
rear connector panel	Located at the bottom rear of the cabinet, the rear connector panel contains the fans and the connectors for attaching external cabling to the library.
SCSI	Small Computer System Interface communications standard for attaching peripheral equipment to computers.
tape drive	The mechanism that reads and writes data from and to a tape.
tape drive alignment cartridge	An alignment aid in the general form of a DLT™ cartridge which has flanges to keep it from being stuck in a drive.

TL820 library	An automated library system developed for storing and handling DLT™ cartridges. Contains three TZ87 DLT™ tape drives and a maximum of 264 cartridges.
TL822 library	An automated library system developed for storing and handling DLT™ cartridges. Contains three TZ88 DLT™ tape drives and a maximum of 264 cartridges.
TL826 library	An automated library system developed for storing and handling DLT™ cartridges. Contains six TZ88 DLT™ tape drives and a maximum of 176 cartridges.
TL893 library	An automated library system developed for storing and handling DLT™ cartridges. Contains three TZ89 DLT™ tape drives and a maximum of 264 cartridges.
TL896 library	An automated library system developed for storing and handling DLT™ cartridges. Contains six TZ89 DLT™ tape drives and a maximum of 176 cartridges.
UL	Underwriters Laboratories.
vertical belt	The drive belt connecting the vertical motor to the vertical axis assembly.
vertical carriage assembly	The crossbar and linear bearings mounted onto the vertical rails and everything mounted on the crossbar.
ZIF connector	A Zero Insertion Force connector used for electrical wiring.

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