EAGLE 5 SAS with T1000 AS Hardware Manual

Table of Chapters

910-0095-001 Revision A, August 2005

Tekelec EAGLE® 5 SAS with T1000 AS

Tekelec 1000 Application Server Hardware Manual

910-0095-001
Revision A, August 2005

TEKELEC

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About This Manual

Introduction

This manual is a generic manual that describes common components of Tekelec 1000 Applications Server (AS) hardware systems and describes how to install them and replace them. A Tekelec 1000 hardware system consists of one or more Tekelec 1000 platforms (with applications loaded) and any additional hardware (such as hubs, switches, or power distribution equipment) needed to support the applications.

NOTE: This manual includes links to documents that are specific to a given product, depending on which product CD this manual is viewed. Although the manual is the same on CDs for various products, the linked documents are different on different product CDs. For more information about linked documents, see "Where to Find Other Information" on page 1-4.

Tekelec 1000 hardware systems are delivered with applications already loaded.

- Most applications run on Tekelec 1000 hardware systems installed in a Direct Current (DC) environment.
- Some applications may run on Tekelec 1000 hardware systems installed in a Alternating Current (AC) environment, in which the Tekelec 1000 hardware system contains a rectifier to convert AC power to DC used by the Tekelec 1000 platform.

For more information about Tekelec 1000 hardware systems in AC and DC environments, see Chapter 3, "Tekelec 1000 AS Hardware System Overview."

Each time this manual is published, the revision level is changed. For example, the first time this manual is published, it uses Revision A; the second time it is published, it uses Revision B.

Where to Find Information in This Manual

Table 1-1 shows how this manual is organized.

Table 1-1. Manual Organization

Chapter Number and Title	Description
Chapter 1, "About This Manual"	Describes how to use the manual, where to find other information, and how to contact Technical Services.
Chapter 2, "Safety and Pre-Installation Requirements"	Lists general safety instructions that readers should be familiar with, and lists site requirements that should be verified before installing Tekelec 1000 hardware systems.
Chapter 3, "Tekelec 1000 AS Hardware System Overview"	Presents an overview of the various hardware components that can be included in Tekelec 1000 hardware systems.
Chapter 4, "How to Install a Tekelec 1000 AS Frame"	Describes how to install a heavy duty frame which is delivered from manufacturing with Tekelec 1000 units mounted in a heavy-duty frame for use in a DC environment.

Table 1-1. Manual Organization

Chapter Number and Title	Description
Chapter 5, "How to Install Hardware in an Existing Frame"	Describes how to install an individual Tekelec 1000 unit into a frame that has already been installed. This chapter covers both: • Adding a Tekelec 1000 unit into a heavy duty frame that already contains from 1 to 4 Tekelec 1000 units in a DC environment • Installing a single Tekelec 1000 unit into a customer's frame in an AC environment.
Chapter 6, "Post Installation Procedures"	Presents a post-installation checklist and instructions on how to verify voltage and to power-up the system.
Chapter 7, "Field Replaceable Units"	Describes the components of a Tekelec 1000 hardware system that can be replaced in the field, and includes procedures for replacing each type of field-replaceable unit (FRU).
Appendix A, "Tekelec 1000 AS Hardware Feature Information,"	Describes in greater detail some of the hardware features of the Tekelec 1000 chassis.
Appendix B, "Hardware Repair and Return,"	Describes how to obtain a Return Material Authorization, find part numbers on labels, and ship returned equipment.

Where to Find Other Information

This manual is delivered on a compact disk (CD) that also contains the following documentation (these documents can also be accessed from the introductory page of the documentation CD):

- The CD contains linked documents shown in the following sections. To display one of these documents from within this document, click anywhere in the highlighted area. For information about software needed to open these links, see "Programs Needed to View Linked Documents" on page 1-4.
- Optionally, the CD may also contain application documentation, which describes the environment in which the Tekelec 1000 hardware system runs as well as provides information about the application.

NOTE: Documentation about Tekelec 1000 hardware components (such as breaker panels or Ethernet switches) that are supplied by other companies is shipped with the Tekelec 1000 hardware system. When unpacking a frame or individual components, be sure to obtain this documentation and store it where it can be accessed later.

Programs Needed to View Linked Documents

To view the linked documents, the workstation on which this manual is being viewed needs to have the following programs:

- Most of the linked documents are in Portable Document Format (PDF), which has a file type of `.pdf`. PDF is also the format of this manual. When a PDF link is clicked, the linked document is opened in the same window as this manual. To return to this manual, click the Back button on the PDF display window.
- A document with a `.doc` file type can be viewed with Microsoft® Word. The linked document may open in a minimized window.
- A document with an `.mpg` file type can be viewed with a variety of video programs. Two commonly used programs are:
  - — Microsoft Windows® Media Player (this program is usually included with Microsoft Internet Explorer)
  - — RealOne™ Player

Documents That Show How to Perform a Procedure

The following documents illustrate how to perform procedures. The first document uses a Word format; the others are videos with sound that can be opened with most video programs.

- 822-0094-02.doc, WORK INSTRUCTIONS, UNPACKING, VERTICAL SHIPPING CRATE, HEAVY DUTY, EAGLE
- access_in_frame.mpg, video that shows how to slide Tekelec 1000 chassis out from frame and open lid (also see Procedure 7-5, "Slide Tekelec 1000 Chassis Out from Frame," on page 7-11)
- replace_filter.mpg, video that shows how to replace a filter (also see Procedure 7-9, "Replace Air Filter," on page 7-22)
- replace_fans.mpg, video that shows how to replace a fan assembly (also see Procedure 7-10, "Replace a Fan Assembly," on page 7-23)
- replace_disk_drives.mpg, video that shows how to replace a hard disk drive assembly (also see Procedure 7-11, "Replace a Hard Disk Drive Assembly," on page 7-27)
- replace_main_unit.mpg, video that shows how to replace a Tekelec 1000 chassis (also see Procedure 7-14, "Replace a Tekelec 1000 Chassis FRU," on page 7-46)

Installation Documents

This section contains links to assembly drawings, interconnect diagrams, and related installation documents.

NOTE: A given application or set of applications might support only a DC environment or only an AC environment. For information about which environment is supported, refer to the application documentation. If the environment is not supported by the application, the link will open a document that states that the drawing is not available.

Linked Documents For DC Environments

The following documents provide information about Tekelec 1000 hardware systems in DC environments:

- DC_AssemblyDrawing.pdf, a drawing of the maximum configuration possible in a frame in a DC environment
- DC_InterconnectDiagram.pdf, a diagram that shows how the elements in a frame should be connected

- DC_CableList.pdf, a list of the cables shown in the system interconnect drawing. The list contains links to drawings of each cable used in the DC_InterconnectDiagram.
- DC_BreakerSettings.pdf, information that shows mapping of breakers to hardware components.

Linked Documents For AC Environments

The documents in this section provide information about Tekelec 1000 hardware systems in AC environments.

NOTE: Some applications and application sets do not support installation of Tekelec 1000 hardware systems in AC environments. When installation in an AC environment is not supported, the links shown in this section will open documents that state "This application set does not support installation in AC environments."

- AC_PowerSystem.pdf, a detailed drawing of the rectifier used to convert AC to DC power
- AC_InterconnectDiagram.pdf, a diagram that shows how the elements in a customer-provided frame should be connected in an AC environment
- AC_CableList.pdf, a list of the cables shown in the system interconnect drawing. The list contains links to drawings of each cable used in the AC_InterconnectDiagram.

Applications Documents

Tekelec 1000 units support a variety of applications. For more information, refer to application documentation.

NOTE: Application documentation may also contain information about additional hardware.

Documentation Packaging and Updates

Customer documentation is upgraded whenever significant changes are made that affect system operation or configuration are made.

The document part number is shown on the title page along with the current revision of the document, the date of publication, and, if applicable, the software release that the document covers. The bottom of each page contains the document part number and the date of the publication.

Documentation Admonishments

Admonishments are icons and text that may appear in this and other Tekelec manuals. Admonishments alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage.

The following admonishments, listed in descending order of priority, are used in Tekelec manuals.

TOPPLE: This icon and text indicate the possibility of equipment damage and personal injury from toppling.

DANGER: This icon and text indicate the possibility of *personnel injury*.

WARNING: This icon and text indicate the possibility of *equipment damage*.

CAUTION: This icon and text indicate the possibility of *service interruption*.

Technical Services and Support

Test a change. The Tekelec Technical Services department offers a point of contact through which customers can receive support for problems that may be encountered during the use of Tekelec's products. The Tekelec Technical Services department is staffed with highly trained engineers to provide solutions to your technical questions and issues seven days a week, twenty-four hours a day. A variety of service programs are available through the Tekelec Technical Services department to maximize the performance of Tekelec products that meet and exceed customers' needs.

To receive technical assistance, call the Tekelec Technical Services department at one of the following locations:

Table 1-2. Contacting Tekelec Technical Services

Tekelec Service Center Location	Calling From:	Numeric Dialing
Tekelec, United Kingdom email: **ecsc@tekelec.com**	Within the UK	+44 1784 467 804
	FAX UK	+44 1784 477 120
Tekelec, United States of America email: **eaglets@tekelec.com**	Within the continental US	888-FOR-TKLC (888-367-8552)
	Outside the continental US	+1 919-460-2150

2

Safety and Pre-Installation Requirements

Introduction

This chapter presents:

- General safety considerations that should always be kept in mind when Tekelec products are installed or replaced
- Listing of regulatory compliances and certifications that Tekelec products support
- Site requirements that should exist before Tekelec products are installed

Safety Information

Safety icons and text are used throughout Tekelec manuals to warn the reader of the potential of personal injury, service interruption, and equipment damage. For information about what each of the icons mean, see "Documentation Admonishments" on page 1-7.

Before beginning any procedure described in this manual, ensure that you are familiar with each of the following safety admonishments. Additional safety admonishments may be included, or repeated, for specific procedures.

TOPPLE: Always read and understand instructions completely before working on, moving, raising or lowering the frame, any portion of the frame, or attachments to the frame or equipment.

TOPPLE: Never try to unpack any frame from the shipping container without at least two people to steady any movement of the frame and related components. At least two people are required to safely move and position any frame.

TOPPLE: Never pull out the shelf of any frame that is not anchored properly. Some frames are required to be attached to overhead ladder racks before shelves are extended.

DANGER: No commercially AC powered equipment may be used or placed within 7 ft. of –48V equipment. AC powered equipment within 7 ft. of –48V equipment may create a shock or current loop that can be severely hazardous to personnel and equipment.

DANGER: Do not wear metal, chains, rings, watches, or jewelry or carry exposed metal, keys or tools in pockets when working on system equipment or other related electrostatic-sensitive components. Always wear a wrist strap or other electrostatic protection when handling printed circuit boards and other electrostatic-sensitive devices.

WARNING: Do not leave or allow unused metal objects, such as screws or washers, to remain anywhere within the equipment. Remove all unused material from the equipment

WARNING: Do not allow any metal shavings to remain in the equipment area. Metal Shavings may result from over tightened screws or bolts. These small metal particles are hazardous to electronic equipment.
Be careful not to over tighten screws or bolts.

WARNING: Do not use tie wrAS on or above the top traverse arms on a frame. Always trim tie wrap flush and turn the trimmed tie wrap to the rear of the cable.

CAUTION: All personnel associated with the installation of these systems must adhere to all safety precautions and use required protection equipment, to avoid the possibility of injury to personnel, service degradation, and/or service interruption.

CAUTION: These systems have redundant power supplies to allow service during normal maintenance. When repairs require a total power disconnect, both input supply sources must be disconnected. This causes service interruption and takes down the systems.

CAUTION: This equipment has a connection between the earthed conductor of the DC supply circuit and the earthing conductor.

CAUTION: The Branch Circuit Overcurrent Protection shall be rated minimum -48V, maximum 40A.

CAUTION: Equipment is to be installed in restricted access areas in accordance with articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70.

CAUTION: A readily accessible disconnect device that is suitable, approved, and rated shall be incorporated in the field wiring.

CAUTION: Connect to a reliably grounded SELV source which is reliably earthed and electrically isolated from the AC source.

CAUTION: Use only listed closed loop connectors for connection to the supply.

CAUTION: When some CPCI cards arrive from the manufacturer, they may have a small plastic cover over the screws and/or the alignment ejector pins. Remove and discard these plastic covers. If inserting the cards takes an excessive amount of force, check for obstructions. Forcing the card into a slot may damage the ejector handle or pin.

Regulatory Compliance and Certification

Tekelec products are tested to meet the following regulatory standards:

- Network Equipment Building System (NEBS) level 3 as listed in Telcordia SR-3580 Issue 1, November 1995.
- Applicable Telcordia Electromagnetic Compatibility and Electrical Safety requirements in GR-1089-CORE; Issue 2, with Revision 1, February 1999.
- Applicable Physical Protection requirements in GR-63-CORE, Issue 2, April 2002.
- Relevant directives and harmonized standards in support of the products Compliance European (CE) mark required in Europe. Figure 2-1 shows the mark used to indicate this compliance.

Figure 2-1. European Directives CE Mark

- Requirements of RTTE Directive 1999/5/EC, Radio Telecommunications Terminal Equipment, as tested to the relevant standards identified in the Official Journal of the European Communities. Figure 2-2 and Figure 2-3 show the marks used to indicate this compliance.

Figure 2-2. Combined UL and GS Mark

Figure 2-3. UL-Demko Mark

- Relevant standards in ElectroMagnetic Compatibility (EMC) directive 89/336/EEC.

- Relevant standards in Safety directive 73/23/EEC, supported by Certified Body (CB) Test Certificates US/5923/UL or US/5451/UL issued by the National Certification Body as tested to IEC 60950 with national differences for European countries
- Underwriters Laboratories (UL) listed under UL File E200146 for USA and c-UL for Canada. Figure 2-4 shows the mark used to indicate this compliance.

Figure 2-4. Combined UL Mark for the United States and Canada

Pre-Installation Site Requirements

Before installing any Tekelec 1000 hardware system, ensure that the requirements described in both of the following sections have been met.

- "Generic Site Requirements" on page 2-5
- "Grounding and Power Requirements" on page 2-8

Generic Site Requirements

Ensure that the site where the product will be installed conforms to the specifications listed in the following sections. These specifications are standard telephony industry requirements for equipment installation.

Fire Protection

Local fire protection codes must be satisfied in the equipment room where the system is to be located.

Environmental Requirements

Tekelec products are designed for environments that have temperature and humidity controls.Temperature and humidity controls must be activated as quickly as possible for equipment to operate at an optimum level.

When temperature and humidity controls fail, the equipment has been tested to operate within the following ranges:

- Temperature
  - — 5° C to 40° C (41° F to 104° F) for normal operation
  - — -5° C to 50° C (23° F to 122° F) for no more than 96 hours in duration and at elevations less than 1800 meters
  - — -5° C to 50° C (23° F to 122° F) for storing the product
- Humidity
  - — 5% to 85% non-condensing for normal operation
  - — 5% to 90% non-condensing (but not to exceed 0.024 kilograms of water per kilogram of dry air) for no more than 96 hours in duration and at elevations less than 1800 meters

Tekelec products are tested to operate at an elevations within the following range:

- Minimum: 60 meters below sea level at ambient temperature of 30° C (86° F)
- Maximum: 4000 meters above sea level at ambient temperature of 40° C (104° F)

HVAC Requirements

Tekelec products are designed to bring cool air in from the bottom front and exit heated air out the top rear of the installed equipment.

The required HVAC (Heating, Ventilation, and Air Conditioning) capacity depends on the installed equipment. To calculate needed HVAC capacity, determine the total wattage of the installed equipment and use the following formula:

```
BTUs/hr. =  watts x 3.413
```

Lighting

Adequate lighting should be provided in the room where the equipment is to be located. Lighting fixtures must be far enough from the equipment and cables to prevent heat damage and to allow safe access to equipment and cables.

Earthquake Resistance

All Tekelec system configurations are designed to assure that the system remains operational during and after an earthquake, even when the system is located on the upper floors of a zone 4 central office.

Space Requirements

Provide space as described in Table 2-1. These space requirements provide for Tekelec equipment installed in a 23-inch heavy-duty frame, which measures 7 feet high. Separator panels and end panels add to the width of multiple frame systems.

Table 2-1. Space Requirements

Building Area	Dimensions	Notes
Halls	4.5 feet wide by 8 feet tall (1.4 meters wide by 2.4 meters tall)	To provide a clear, uncluttered route for moving equipment between the loading/receiving dock and the planned system location
Frame location	30 inches wide by 24 inches deep (76.2 cm wide by 60.96 cm deep)	Floor area recommended for one Tekelec frame (multiply by the number of frames listed on the Initial Sales Order) Total area per frame = 720 square inches (5.0 square feet) (0.465 square meters)
Side aisles	4 feet (1.2 meters)	To allow maneuvering frames into place and provide ample work space around the equipment
Front and rear access	3 feet 6 inches (107 cm)	From walls or other frames
Side access	12 inches (31 cm)	From walls or other frames

In addition, when planning the installation, be sure to take into account spare hardware storage, modems, terminals, printers, cross connect panels, and all other items that might require space in a system.

Floor Loading

Tekelec products installed in heavy-duty frames are designed for installation on raised or solid floors, which are recommended to have a distributed load capacity of no less than 100 pounds per square foot (504 kg/m2). Each of the system frames weigh a maximum of 550 lbs (249 kgs).

Use the following equation to calculate the floor loading:

```
Distributed floor capacity = Total equipment weight/floor area
```

Grounding and Power Requirements

Before installing a Tekelec 1000 AS hardware system, refer to the application documentation to determine whether it is to be installed in an Alternating Current (AC) or Direct Current (DC) environment. Then, ensure that the grounding and power requirements in the appropriate following sections have been met.

- "Grounding Requirements" on page 2-8 (this section describes requirements both for AC and DC environments)
- "Power Requirements in a DC Environment" on page 2-9
- "Power Requirements in an AC Environment" on page 2-10

Grounding Requirements

Tekelec systems operate as digital isolated ground plane systems in a central office environment and require a single connection to the central office ground window. The system's ground cables must provide the sole grounding connection between the entire system and the central office grounding.

WARNING: Always install an isolator pad between the frame and ground. Tekelec frames are shipped with isolator pads to completely isolate the frames from ground. If a non-Tekelec frame is used, an isolator pad must be provided.

The system can use three types of grounding paths:

- Battery return

  The battery return grounding path is the return path for all –48VDC loads in the system. This path is isolated from other system grounds and connects to the rest of the central office through the –48VDC return connections located on the breaker panels of each frame.

- Logic Ground

  Some system types require connection to a logic ground. The logic ground path provides a common voltage reference point between all circuit boards of a system. Each connection terminates to the system ground. The logic ground path is shown on your system's interconnect drawing. The logic ground path does not carry current.

  NOTE: Logic ground is not required in an AC environment when the Tekelec 1000 AS unit uses only Ethernet connections. Ethernet connections are the only network connections intended for use with the AC powered Tekelec 1000 unit. If the AC-powered Tekelec 1000 unit uses serial RS232 connections, the grounding in a standard serial cable will provide the logic ground necessary for the data transmission.

  NOTE: AC-powered Tekelec 1000 units should not be used for RS485, DS0, V.35, or other network connections unless specified by Tekelec.

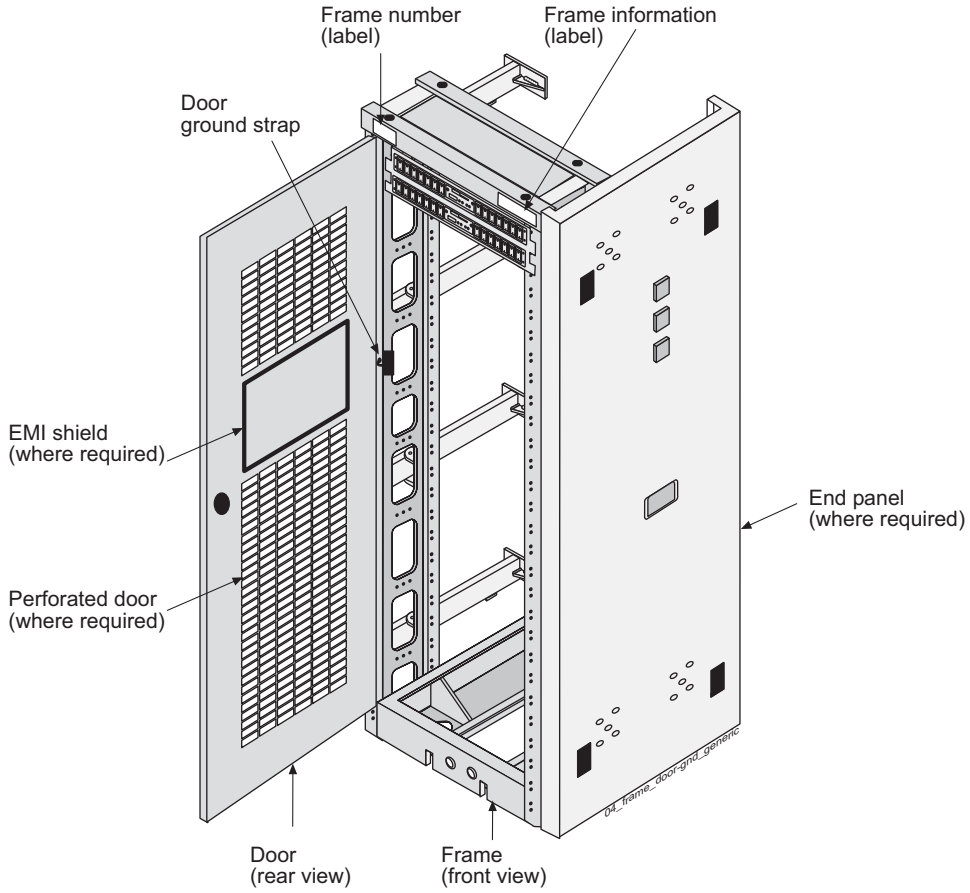
- Frame/chassis ground

  The frame/chassis ground path provides a low impedance connection for all metal parts of the entire system, including the frame, doors, shelves, and end panels. Each frame/chassis connection within the system lineup terminates to the frame and connects to the main ground by way of HtAS, #6 American Wire Gauge (AWG) to 1/0 cable.

  NOTE: The frame/chassis ground path does not carry current.

  For products installed in a frame, the doors installed are grounded to the frame through a two-hole lug ground wire and through a screw-down latch. Figure 2-5 shows a cutaway view example of an open frame door showing the door ground strap.

Figure 2-5. Door Grounding Strap Placement



Power Requirements in a DC Environment

A Direct Current environment must supply four 40Amp feeds from the customer's power source. Each frame containing Tekelec products requires that power be provided from two to four breakers at –48VDC.

Each frame is divided into A and B power buses. In the event of loss of power on one of the buses, the other bus must be able to supply current for the entire frame. Therefore, each bus requires wiring sized to handle up to the maximum amps at –48VDC, with a maximum voltage drop of 0.6 volts. This requirement is met automatically when power is supplied by breakers.

NOTE: If breakers are tripped by an overload, they must be switched completely OFF and then ON to reset.

The following table contains detailed information on Tekelec 1000 power requirements in a DC environment: DC_PowerReqmts.pdf,

Power Requirements in an AC Environment

An Alternating Current environment must supply two 20 Amp feeds from separate circuits.

3

Tekelec 1000 AS Hardware System Overview

Introduction

Depending on the applications that run on them, Tekelec 1000 AS hardware systems are delivered in one of the following ways:

- **Integrated applications**

  Most applications that run on Tekelec 1000 AS systems are designed to be integrated with features that run on a Signal Transfer Point (STP). Tekelec 1000 systems for these applications run in a Direct Current (DC) environment and are delivered in one of the following ways:

  — For all applications, the initial installation of the Tekelec 1000 hardware system consists of one or more Tekelec 1000 units, along with breaker panels and Ethernet communication equipment, already installed by Tekelec manufacturing in a heavy duty frame.

  — Some applications allow a single Tekelec 1000 unit to be added to a heavy duty frame that has been previously installed and already contains one to four Tekelec 1000 units. To view the maximum configuration allowed, refer to the DC assembly drawing.

  For more information about these Tekelec 1000 hardware systems, see "Tekelec 1000 AS Hardware System in a DC Environment" on page 3-3.

- **Non-integrated applications**

  Applications (such as provisioning applications or network management applications) that do not need to integrate with STP features may not require a DC environment. If an application is designed to run in an Alternating Current (AC) environment, a single Tekelec 1000 unit is delivered along with equipment that converts AC power to DC power.

  For more information, see "Tekelec 1000 Hardware System in an AC Environment" on page 3-5.

To determine which environments are supported by the applications that run on the Tekelec 1000 systems, refer to the applications documentation.

This chapter provides an overview of Tekelec 1000 hardware systems in each of the possible environments and an overview of each of the components that can be part of a Tekelec 1000 hardware system.

Tekelec 1000 AS Hardware System in a DC Environment

In a Direct Current (DC) environment, a Tekelec 1000 hardware system consists of the following hardware components, which are assembled in a heavy-duty frame by Tekelec and delivered as one unit when first ordered (some applications allow additional Tekelec 1000 units, to a maximum of five, to be added later):

- Depending on the applications loaded, from one to five Tekelec 1000 units, identified as A through E, starting with the topmost server identified as A. Each server consists of Tekelec 1000 hardware that is loaded at the factory with platform software and application software. Some applications allow each server to be installed with different application software. (The minimum and maximum number of servers in the frame depends on which applications are loaded; for more information, refer to the applications documentation and to the DC assembly drawing.) For an overview of the Tekelec 1000 units, see "Tekelec 1000 Hardware Features" on page 3-5.

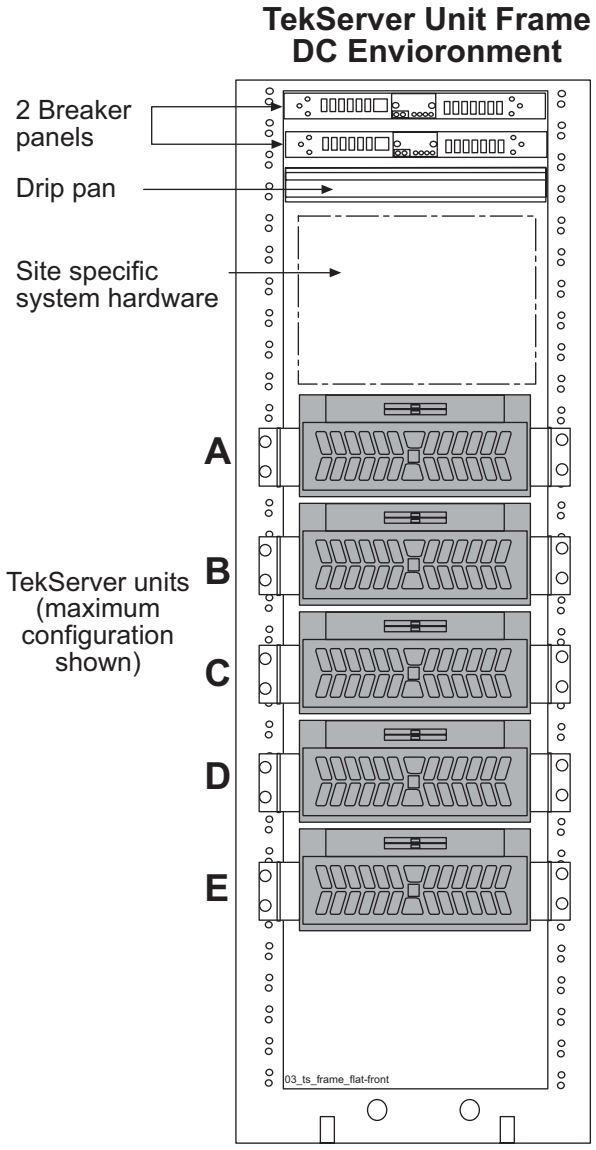
  NOTE: Some applications allow individual Tekelec 1000 units (to a maximum of five per frame) to be added later.

- Two Breaker Panels (BPs). For an overview, see "Breaker Panels" on page 3-12; for more information, refer to the documentation delivered with the product.
- Additional equipment, such as consoles and communications switches and hubs. For more information on these components, refer to the documentation delivered with the product.

Figure 3-1 shows an example Tekelec 1000 hardware system in a DC environment.

NOTE: This figure shows the maximum configuration of five servers in the frame. For more complete information about the configuration used by the application, refer to the DC assembly drawing.

Figure 3-1. Tekelec 1000 Hardware System in DC Environment



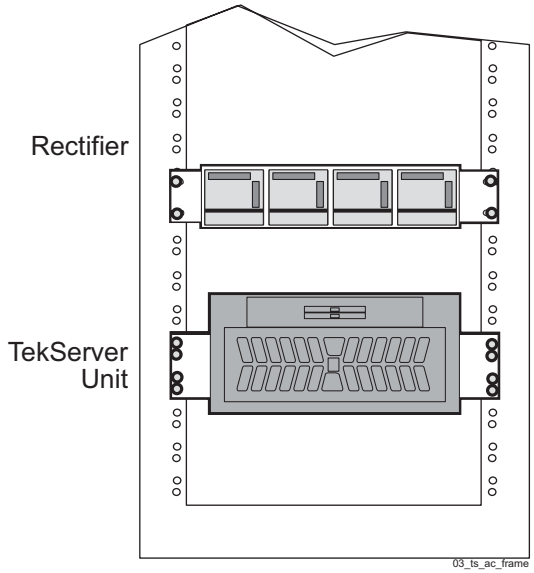
Tekelec 1000 Hardware System in an AC Environment

In an Alternating Current (AC) environment, a Tekelec 1000 hardware system consists of the following hardware components, which are delivered as separate units and are assembled at the customer site in a frame supplied by the customer (the frame can be either 19 inches or 23 inches wide):

- One Tekelec 1000 unit, which is loaded at the factory with platform software and application software. For an overview of the Tekelec 1000 units, see "Tekelec 1000 Hardware Features" on page 3-5.
- A rectifier, which accepts an AC voltage and produces a regulated DC voltage output. For an overview, see "Rectifier" on page 3-14; for more information, refer to the documentation delivered with the product.

Figure 3-2 shows an example Tekelec 1000 hardware system in an AC environment.

Figure 3-2. Tekelec 1000 Hardware System in AC Environment



Tekelec 1000 Hardware Features

The Tekelec 1000 Services Platform is a general-purpose application engine (AE) that offers high transaction rates with low latency. It supports a variety of application solutions for the wireless and wireline telecommunications infrastructure to provide the building blocks for next-generation signaling systems.

The Tekelec 1000 Services Platform is a scalable computing platform constructed with state-of-the-art components packaged in a compact-size, stand-alone enclosure. The Tekelec 1000 chassis utilizes dual processors, and has eight PCI slots, four internally mounted media devices, and expandable memory.

Figure 3-3 shows a single Tekelec 1000 Services Platform. For clarity, it is shown not mounted in a frame.

Figure 3-3. Tekelec 1000 Chassis

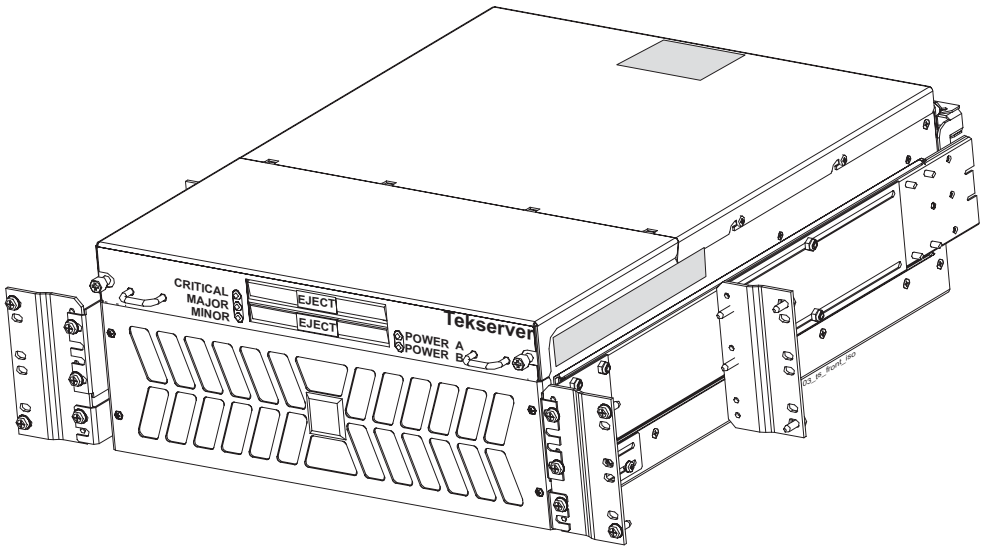
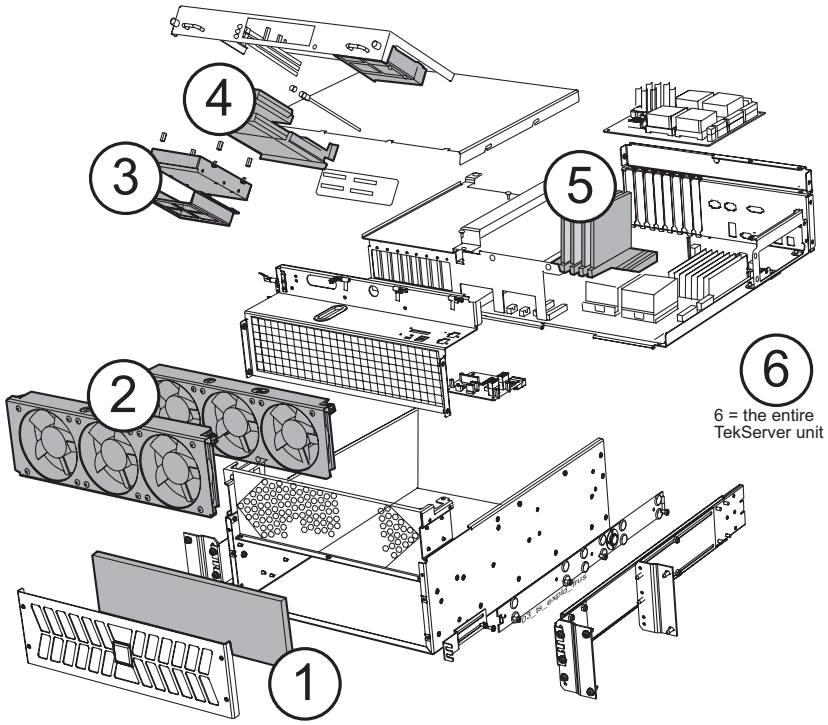


Figure 3-4 shows an exploded view of the Tekelec 1000 chassis. This view shows where the various hardware components, especially the Field Replaceable Units (FRUs), are located.

Figure 3-4. Exploded View of Tekelec 1000 Chassis



The following correspond to the Field Replaceable Units shown in Figure 3-4:

1. Air filter
2. Fan assemblies
3. Hard disk assembly (only the assembly on the left side is shown as an exploded view)
4. Removable media disk drive assembly
5. Peripheral Component Interconnect (PCI) cards
6. Entire Tekelec 1000 chassis

For more information about FRUs, see Chapter 7, "Field Replaceable Units."

For more information about the hardware components, see Appendix A, "Tekelec 1000 AS Hardware Feature Information."

Tekelec 1000 Rear I/O Panel

The rear input/output (I/O) panel is perforated to facilitate airflow and forms the back wall of the Tekelec 1000 enclosure. It has openings for:

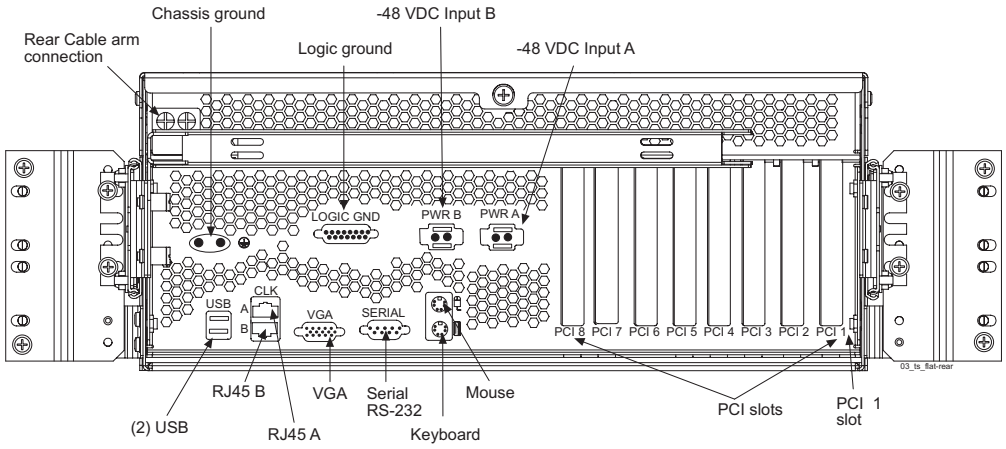
- Eight peripheral component interface (PCI) cards' I/O panels
- The I/O connectors on the rear edge of the main board (mouse, keyboard, VGA, serial port, E1 or T1 clock inputs, and two USB ports)
- The power board I/O (logic ground connection)

Power entry is at the rear of the Tekelec 1000 platform. There are two right angle power connectors (A and B feeds) on the power board that are accessible through the rear I/O panel. The power input connectors are keyed and have positive locking features.

Logic ground is carried on a 15-position, right-angle connector on the power board. The connector is bulkhead-mounted to the rear I/O panel. There are also two chassis ground connector studs on the rear I/O panel. See Figure 3-5 for a detailed view of the rear I/O panel.

NOTE: Figure 3-5 shows empty PCI slots.

Figure 3-5. Rear I/O Panel

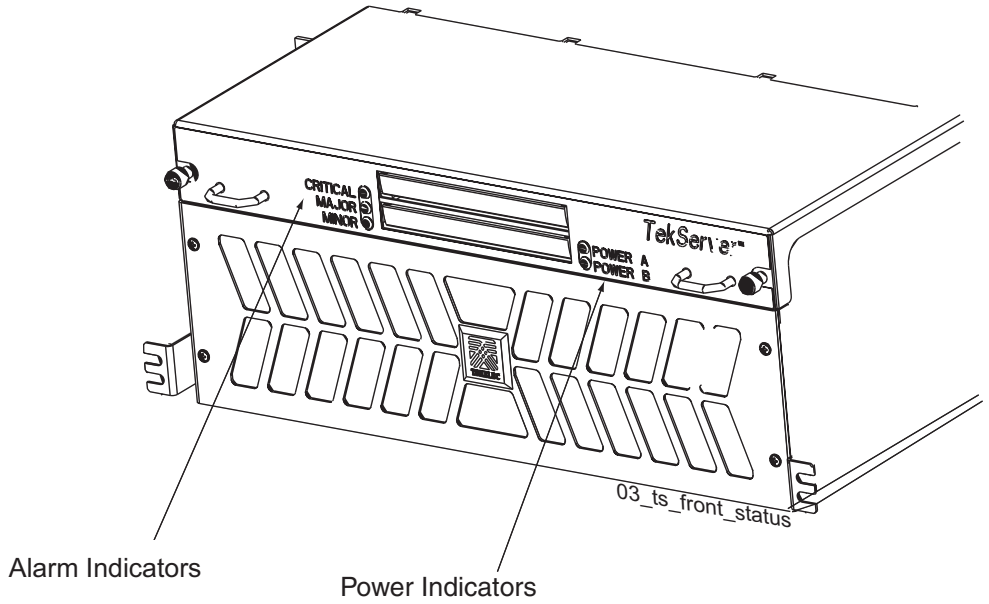


Tekelec 1000 Status Indicators

The Tekelec 1000 platform provides the following light-emitting diode (LED) status indicators on the front panel of the Tekelec 1000 platform (see Figure 3-6):

- Critical, Major, and Minor visual alarm indicators indicate operational condition of the Tekelec 1000 platform, including status of the major subsystems: processors, volatile memory, non-volatile memory (disk drives, etc.), and interfaces.
- Indicators for A and B power inputs.

Figure 3-6. Tekelec 1000 Status Indicators



For more information about the diagnostics that manage these alarm and status indicators, see "Tekelec 1000 Diagnostics" on page A-6.

Tekelec 1000 Chassis Installation and Replacement

The Tekelec 1000 chassis is installed in the frame using slides that have inner and outer rails. The outer slide rail is attached to the frame and the inner slide rail is attached to the Tekelec 1000 chassis (see Figure 5-1 on page 5-3). The chassis is installed by sliding the inner rails into the outer rails.

DANGER: Moving a Tekelec 1000 chassis requires two people. Each Tekelec 1000 chassis weighs approximately 25 kg (55 lbs) and may cause personnel injury or damage to the internal components due to shock and vibration if not handled properly.

The Tekelec 1000 chassis is also field replaceable. Tekelec 1000 replacement, including disconnecting cables, mounting a replacement system (of identical configuration), and reconnecting cables requires no more than 30 minutes.

NOTE: All I/O connections are at the rear of the Tekelec 1000 chassis.

Table 3-1 lists the dimensions of the Tekelec 1000 chassis.

Table 3-1. Tekelec 1000 Chassis Dimensions

Dimension	Value	Notes for Rack-Mounting
Depth	20.6 inches from front surface to rear bulkhead	Allows over 2.5 inches of depth for cable management in a Tekelec Heavy Duty Frame. The pull handles on the front lid protrude 0.75 inches leaving 0.3 inches of clearance between the handles and a perforated door assembly. Chassis slide lock brackets are used to anchor the Tekelec 1000 chassis in position during normal operation.
Height	6.9 inch high (4U) form factor	Allows for multiple Tekelec 1000 chassis and associated Ethernet switches to be mounted in a Tekelec Heavy Duty frame
Width	17.6 inches wide, with slides	Allows for a Tekelec 1000 chassis to be installed in 19 inch racks. Adapter plates are required to mount a Tekelec 1000 chassis with slide rails in 23 inch frames.

1. Tekelec makes no warranties for servers that are installed without proper clearances or that are removed from Tekelec-standard frames.

2. The Tekelec 1000 enclosures should be free to slide only during installation, service, or repair; they should be locked down at all other times.

Cable Management Arms

The Tekelec 1000 is installed on slides for easy access. When the chassis is slid in or out, strain on the cables is relieved by one of the following cable management systems:

- Side Cable Management Arms

  These cable management arms are attached to the sides of the frame and fold inward towards the back of the Tekelec 1000 as it is slid out from the frame (see Figure 3-7 on page 3-11). A Tekelec 1000 chassis that is shipped with these cable management arms also includes tension bars that are mounted on the rear of the server to further reduce strain on the cables.

Figure 3-7. Tekelec 1000 with Side Cable Management Arms

- Rear Cable Management Arm

  The Rear Cable Management Arm attaches to the rear of the Tekelec 1000 and unfolds as the Tekelec 1000 is slid out.

  NOTE: Rear Cable Management Arm systems are no longer being shipped with new Tekelec 1000 installations.

Breaker Panels

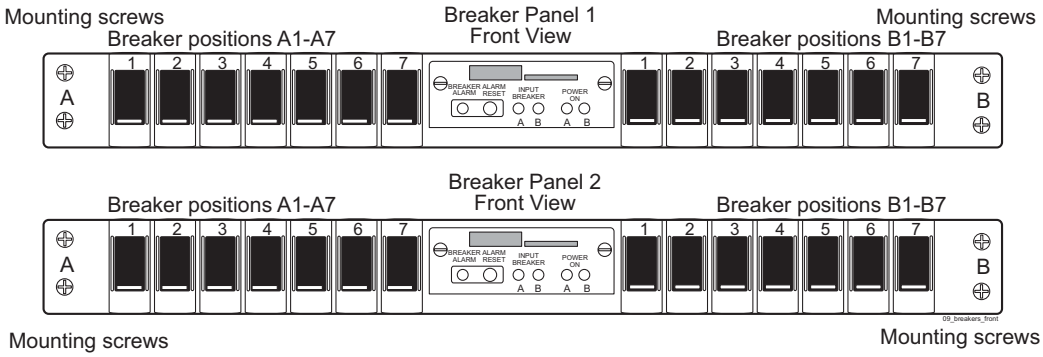
Breaker panels are used to provide redundant power paths to Tekelec 1000 units and other equipment in a heavy duty frame in a DC environment.

Figure 3-8 shows the two breaker panels used to provide redundant power paths:

- An upper breaker panel, called BP-1
- A lower breaker panel, called BP-2

Each breaker panel has two sides: side A and side B. Each side has seven breakers, although only certain breakers on each side are active (closed). The open position of each breaker is marked by "O" and "|" marks the closed position.

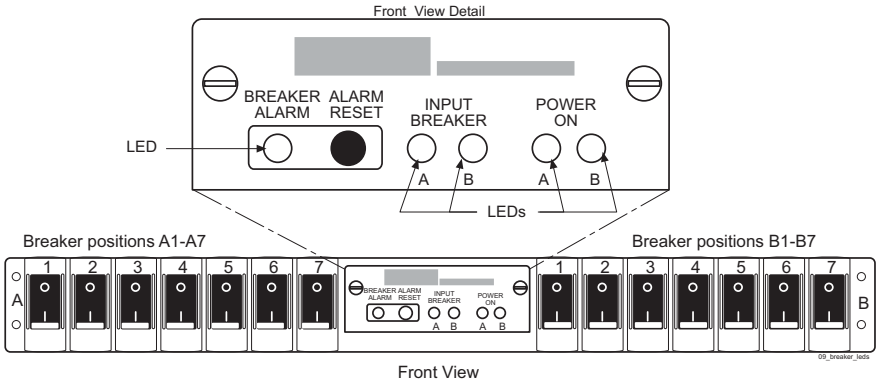
Figure 3-8. Front of Breaker Panel



Breaker Panel LEDs

Figure 3-9 shows a close-up of the power module, also called the "Indicator Panel," in the center of the front of each breaker panel.

Figure 3-9. Breaker Panel LEDs



The power module contains two pairs of light-emitting diodes (LEDs), each labeled **A** and **B** with respect to the side of the breaker panel that the LED represents:

- The pair of LEDs labeled **INPUT BREAKER** is on (illuminated green) for normal operation. If one of the rear input breakers opens (pops out), its respective LED is off (not illuminated).
- The pair of LEDs labeled **POWER ON** is also on (illuminated green) for normal operation. If power is lost coming to the breaker panel, the affected LED is off (not illuminated.)

  NOTE: If one of the POWER ON LEDs is off, the respective INPUT BREAKER LED will also be off and the BREAKER ALARM LED will be illuminated red.

Breaker Panel Power

The breakers receive power from the input circuit on their respective side. Each breaker controls the power to its corresponding power feed on the back of the breaker panel. The power feeds connect to the individual hardware devices in the frame.

Power comes into each breaker panel on side A and on side B. Each input power line connects to the input power feeds in the rear of the breaker panel. Each input power feed has an input circuit breaker beside it that ensures that the power is within an acceptable range.

Breaker Panel Settings

To view a table that shows the mapping of breakers to the devices, see DC_BreakerSettings.pdf. When a server is installed and powered up, the associated breakers should be closed. Inactive breakers are not required to be in the closed position.

NOTE: The breaker mapping table shows only end-to-end connectivity from the breaker panel breakers to the servers. For detailed information on wiring, see the DC interconnect diagram.

Ethernet Switches or Hubs

Ethernet switches or hubs cross-connect all the components in a heavy duty frame. To determine which type of Ethernet switch or hub is used, see the DC assembly drawing. For more information about the Ethernet switches or hubs, refer to the documentation that was delivered with the product.

Console Servers

Some Tekelec 1000 hardware systems contain a console server, which provides access to the console ports of the Tekelec 1000 units and allows Tekelec Technical Services to access remotely the Tekelec 1000 units. A console server is used only during maintenance and failure conditions. To determine whether a console server is used, see the DC assembly drawing.

For more information about the console server hardware, refer to the documentation that was delivered with the product. For information about how to configure the console server, contact Tekelec Technical Services (see "Technical Services and Support" on page 1-7).

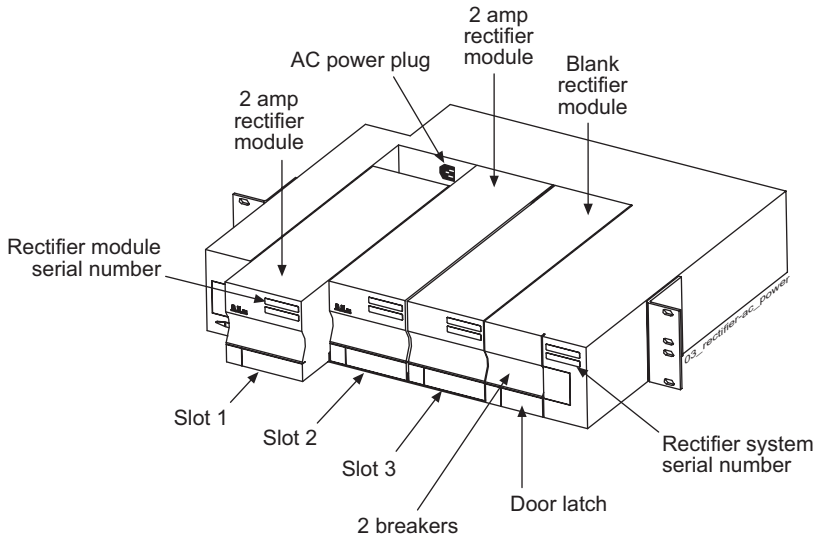
Rectifier

In Alternating Current (AC) environment, a rectifier is used to accept AC input from the environment's power source and produce DC output that can be used by the Tekelec 1000 unit.

Rectifier Overview

Figure 3-10 shows an example rectifier.

Figure 3-10. Rectifier



In a Tekelec 1000 hardware system in an AC environment, the rectifier system contains two rectifier modules; Figure 3-10 shows two rectifier modules, one each in Slots 1 and 2, and a blank module in Slot 3. Each rectifier module is hot-swappable (can be replaced without turning off power to the rectifier system).

For a more detailed drawing of the rectifier, see AC_PowerSystem.pdf. For more information about its features, refer to the documentation delivered with the product.

Rectifier Breaker Settings

To turn on power from the rectifier to the Tekelec 1000 unit, open the door at the right of the rectifier and turn all the breakers to ON.

4

How to Install a Tekelec 1000 AS Frame

Introduction

This chapter describes how to unpack and install in a DC environment a heavy-duty frame that contains from one or more Tekelec 1000 AS units and associated equipment.

For information about installing a Tekelec 1000 unit in an AC environment and about installing an additional Tekelec 1000 unit into a heavy-duty frame that already contains from one to four Tekelec 1000 units, see Chapter 5, "How to Install Hardware in an Existing Frame."

NOTE: The total number of Tekelec 1000 units allowed in a frame depends on the application. For more complete information about the maximum configuration allowed by the application, refer to the DC assembly drawing.

How to Unpack the Tekelec 1000 Frame and Conduct Inventory

When the Tekelec 1000 hardware system frame arrives, perform the following procedure:

Procedure 4-1. How to Unpack Frame and Conduct Inventory

1. Unpack the heavy-duty frame, using the procedure described in 822-0094-02.

2. Ensure that all the parts listed on the packing list have been received.

3. Ensure that the part numbers on the labels on the left and right sides of each Tekelec 1000 unit match the sales order for each of the following categories:
   - Base configuration for hard disk
   - Installed memory information
   - PCI card configuration

   For information about the fields on a label, see "Tekelec 1000 Chassis Part Number Information" on page B-15.

4. Be sure to return the frame's shipping container, as described in 822-0094-02.

5. This procedure is complete.

How to Install a Tekelec 1000 Frame

A Heavy Duty (HD) frame is a specific Tekelec frame that has a specific footprint. It should not be confused with other 19- or 23-inch standard frames.

To install and anchor a heavy duty frame, perform the following tasks:

- Prepare the floor. See page 4-3.
- Anchor the frame to the floor. See page 4-6.

  NOTE: The anchoring procedure and the anchor assembly to use depend on the type of floor on which the frame is to be installed.
- Anchor the frame to the ceiling using an overhead rack. See page 4-18.

Recommended Tools

All Tekelec tools should be labeled "Property of TEKELEC" with either a press-on Field Tool Identification label (P/N 658-0941-01) or Field Tool Identification wrap (P/N 658-0941-02).

- Safety glasses
- Ear protectors
- Mounting hardware kit (P/N 840-0092-01)
- Isolator pad (in mounting hardware kit), also used as template
- Chalk (or chalk line)
- Fiberglass tape measure
- Felt tipped marking pen
- Rotary impact drill
- 18 mm (11/16 inch) masonry drill-bit
- 1 inch (25.4 mm) masonry drill-bit
- Extension cord
- High Efficiency Particulate Air (HEPA) vacuum cleaner
- Masking tape
- File
- 3/4 inch (19mm) box-end wrench
- 3/4 inch (19mm) socket wrench
- Carbide-toothed hole saw
- Sub-floor marking tool (star bit)
- Hammer

How to Prepare the Floor for Heavy Duty Frames

Frame layout is site specific; Figure 4-1 on page 4-4 shows the most typical frame layout. The recommended minimum aisle spacing is 3 ft. (91.5 cm) front and rear. The following subsections provide instructions on marking the floor layout and preparing raised floors.

How to Mark the Floor Layout

Use the following procedure to mark the floor layout.

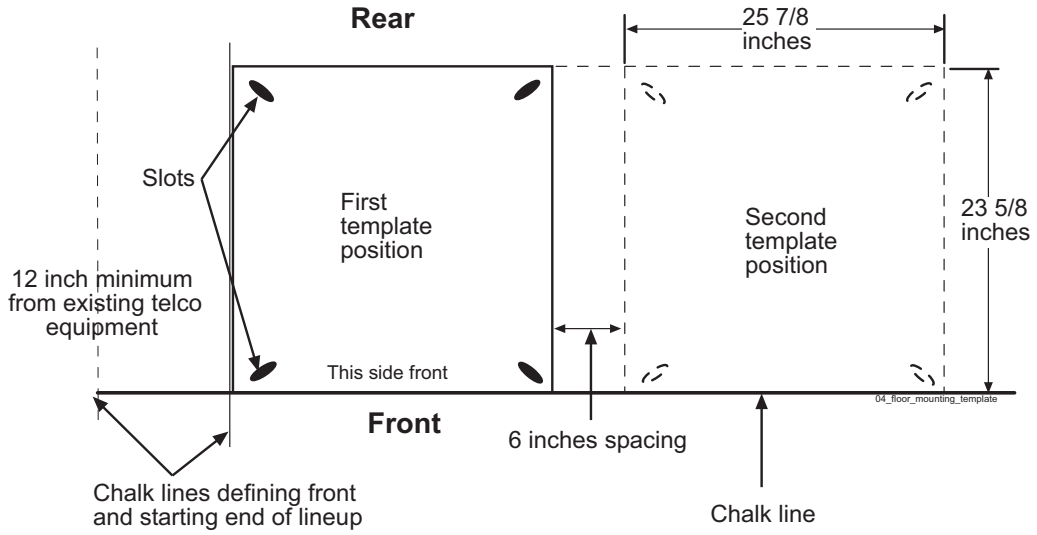
Procedure 4-2. Mark Floor Layout

1. Verify with a customer representative that the required area dimensions and equipment location correspond with the marked floor plan.

2. Use the floor plan provided with the engineering site file specifications to mark the front base line and the borders of the first frame with the chalk line.

3. Align the frame template (isolator pad) with either of the two sides marked "This side front" along the front chalk line. Using a felt tip pen, mark Anchor locations in the middle of each oval anchor slot. Mark the corners of the first frame as shown in Figure 4-1.

Figure 4-1. Floor Marking Template for HD Frame



4. Create another chalk line that allows 6 inches between each frame for correct spacing.

Align the template (isolator pad) again against the front chalk line and continue the process of aligning, marking, and moving the template (isolator pad) until the site specific number of frame spaces has been laid out.

5. This procedure is complete.

Next, do one of the following:

- If you are installing the frame on a slab floor, see Procedure 4-4, "Anchor a HD Frame into a Slab Floor," on page 4-7.
- If you are installing the frame on a raised floor, see Procedure 4-3, "Create Cable and Anchor Holes for Raised Floors," on page 4-5.

Additional Preparations for Raised Floors

Use the procedures in this section to prepare floors for anchoring frames on raised floors. For raised floors, you must create cable and anchor holes in the raised floor tiles.

Procedure 4-3. Create Cable and Anchor Holes for Raised Floors

1. Mark the spots where the cable holes are to be drilled. (The spots where the anchor holes are to be drilled were marked in Procedure 4-2, "Mark Floor Layout," on page 4-4.)

2. Mark the corners of the raised floor tiles to ensure the same tiles will be returned to the same place when the procedure is complete.

3. Remove the tiles from the equipment area.

4. Use a HEPA vacuum cleaner to collect the shavings while drilling. Using a carbide-toothed hole saw of the appropriate diameter, drill the cable holes required in the raised floor tiles. For the anchor holes, drill 1 inch (2.54 cm) diameter holes in the tiles corresponding to the marked anchor locations. Use a file to remove any sharp edges from the drilled tiles.

5. Return to the equipment area with the drilled tiles and replace the tiles, making sure the holes match where the frame anchors will be installed.

6. You have completed this procedure.

Next, perform one of the following procedures, depending on the anchoring method you choose:

- Procedure 4-5, "Anchor the Frame to the Slab Beneath the Raised Floor," on page 4-11
- Procedure 4-6, "Anchor Frame to Raised Floor with Support Channel," on page 4-14
- Procedure 4-7, "Anchor Frame with Support Channel/Spring Nut," on page 4-16

How to Anchor the HD Frame to the Floor

See the following sections for instructions on anchoring heavy duty frames to the floor. These procedures are for typical installation sites with slab (concrete) floors and raised floors. You might have to accommodate these procedures to the unique features of your site. Depending upon your floor, use the procedure in one of the following sections:

- Anchoring directly to a slab floor (see "How to Anchor Frame to Slab Floor" on page 4-6)
- Anchoring to a slab floor beneath a raised floor (see "How to Anchor to Concrete Floor Under a Raised Floor" on page 4-10)
- Anchoring to a raised floor using washer and nut (see "How to Anchor on Raised Floor Using Support Channel" on page 4-13)
- Anchoring to a raised floor using a unistrut (see "How to Anchor on Raised Floor Using Support Channel with Spring Nut" on page 4-16)

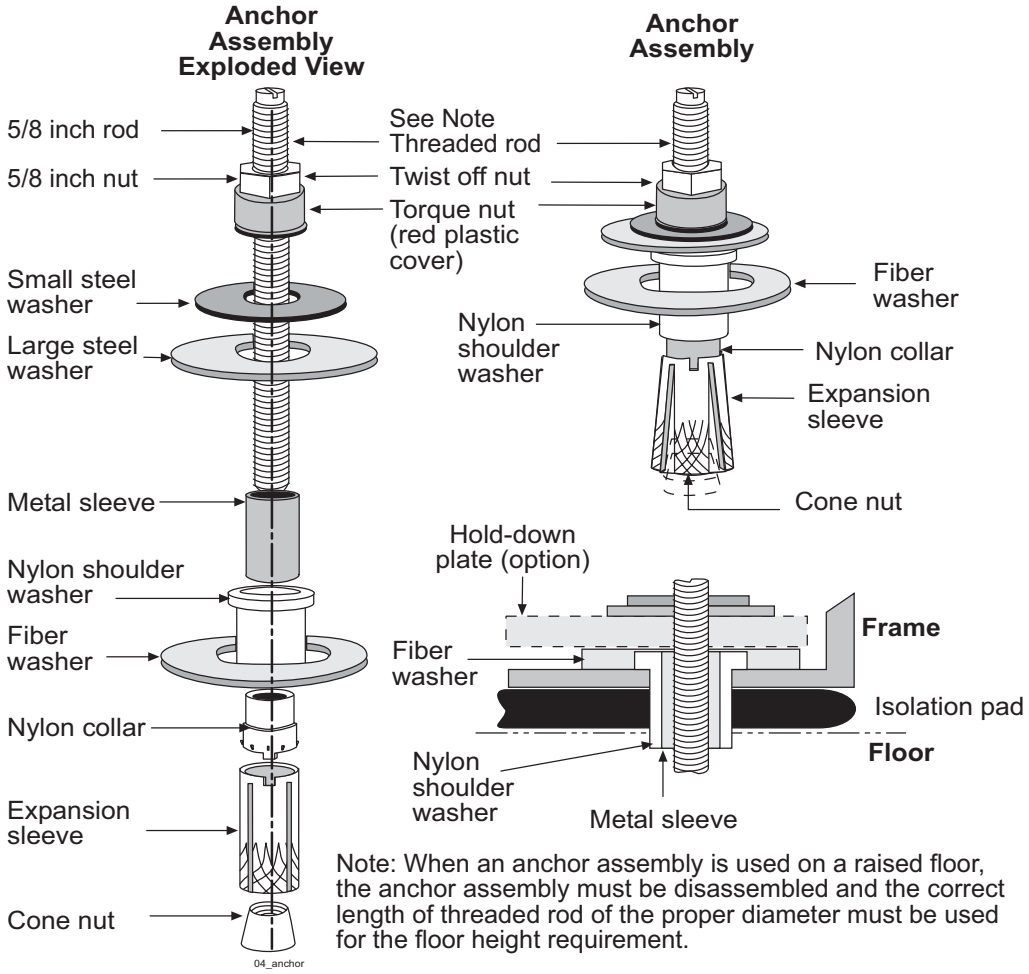
WARNING: Before drilling holes in any flooring, verify with facilities personnel that the area is free of gas or water pipes, ventilation plenum, and electrical wiring conduits.

How to Anchor Frame to Slab Floor

Use the procedure in this section to anchor the frame directly to a concrete slab floor. If you are anchoring to a raised floor above a slab floor, see "How to Anchor to Concrete Floor Under a Raised Floor" on page 4-10. Always get permission from facility personnel before drilling any holes for HD frame installation.

Figure 4-2 shows the components of the Anchor Assembly used for a slab floor.

Figure 4-2. Anchor Assembly for Slab Floors



Procedure 4-4. Anchor a HD Frame into a Slab Floor

1. Use the HEPA vacuum cleaner to collect the dust while drilling holes. At each anchor location marked on the concrete floor, drill a hole that is 11/16 inches (18 mm) in diameter to a depth of 3 inches (7.7 cm). The anchor and frame will not come together properly if the hole is drilled at an angle other than 90°.

NOTE: If any obstruction is encountered while drilling the hole, fill the unusable hole with liquid concrete. After allowing sufficient time for the liquid concrete to set, drill the hole at another spot within the marked area.

Clean out each hole after drilling is completed.

2. Set a fully assembled anchor into each drilled hole.

3. From each anchor remove all pieces above the metal sleeve. Retain the pieces for use in step 7.

4. Lay the isolator pad on the floor with the holes in the isolator pad aligned over the anchor assemblies.

5. Roll the frame (still on the dolly) into position above the isolator pad.

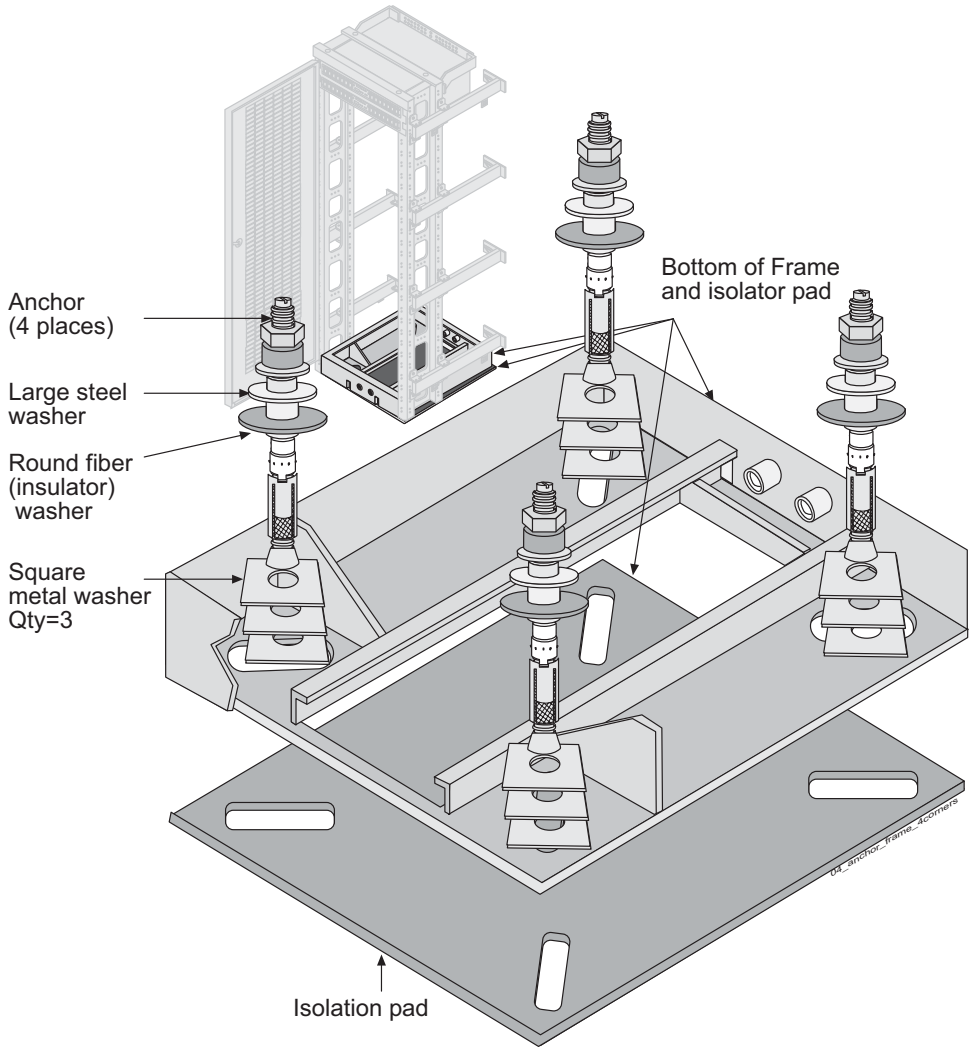
6. Lower the frame onto the floor with the holes in the frame aligned over the anchor assemblies. For instructions about how to lower the frame, refer to 822-0094-02.

7. Install the three square washers, the round fiberglass washer, the large steel washer, and the torque nut (with red plastic cover) in the order shown in Figure 4-3. (The large steel washer, nylon shoulder washer, and round fiber washer are found in the mounting hardware kit.)

   When reassembling the anchor assembly, the bottom of the threaded rod must be flush with the bottom of the cone nut and the torque nut must be near the top of the threaded rod.

   NOTE: When reassembling any anchor bolt assembly, lightly finger tighten only.

Figure 4-3. Anchor Installation of HD Frame into Slab Floor



8. Tighten the top nut of the anchor assembly with a socket wrench until the twist off nut above the plastic red cover breaks free. Leave the twist off nut on the threaded rod to indicate that the torque on the nut beneath has been set properly.

9. This procedure is complete.

Next, go to Procedure 4-8, "Attach Overhead Rack Support," on page 4-19.

How to Anchor on Raised Floors

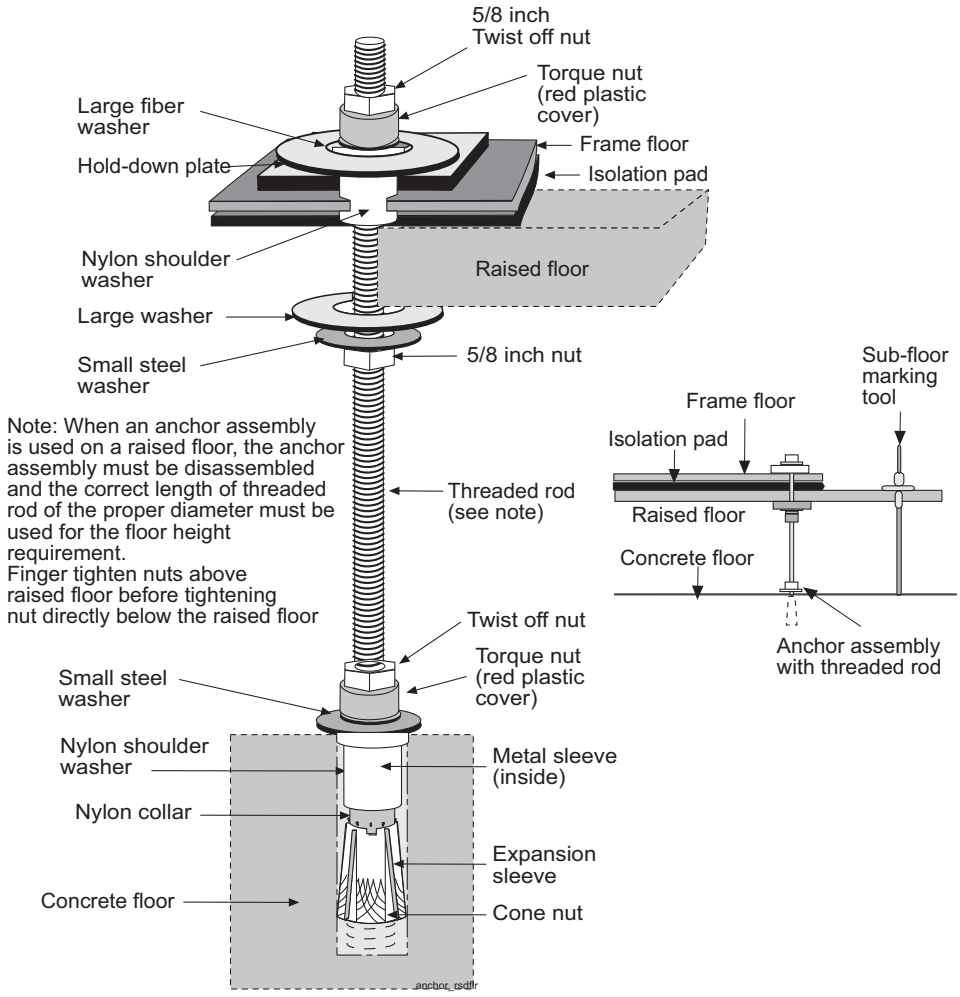
To anchor a frame on a raised floor, use the procedure in one of the following sections :

- "How to Anchor to Concrete Floor Under a Raised Floor" on page 4-10
- "How to Anchor on Raised Floor Using Support Channel" on page 4-13
- "How to Anchor on Raised Floor Using Support Channel with Spring Nut" on page 4-16

How to Anchor to Concrete Floor Under a Raised Floor

Use the following procedure to anchor a frame on a raised floor to the concrete slab beneath the raised floor. Figure 4-4 shows the components of the anchor assembly used for a concrete floor beneath a raised floor.

Figure 4-4. Anchor Assembly for Raised Floor Over Concrete



Procedure 4-5. Anchor the Frame to the Slab Beneath the Raised Floor

1. Ensure that Procedure 4-3, "Create Cable and Anchor Holes for Raised Floors," on page 4-5 has already been performed.

2. Perform the following substeps for each hole associated with each frame to be installed on the raised floor:

   NOTE: The threaded rod must be absolutely perpendicular to the floor. Using a level is recommended.

   a. Insert the threaded rod into the anchor holes in the tiles, making sure that the threaded rod is perpendicular to the hole.

   b. Strike the top of the threaded rod with a hammer using enough force to mark the concrete floor.

3. Remove the floor tiles for access to the concrete floor.

4. Use a HEPA vacuum cleaner to collect the dust while drilling. Drill an 18 mm diameter hole in the concrete floor to a depth of 3 inches (7.7 cm).

   NOTE: If the hole is drilled at an angle the anchor and frame will not come together properly.

5. Ensure that each hole is clean after the drilling is complete.

6. For each threaded rod, thread the following components in the order shown onto one end of the rod (these components are threaded on the rod while the rod is upside down; see Figure 4-4 on page 4-10 to identify the components and their orientation):

   a. Torque nut

   b. Small steel washer

   c. Metal sleeve

   d. Nylon collar

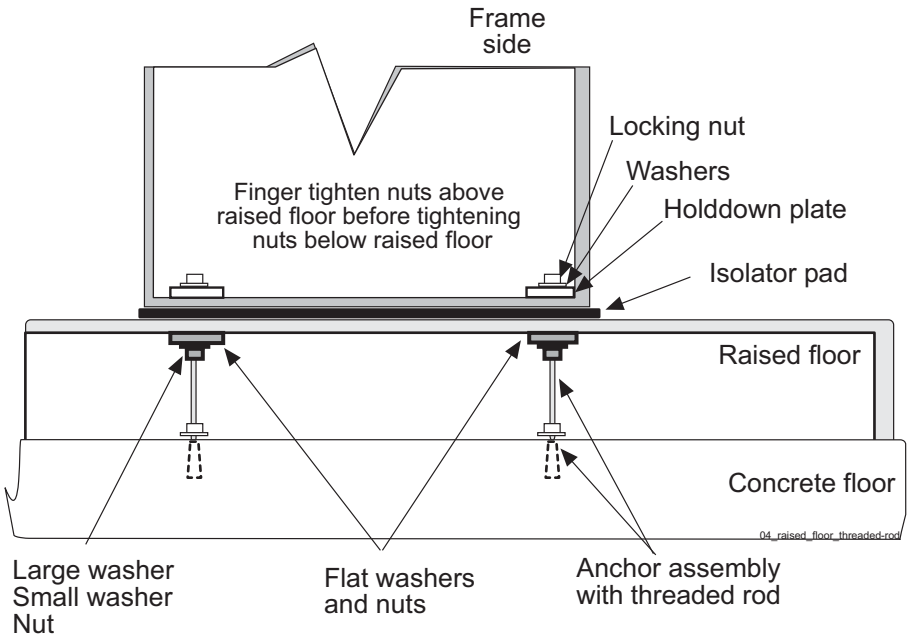
   e. Expansion sleeve

   f. Cone nut (thread onto the rod until the end of the threaded rod is flush with the bottom of the cone nut)

   NOTE: These components should be in contact with each other, but do not tighten the assembly because doing so could prematurely expand the expansion sleeve.

7. Insert each threaded rod/anchor assembly into its hole, with the cone nut at the bottom, and tighten with a 3/4 inch (19mm) wrench until the top nut of the torque nut breaks free (this nut is called the twist-off nut in Figure 4-4 on page 4-10).

Figure 4-5. Anchoring on Raised Floor Over Concrete Slab



8. At the top end of each threaded rod, thread on a 5/8 inch nut until it is below the level where the floor tile will meet the threaded rod.

9. On top of the 5/8 inch nut, drop a small steel washer and then a large steel washer.

10. Return tiles to their original positions, fitting the anchor holes in the tiles over the threaded rod assemblies.

11. Lay the isolator pad on the raised floor with the holes in the isolator pad aligned over the threaded rod assemblies.

12. Roll the frame (still on the dolly) into position above the isolator pad.

13. Lower the frame onto the floor with the holes in the frame aligned over the threaded rod assemblies. For instructions about how to lower the frame, refer to 822-0094-02.

14. Over each threaded rod, install the following components in the order shown (see Figure 4-4 on page 4-10):

a. Nylon shoulder washer (through the holes in the frame and isolator pad and into the raised floor)

b. Fiber washer (around the nylon shoulder washer)

c. Square holddown plate

d. Large steel washer

e. Small steel washer

f. Torque nut

15. For each threaded rod, finger-tighten the torque nut inside the frame.

WARNING: Finger-tighten nuts on threaded rods inside the frames above the raised floor before finger tightening the nuts below the raised floor.

16. For each threaded rod, finger-tighten the 5/8 inch nut and washers against the bottom of the floor tile (see Figure 4-5 on page 4-12).

NOTE: Tighten only until the washers and nuts are flush with the bottom of the floor tile. DO NOT over tighten, causing the tile or frame to tilt.

17. With a 3/4 inch (19mm) socket wrench, tighten each torque nut inside the frame until the twist off nut above the plastic red cover breaks free. Leave the twist off nut on the threaded rod to indicate that the torque on the nut beneath has been set properly.

18. If any tiles were removed to access the underside of the raised floor, replace them.

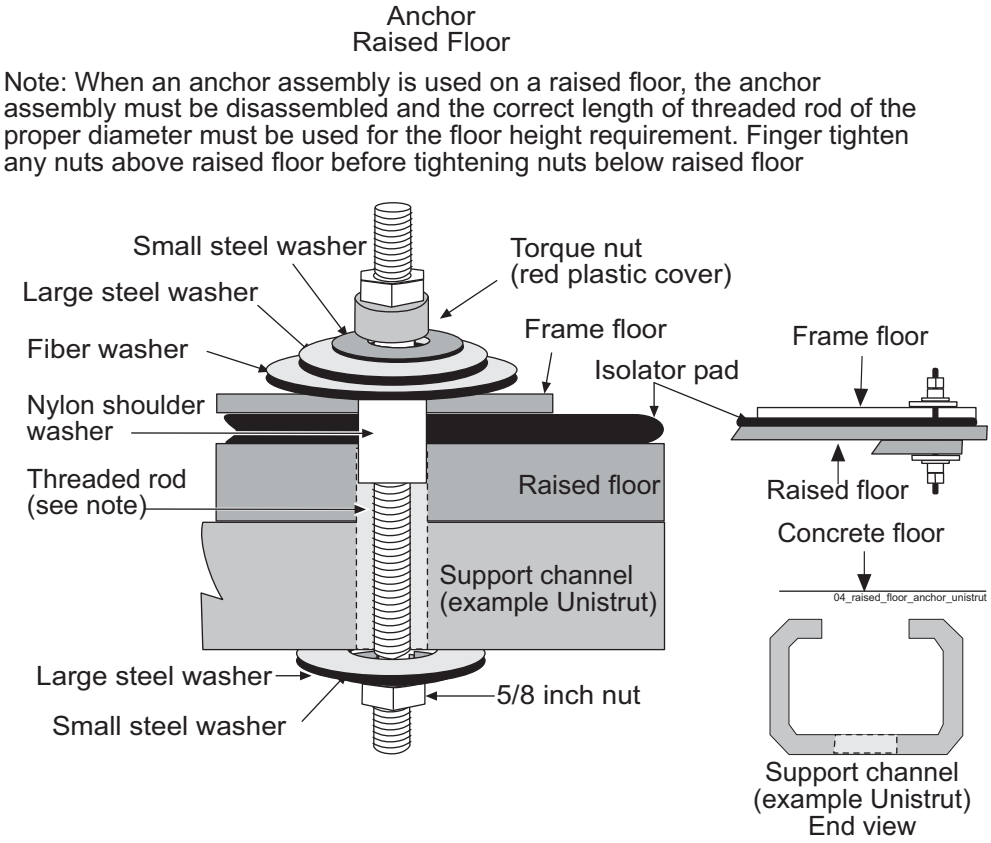
19. This procedure is complete.

Next, go to Procedure 4-8, "Attach Overhead Rack Support," on page 4-19.

How to Anchor on Raised Floor Using Support Channel

Use the following procedure to anchor the HD frame to the raised floor tiles using the anchor assembly shown in Figure 4-6.

Figure 4-6. Anchor Assembly for Use with Support Channel



Procedure 4-6. Anchor Frame to Raised Floor with Support Channel

1. Ensure that Procedure 4-3, "Create Cable and Anchor Holes for Raised Floors," on page 4-5 has already been performed.

2. For each threaded rod, thread the following components in the order shown onto one end of the rod (these components are threaded on the rod while the rod is upside down; see Figure 4-6 on page 4-14 to identify the components and their orientation):

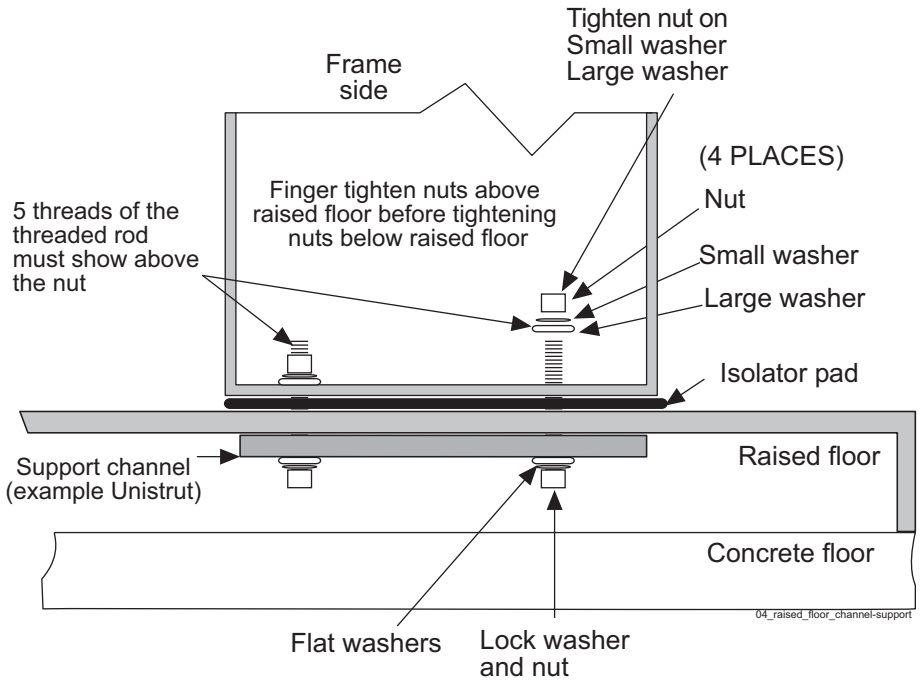
a. 5/8 inch nut

b. Small steel washer

c. Large steel washer

3. From underneath the raised floor, insert the threaded rod/anchor assembly through the support channel, the raised floor, the isolator pad, and the frame floor.

Figure 4-7. Anchoring Frame to Raised Floor with Support Channel



4. From inside the frame, drop onto each threaded rod the following components in the order shown (see Figure 4-7):
   - **a.** Metal sleeve inside a nylon shoulder washer
   - **b.** Fiber washer (around the nylon shoulder washer)
   - **c.** Large steel washer
   - **d.** Small steel washer
   - **e.** Torque nut

   Be sure to leave at least 5 threads of the threaded rod exposed inside the frame.

5. Finger tighten the nut above the raised floor before finger tightening the nuts below the raised floor.

6. Finger tighten the nut below the raised floor.

7. Securely tighten all the nuts above the raised floor with a socket wrench.

NOTE: Tighten only until the washer and nuts are flush with the bottom of the floor tile. DO NOT over tighten.

8. Replace tiles if necessary.

9. This procedure is complete.

Next, go to Procedure 4-8 on page 4-19.

How to Anchor on Raised Floor Using Support Channel with Spring Nut

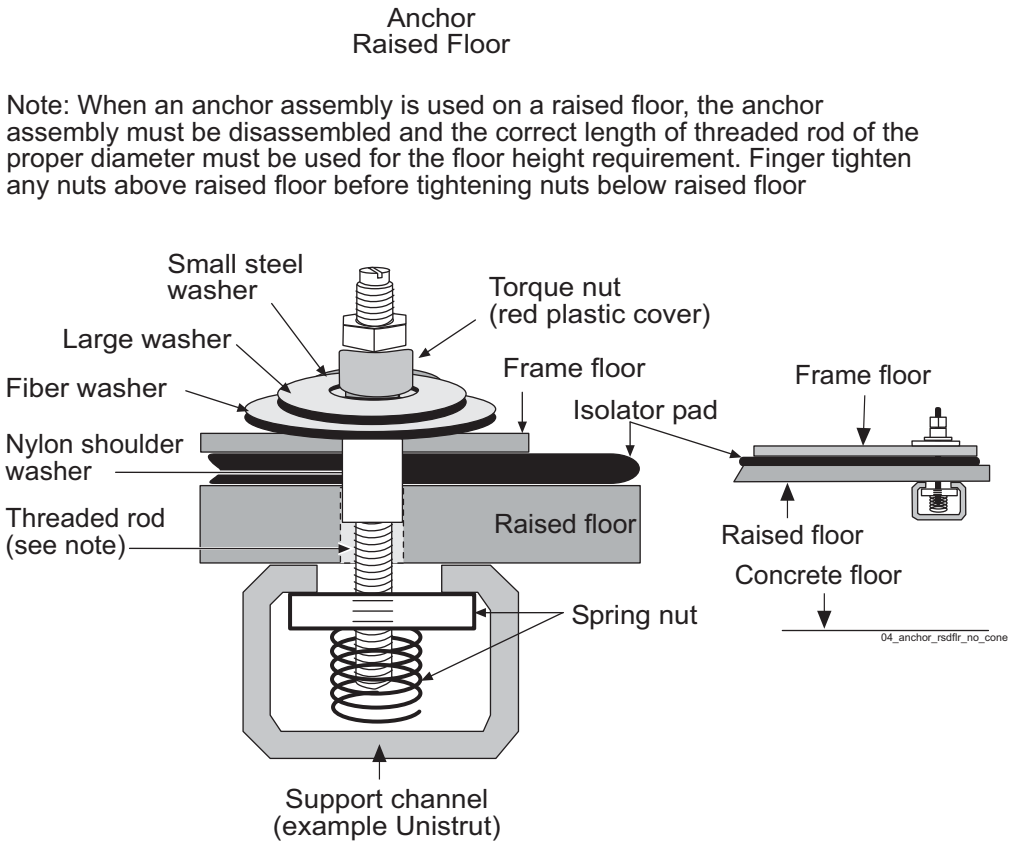
Use the following procedure to anchor the HD frame to the raised floor tiles using the a support channel with spring nut.

Procedure 4-7. Anchor Frame with Support Channel/Spring Nut

1. Ensure that Procedure 4-3, "Create Cable and Anchor Holes for Raised Floors," on page 4-5 has already been performed.

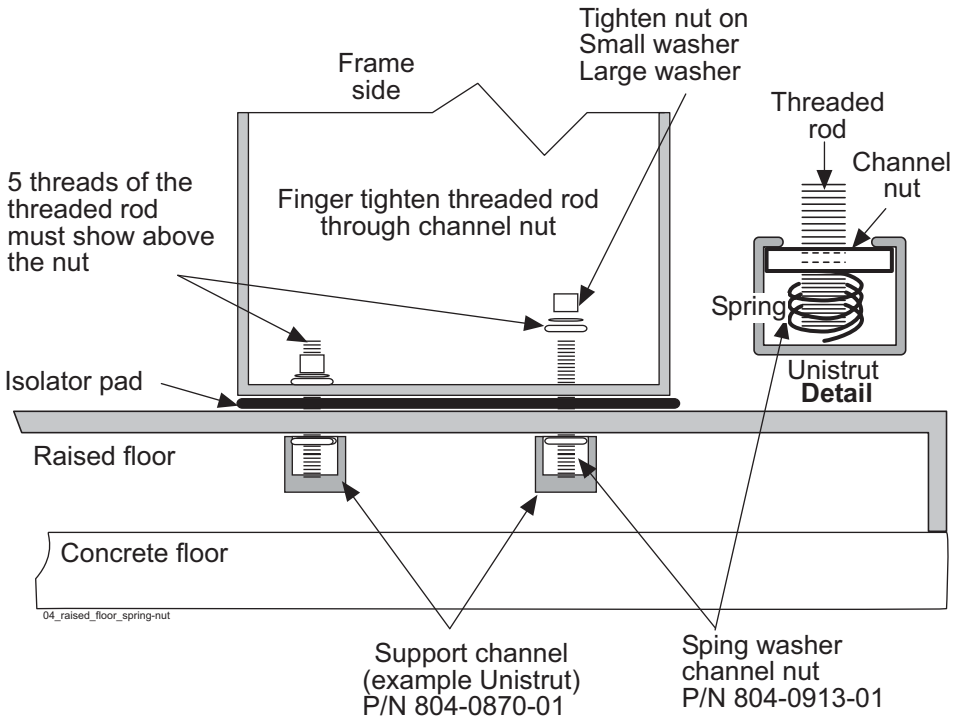
2. Insert threaded rods through the frame and the raised floor and into the spring nut in the support channel as shown in see Figure 4-8.

Figure 4-8. Anchor Assembly for Support Channel with Spring Nut



3. Finger tighten the rods into the spring nut in the support channels (see Figure 4-9).

Figure 4-9. Anchoring Frame Using Support Channel/Spring Nut



4. Insert the large washer, small washer, and torque nut onto the threaded rod on the inside of the frame. Be sure to leave at least 5 threads of threaded rod exposed on the inside of the frame. Tighten the nuts above the raised floor.

   NOTE: DO NOT over tighten, causing the tile or frame to tilt.

5. This procedure is complete.

Next, go to Procedure 4-8, "Attach Overhead Rack Support," on page 4-19.

How to Anchor to Overhead Rack of HD Frame

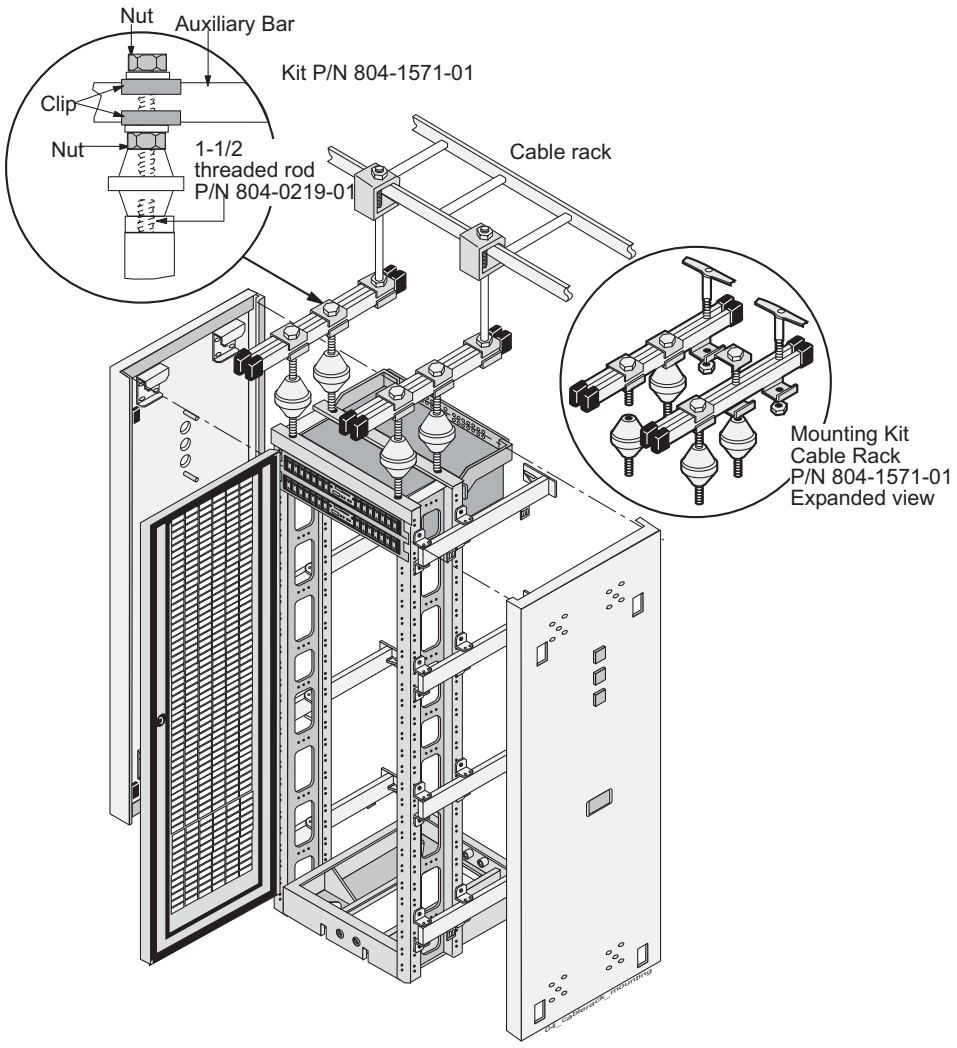
Frames with shelves that extend must be attached to overhead racks to prevent toppling.

Procedure 4-8. Attach Overhead Rack Support

1. Using the Cable Rack Mounting kit with ladder hooks, threaded rods, and insulators, place the assembly directly above the frame for overhead support.

2. Secure the top of the frame to the overhead racks using threaded rods with hardware as shown in Figure 4-10 on page 4-19.

Figure 4-10. HD Frame with Overhead Rack



3. This procedure is complete.

How to Cable a Tekelec 1000 Frame

WARNING: Verify that all breakers are set to the OFF (O) position.

Verify that the cables already attached are connected correctly. (The Tekelec 1000 hardware system frame is shipped with most of the cables already attached.) Complete any other required cable connections.

To determine the cables used and how to connect them, refer to the DC system interconnect diagram, which lists each cable, its quantity, length, how it is used, and a diagram of how to connect it.

NOTE: Some of the listed cables are used only as required. Actual cables used may vary by application.

To view a drawing of a cable, refer to the DC Cable List document, which lists all the cables that appear in the system interconnect diagram with a link from each part number to the drawing for that part number.

5

How to Install Hardware in an Existing Frame

Introduction

This chapter describes how to unpack install individual Tekelec 1000 AS hardware system components and install them in frames that are already installed at customer sites in the following situations:

- In a Direct Current (DC) environment, some applications allow one or more additional Tekelec 1000 AS units to be ordered and delivered after the initial Tekelec 1000 frame has already been installed. For an overview of this environment, see "Tekelec 1000 AS Hardware System in a DC Environment" on page 3-3.To view the maximum configuration allowed for your application, refer to the DC assembly drawing.
- In an Alternating Current (AC) environment, both the Tekelec 1000 unit and the rectifier are installed in a customer's frame at the customer site. (This chapter does not describe how to install the frame in an AC environment.)

For information about installing a Tekelec 1000 hardware system that is delivered in a frame, see Chapter 4, "How to Install a Tekelec 1000 AS Frame."

How to Unpack and Conduct Inventory

To unpack and conduct inventory, see one of the following sections:

- "How to Unpack a Tekelec 1000 Unit and Conduct Inventory" on page 5-2
- "How to Unpack a Rectifier and Conduct Inventory" on page 5-3

How to Unpack a Tekelec 1000 Unit and Conduct Inventory

When the individual Tekelec 1000 unit arrives, perform the following procedure:

Procedure 5-1. Unpack a Tekelec 1000 Chassis

1. Inspect the shipping container for indication of damage. If damage is noted, go to step 7.

DANGER: Moving a Tekelec 1000 chassis requires two people. Each Tekelec 1000 chassis weighs approximately 25 kg (55 lbs) and may cause personnel injury or damage to the internal components due to shock and vibration if not handled properly.

2. Inventory the material in the shipping container. If any discrepancies are noted, go to step 7.

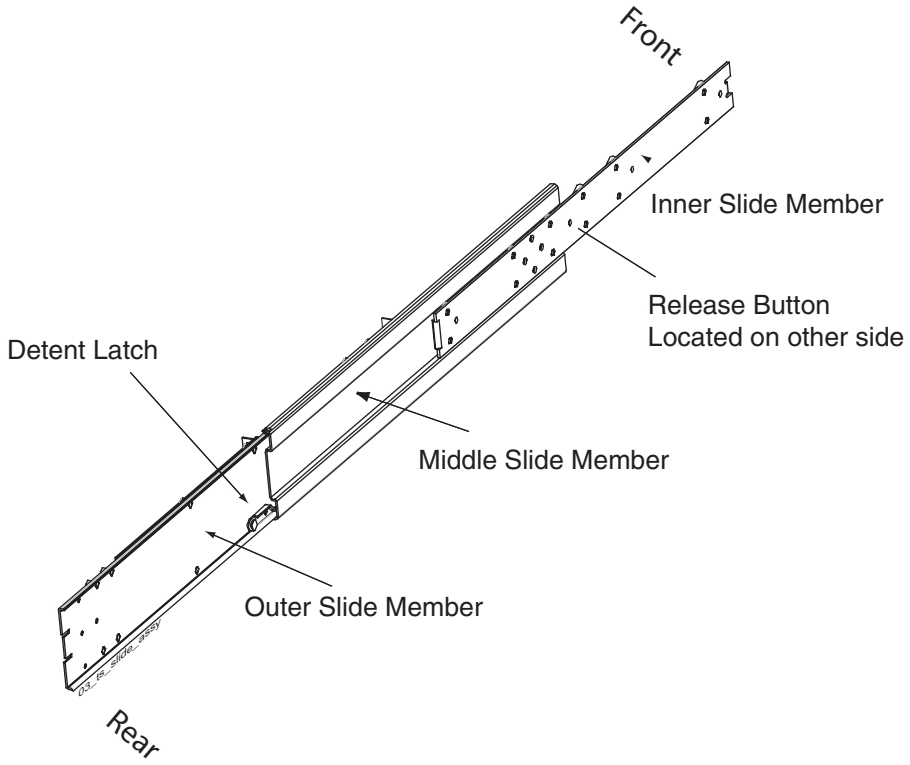
WARNING: Observe proper ESD procedures when handling the Tekelec 1000 chassis. Always wear an ESD wrist strap connected to a grounded bench or frame.

3. Unpack the Tekelec 1000 chassis from the shipping container and place the unit on a secure workbench that is grounded for ESD protection. Discard the container and packing material.

4. Inspect the Tekelec 1000 chassis for indication of damage. If damage is noted, go to step 7.

5. Remove the slide assemblies from the shipping container. The slide assemblies (see Figure 5-1) consist of three sections that will be attached to the Tekelec 1000 chassis and frame.

Figure 5-1. Slide Assembly



6. Inspect the slide assemblies for indication of damage. If damage is noted, go to step 7.

7. If any damage is noted or parts are missing, contact Tekelec Technical Services (see "Technical Services and Support" on page 1-7).

How to Unpack a Rectifier and Conduct Inventory

When a rectifier is received, perform the following procedure:

Procedure 5-2. How to Unpack the Rectifier

1. Inspect the shipping container for indication of damage. If damage is noted, go to step 6.

DANGER: Moving this equipment requires two people. Improper handling of this equipment may cause personnel injury or damage to the equipment's internal components due to shock and vibration.

2. Inventory the material in the shipping container. If any discrepancies are noted, go to step 6.

WARNING: Observe proper ESD procedures when handling the Tekelec 1000 chassis. Always wear an ESD wrist strap connected to a grounded bench or frame.

3. Unpack the rectifier from the shipping container and place the unit on a secure workbench that is grounded for ESD protection.

4. Remove the documentation from the container and store it where you can access it for information about the rectifier. Discard the container and packing material.

5. Inspect the rectifier for indication of damage. If damage is noted, go to step 6.

6. If any damage is noted or parts are missing, contact Tekelec Technical Services (see "Technical Services and Support" on page 1-7).

How to Install an Individual Tekelec 1000 Unit

Use the following procedure to install an individual Tekelec 1000 unit into an existing frame. (For more information about the situations in which an individual Tekelec 1000 unit can be installed, see "Introduction" on page 5-1.)

Tools Required:

- #3 Phillips screwdriver
- 3/8 inch nutdriver
- Volt Ohm Meter (VOM)

Procedure 5-3. Installing a Tekelec 1000 Chassis

TOPPLE: Before beginning this procedure, ensure the frame is properly secured to the floor and cable racks to prevent the frame from tipping over when the slide assembly and Tekelec 1000 chassis is extended.

DANGER: Moving a Tekelec 1000 chassis requires two people. Each Tekelec 1000 chassis weighs approximately 25 kg (55 lbs) and may cause personnel injury or damage to the internal components due to shock and vibration if not handled properly.

1. Turn OFF the breakers that supply power to the position the Tekelec 1000 chassis is being installed in. Consult the system interconnect or wiring tables for the frame or system type the Tekelec 1000 chassis is installed in.

WARNING: A Tekelec 1000 chassis is redundantly powered from both A and B -48 VDC buses. Ensure that both the circuit breaker supplying A power to a chassis and the circuit breaker supplying B power to a Tekelec 1000 chassis are turned OFF by measuring the voltage with a VOM on the cable that connects the Tekelec 1000 chassis to its breakers. Both A and B power LEDs on the front panel of the Tekelec 1000 chassis should be OFF.

2. Remove the front door and any plastic panels from the rear of the frame where the Tekelec 1000 chassis is to be installed. Using an erasable marker indicate the location of the mounting screw holes on the frame rails reserved for the frame brackets. Tekelec 1000 chassis are mounted to slide assemblies attached to the frame brackets for ease of installation and servicing.

   NOTE: Each Tekelec 1000 chassis is 4 U (7 inches) in height and can be mounted immediately above or below existing components (zero clearance). Limits to positioning the Tekelec 1000 in a frame are data cable lengths, lengths of power cables to the breakers, and location of interconnected components.

3. Locate the slide assemblies, which consist of three sections that will be attached to the Tekelec 1000 chassis and frame (see Figure 5-2).

4. Separate the inner slide members (with attached rollers) from the other sections by pulling the inner and outer members apart. When a slide assembly is approximately halfway extended, a large circular release button, located on the side of the inner slide member, will pop into a hole in the middle slide member. Press the release button and continue pulling the slide members apart until the inner slide member is completely separated. See Figure 5-2 and Figure 5-3 for details.

NOTE: Only the inner slide member will separate completely; the middle and outer slide members are permanently connected.

Figure 5-2. Slide Assembly Extended View

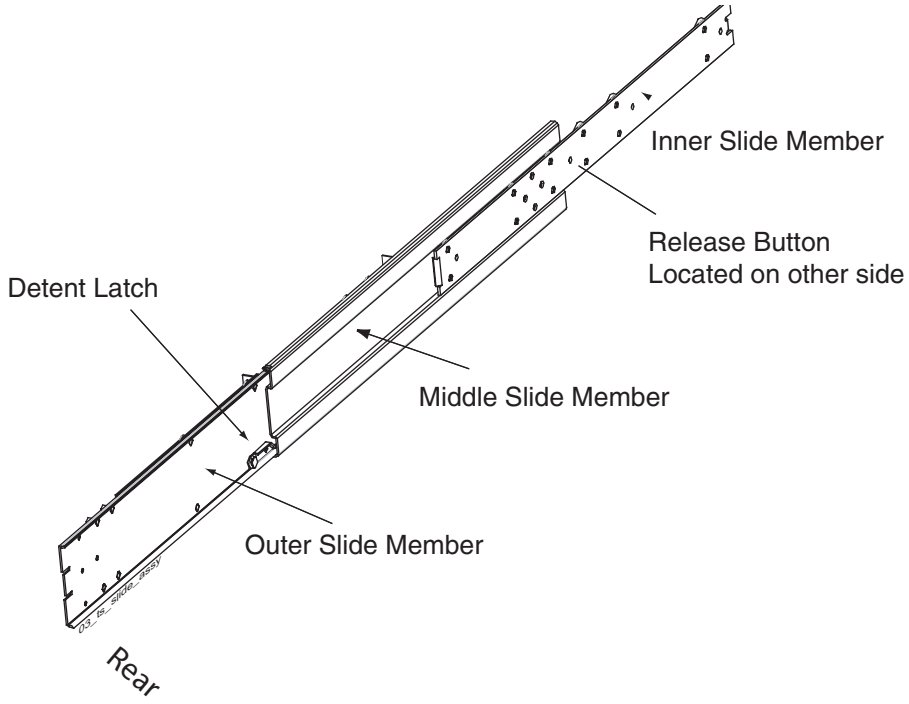
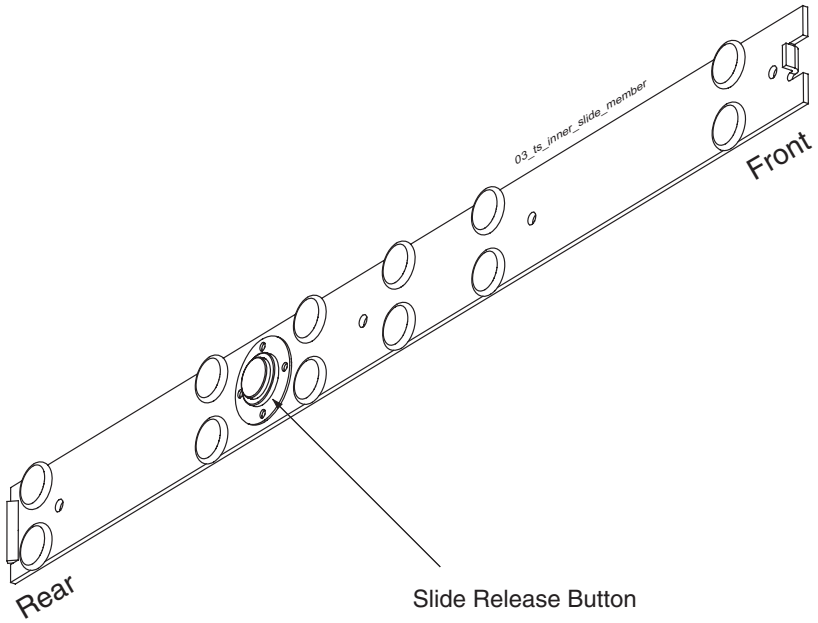


Figure 5-3. Slide Assembly Inner Member Roller Side View



5. Set the slide members aside for use later in this procedure.

6. Attach the four frame adapter brackets to the frame (23-inch frame only) using two each of the #12-24 Phillips screws. Orientation is important; see Figure 5-4 and Figure 5-5 for views of the frame adapter brackets with correct positioning. The small jog in the brackets is directed toward the rear of the frame.

   NOTE: If the frame is 19-inch, do not use the frame adapter brackets. In 19-inch frames, the slide assembly brackets that are attached to the outside members are attached directly to the frame.

   Figure 5-4. Frame Adapter Bracket Expanded

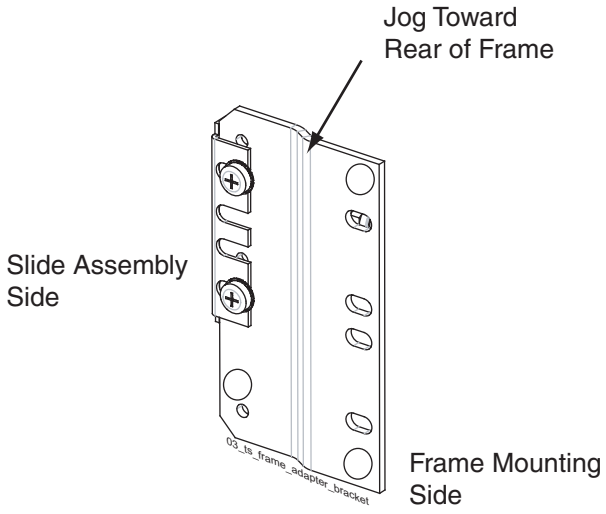
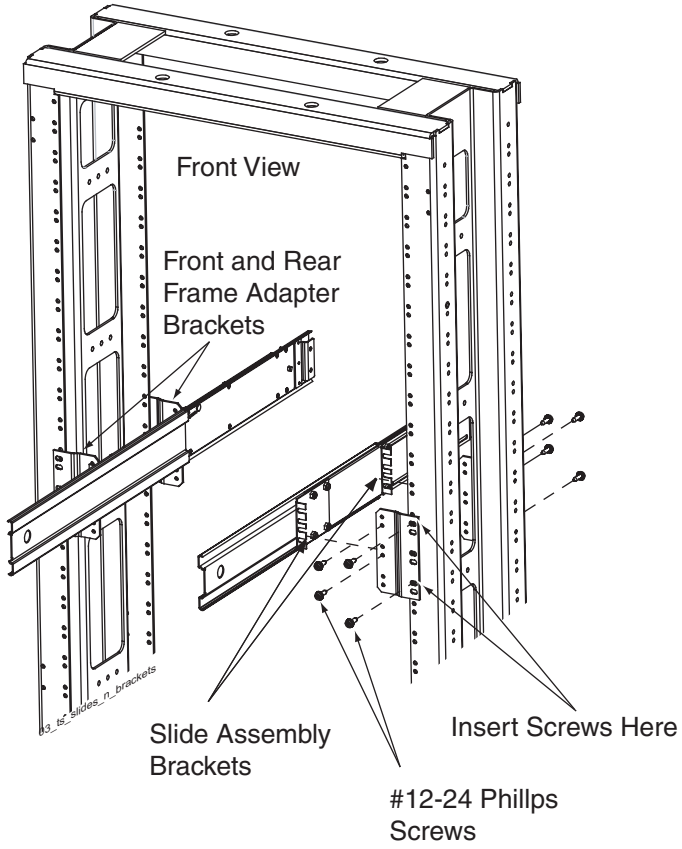
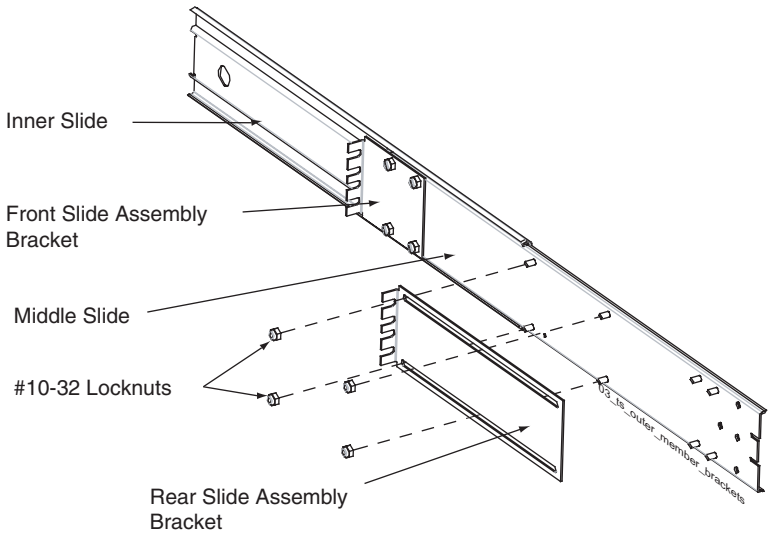


Figure 5-5. Frame Adapter Brackets and Slide Assemblies



7. Loosely attach the rear slide assembly brackets with four #10-32 locknuts to the outer slide members. This makes it easier when attaching the brackets to the frame adapters or frames. See Figure 5-6. The front slide assembly brackets are mounted at the factory.

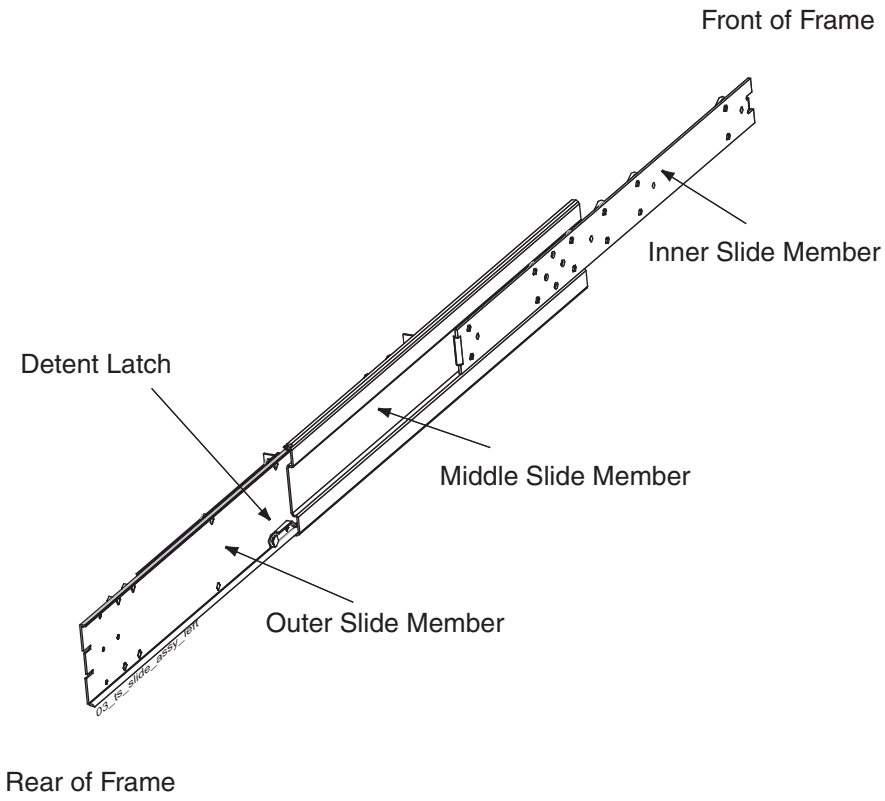
Figure 5-6. Slide Assembly Outer Member



8. Attach the front and back slide assembly brackets on each slide assembly with four #12-24 Phillips screws to the four frame adapters installed in step 6. Both slide assemblies are identical. Viewed from the rear of the frame, orient the slide assemblies with the rear detent latches at the bottom on the left slide assembly and at the top on the right slide assembly. See Figure 5-7 on page 5-10 for positioning.

   NOTE: The inner slide members are shown inserted into the middle slide member in this view for clarity only. In the following steps the inner slide members will be attached to the Tekelec 1000 chassis and inserted into the middle slide members.

Figure 5-7. Slide Assembly Detail Left Side From Rear

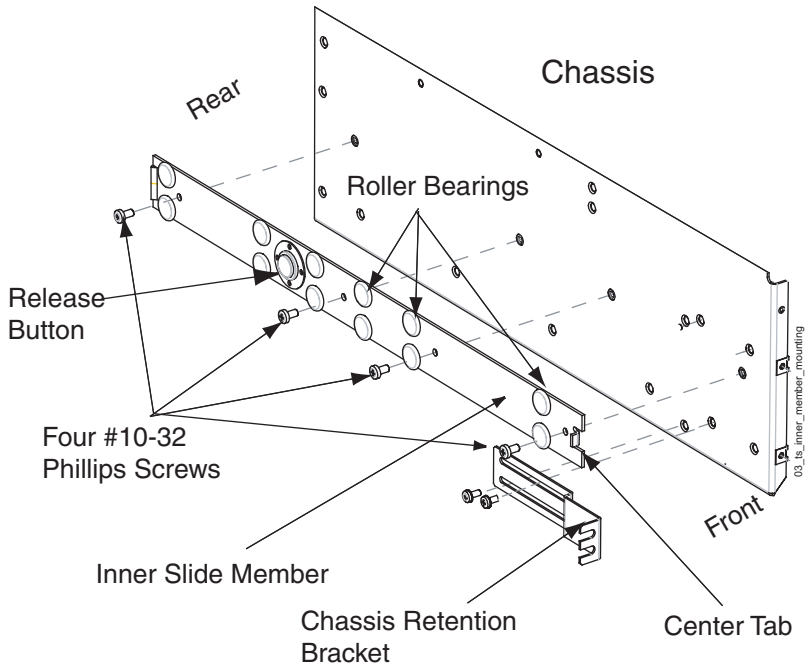


9. Tighten the four #10-32 locknuts on each of the rear slide assembly brackets.

10. Pull the middle slide members from the outer slide members until the rear detents latch. This allows access to the release buttons when inserting the chassis with attached inner slide members.

11. At the workbench, attach the inner slide members that were separated in step 4 on page 5-5, to both sides of the Tekelec 1000 chassis with four #10-32 Phillips screws each. Orient the inner slide members with the roller bearings outward and the center tabs toward the front of the chassis. See Figure 5-8 for a view of the inner member on the left side of the Tekelec 1000 chassis. The inner slide member orientation on the right side of the chassis is similar.

Figure 5-8. Slide Assembly Inner Member Mounting



12. Lift the Tekelec 1000 chassis with the attached inner slide members and carefully insert the inner slide member rollers into the middle slide members that were previously mounted on the frame.

13. Simultaneously press the release buttons on the inner slide members once when the buttons encounter the middle slide members.

NOTE: The inner slide members will travel approximately two more inches and the release buttons will detent into the round cutouts of the middle slide members. This is the standard open position of the slides.

14. Attach the Cable Management System. Do one of the following:

- For Side Cable Management Systems, attach the cable management arms to the rear of the frame using the bolts included with the system. Be sure that the arms can slide in toward the Tekelec 1000.

Figure 5-9. Detail of a Side Cable Management Arm

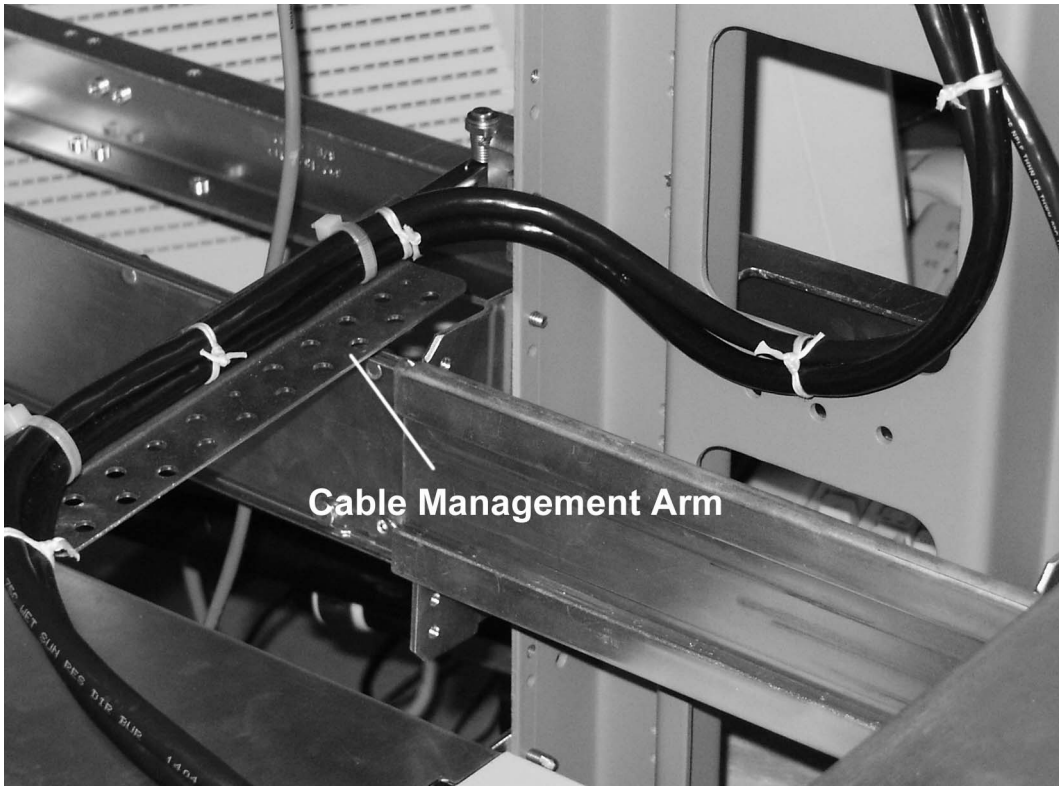
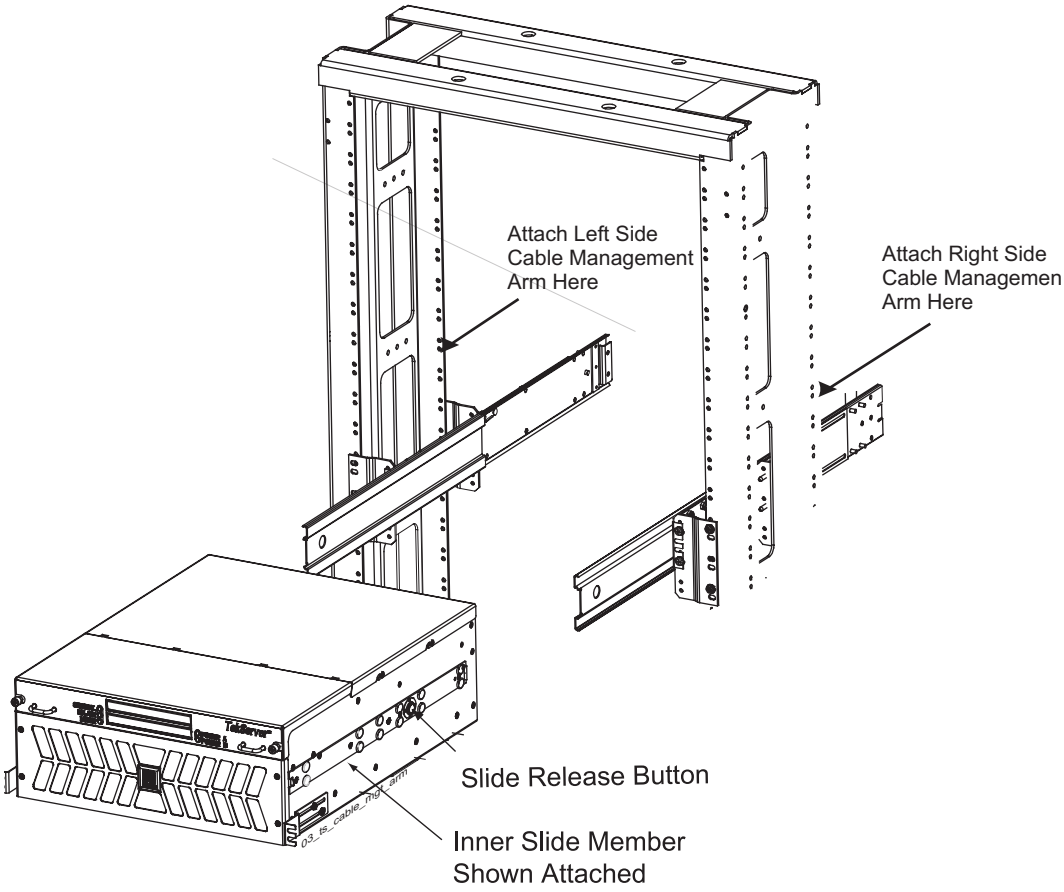
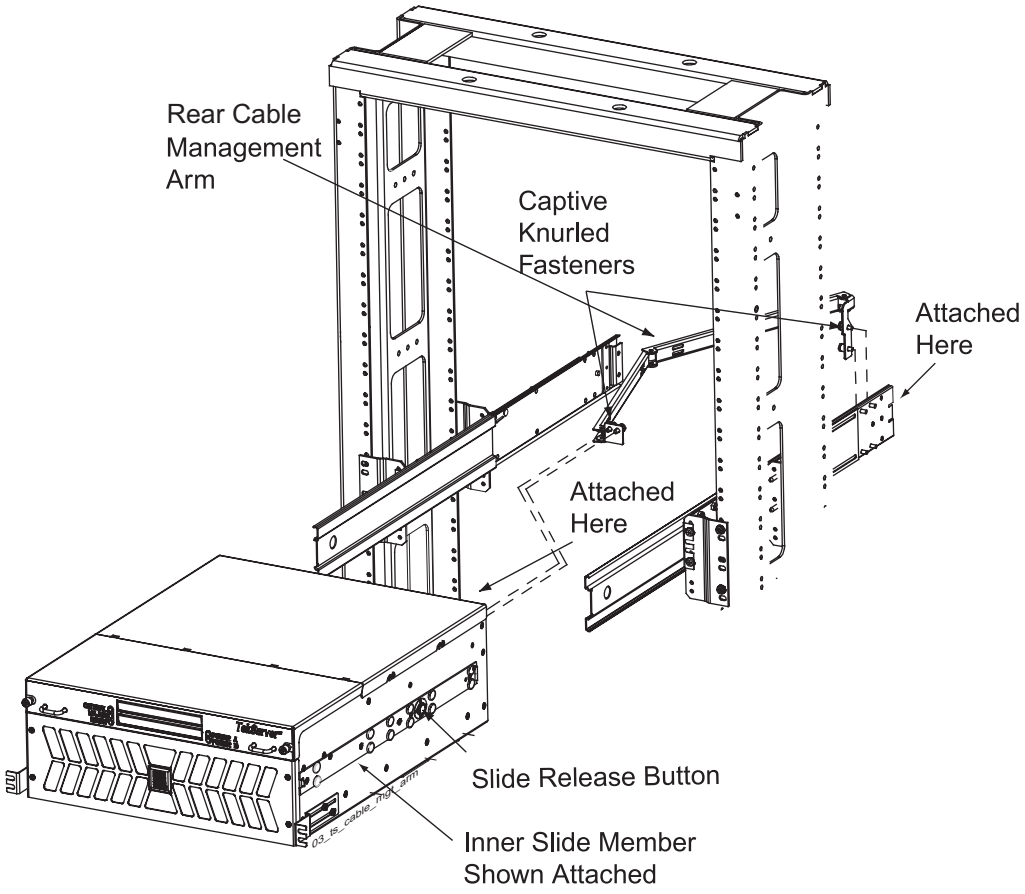


Figure 5-10. Side Cable Management Arm Installation



- For Rear Cable Management Systems, attach the cable management arm to the chassis and slide assembly using the captive knurled fasteners. See Figure 5-11 on page 5-14.

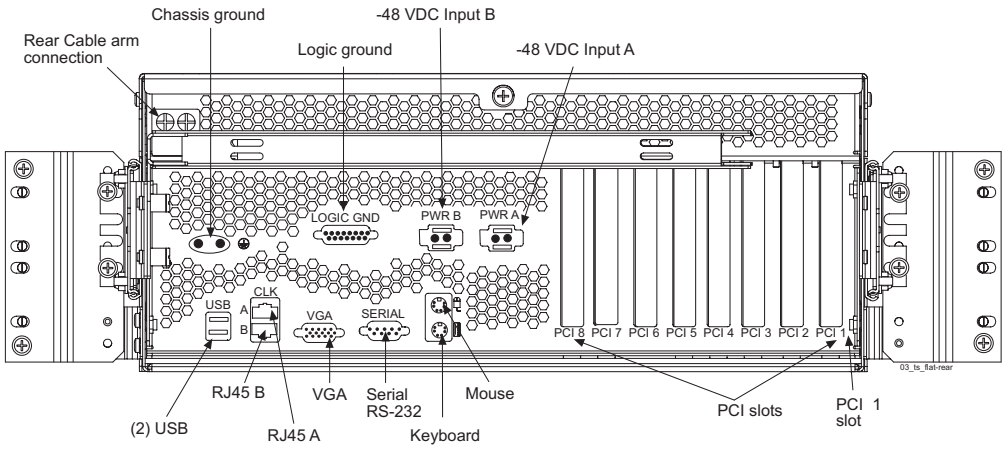
Figure 5-11. Rear Cable Management Arm Installation



NOTE: The mounting position for the additional server may vary. The position shown in Figure 5-11 is for example only.

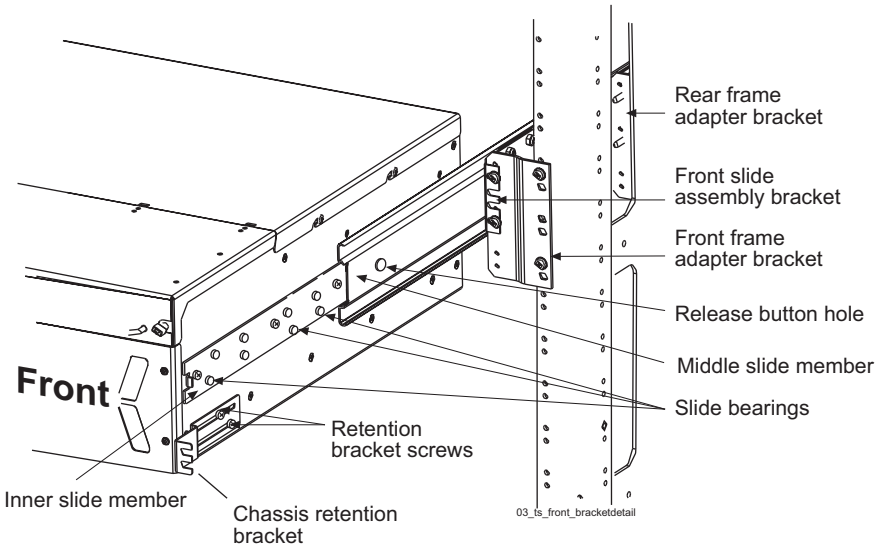
15. Route and connect the power and data cables through the cable management arm to the Tekelec 1000 chassis. Check the labels on the cables and attach them to the appropriate connectors on the rear of the Tekelec 1000 chassis (see Figure 5-12). For information about cables used, see "How to Cable Components Added to Existing Frames" on page 5-16.

Figure 5-12. Tekelec 1000 Rear Detail



16. From the front of the frame, press the round release buttons and slowly push the Tekelec 1000 into the frame while observing the cables to avoid binding or stretching (see Figure 5-13).

Figure 5-13. Frame Mounting Detail



The chassis retention brackets on the front of the Tekelec 1000 will contact the frame adapters when the chassis is positioned correctly in the frame.

17. Secure the chassis with one #10-32 screw on each side in the chassis retention brackets.

18. When the breakers that supply power to the Tekelec 1000 chassis are switched ON, the unit will execute a power up sequence which includes a power-on self test (POST). For information about initializing Tekelec 1000 applications, refer to the applications manual.

19. Replace any plastic panels and doors that were removed.

20. This procedure is complete.

Next, perform the procedures described in Chapter 6, "Post Installation Procedures."

How to Install the Rectifier

For information about how to install the rectifier, refer to the documentation that was delivered with the rectifier.

How to Cable Components Added to Existing Frames

To cable equipment added to an existing frame, follow the directions in one of the following sections:

- "How to Cable a Tekelec 1000 Unit Added to an Existing Heavy Duty Frame" on page 5-16
- "How to Cable a Tekelec 1000 and Rectifier Installed in Customer-Provided Frame" on page 5-17

How to Cable a Tekelec 1000 Unit Added to an Existing Heavy Duty Frame

WARNING: Verify that all breakers are set to the OFF (O) position.

In a Direct Current (DC) environment, after an additional Tekelec 1000 unit has been installed, attach cables.

To determine the cables used and how to connect them, refer to the DC system interconnect diagram, which lists each cable, its quantity, length, how it is used, and a diagram of how to connect it.

NOTE: Some of the listed cables are used only as required. Actual cables used may vary by application.

To view a drawing of a cable, refer to the DC Cable List document, which lists all the cables that appear in the system interconnect diagram with a link from each part number to the drawing for that part number.

How to Cable a Tekelec 1000 and Rectifier Installed in Customer-Provided Frame

WARNING: Verify that all breakers are set to the OFF (O) position.

In an Alternating Current (AC) environment, after the Tekelec 1000 unit and the rectifier have been installed, attach cables.

To determine the cables used and how to connect them, refer to the AC system interconnect diagram, which lists each cable, its quantity, length, how it is used, and a diagram of how to connect it.

NOTE: Some of the listed cables are used only as required. Actual cables used may vary by application.

To view a drawing of a cable, click on the AC Cable List document, which lists all the cables that appear in the system interconnect diagram with a link from each part number to the drawing for that part number.

6

Post Installation Procedures

Introduction

This chapter describes the activities that should be performed after either of the following types of installation:

- A heavy duty frame that contains Tekelec 1000 hardware has been installed
- Tekelec 1000 hardware has been installed in an existing frame

How to Connect Frame Ground and Logic Ground

The procedures in this section must be performed before turning on the power to the frame. To ground a Tekelec 1000 hardware system, the following tasks must be performed:

- Prepare the ground cables (required only in a DC environment); see "How to Prepare the Cables" on page 6-3
- Ground the frame (required only in a DC environment); see "How to Ground the Frame in a DC Environment" on page 6-4.
- Ground the chassis; see either of the following:
  - — "How to Connect Tekelec 1000 Chassis Ground from Tekelec 1000 Chassis to Frame in DC Environment" on page 6-7
  - — "How to Connect Chassis Ground in an AC Environment" on page 6-11
- Ground the logic for the Tekelec 1000 unit; see "How to Ground the Logic Connector in a DC Environment" on page 6-8
- Verify the grounding; see one of the following:
  - — "How to Verify the Ground in a DC Environment" on page 6-11
  - — "How to Verify the Ground in an AC Environment" on page 6-12

DANGER: Strictly observe all grounding requirements to reduce the risk of electric shock.

Recommended Tools

The following tools are recommended for procedures in this chapter:

- Safety glasses
- Multi-meter
- Cable cutters
- Cable stripper
- Socket wrench set with 1/4-inch or 3/8-inch drive or open end wrenches
- Heat-shrink gun (hot air blower)
- Torque wrench
- Fiber paper
- Power knife
- Flush cutters
- Crimping tool with embossing dies (test before using)

- Non-oxidizing grease
- Lacing cord and nylon cable ties

How to Ground in a DC Environment

In a Direct Current (DC) environment, a Tekelec 1000 hardware system operates as a digital isolated ground plane in a central ground environment and requires a single connection to the central ground window. The frame's ground cables must provide the sole grounding connection between the entire frame and the central office grounding.

Perform the procedures in the following sections:

- "How to Prepare the Cables" on page 6-3
- "How to Ground the Frame in a DC Environment" on page 6-4
- For each server in the heavy duty frame, use the procedure in "How to Connect Tekelec 1000 Chassis Ground from Tekelec 1000 Chassis to Frame in DC Environment" on page 6-7
- "How to Ground the Logic Connector in a DC Environment" on page 6-8
- "How to Verify the Ground in a DC Environment" on page 6-11

How to Prepare the Cables

Use this procedure to prepare each frame and logic ground cable.

Procedure 6-1. Prepare the Ground Cables

1. Butt and strip the ends of the green ground cable (P/N 690-0108-07 for the frame ground and P/N 690-0131-01 for the logic ground).

2. Slide a clear heat-shrink (P/N 804-0229-01 for the frame ground and P/N 804-0228-01 for the logic ground) on the butted end of the cable below the stripped end. Move the heat-shrink past the stripped portion of the cable to allow access to the uncovered wire.

3. Apply a thin layer of non-oxidizing grease to the uncovered wires.

4. Slide the cable lug (P/N 804-0977-01 for the frame ground and P/N 804-0817-02 for the logic ground) over the stripped cable. Crimp the lug on the cable, using an embossing crimper. The stripped cable must fill the lug completely to the end of the barrel and be visible in the end window of the lug.

5. This procedure is complete.

Next, go to "How to Ground the Frame in a DC Environment" on page 6-4

How to Ground the Frame in a DC Environment

This section describes how to ground the frame.

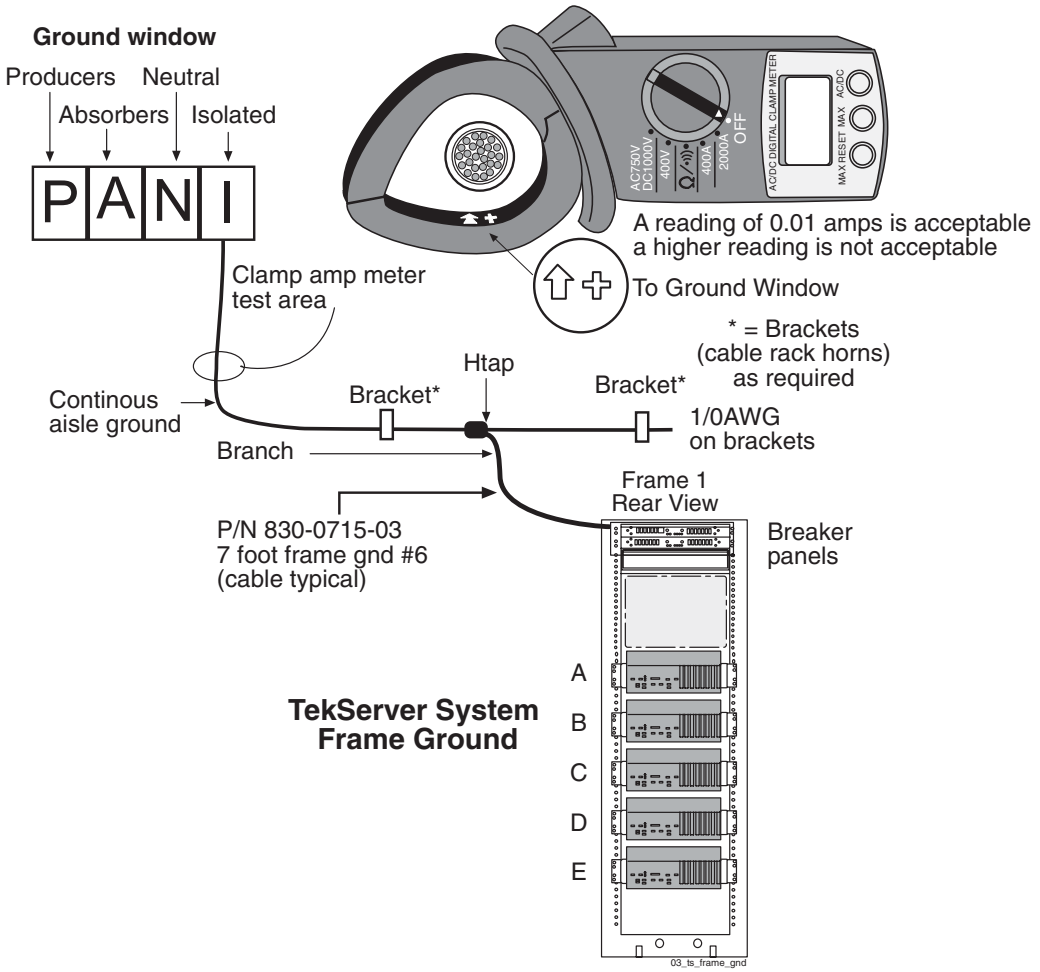
Procedure 6-2. Connect Ground Cable: Frame to Ground Window

1. Ensure that Procedure 6-1 on page 6-3 to prepare the frame ground cable (P/N 690-0108-07) has already been performed.

2. Attach the continuous aisle ground conductor 1/0 to the Ground Window. Run the conductor to the equipment (see Figure 6-1).

3. Install the branch ground conductor to the frame using screws and washers. The continuous aisle ground conductor will be H-tapped to the branch (see Figure 6-1). The separate #6 American Wire Gauge (AWG) cable ground that runs to the frame will allow removal of a frame from a lineup without interrupting the grounding of any other frames in the lineup. Torque screws to 45 inch-pounds.

Figure 6-1. Frame Ground Cable Routes in DC Environment



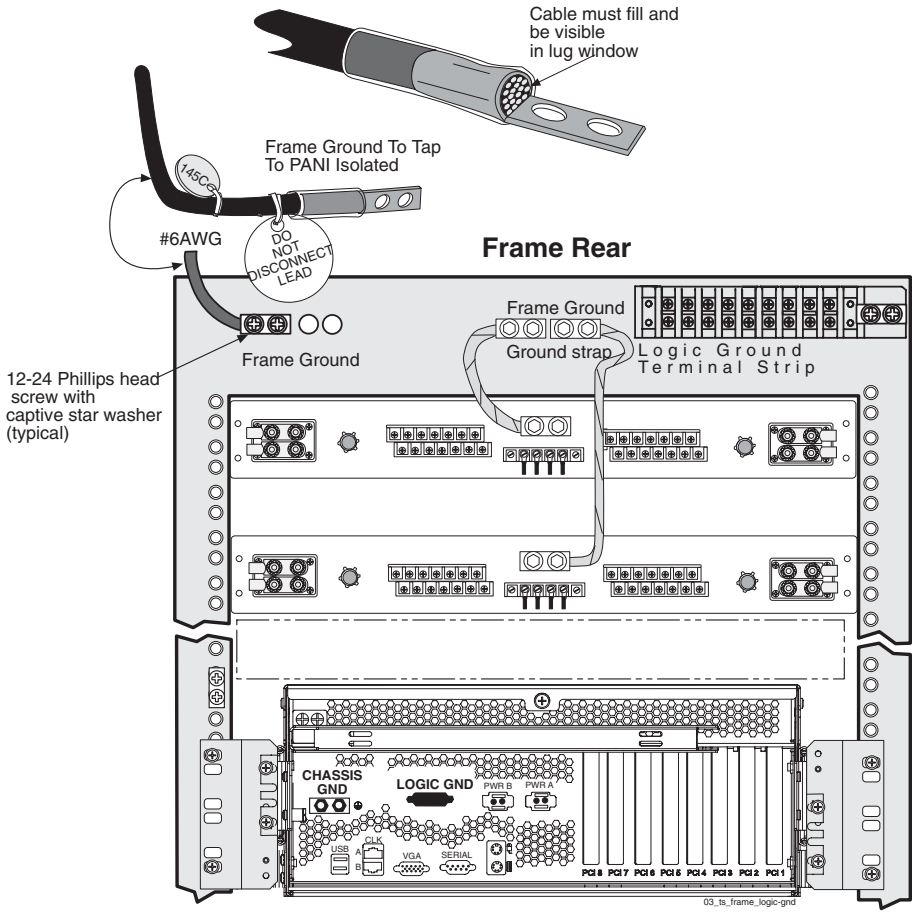
NOTE: This figure shows the maximum configuration of five servers in the frame. For more complete information about the configuration used by the application, refer to the DC assembly drawing.

4. Label all cables with "TO" and "FROM" location information.
Example: FROM Tekelec 1000 frame ground, TO isolated main ground.

5. Ensure that a bolt through any nut must show at least two threads beyond the nut, but no more than four threads should be showing.

6. Use the lacing cord to secure a "DO NOT DISCONNECT LEAD" tag at each end of the cable, just beyond the lug. Apply the 145C cable tags to both ends of the frame ground cable.

Figure 6-2. Frame Ground Cable Attachment Locations in DC Environment



NOTE 1: Main Ground: 1/0 cable from the frame ground to the PANI "I" (isolated) section of the ground window.

NOTE 2: Frame Ground: A cable #6 AWG from a frame is H-tapped into a 1/0 cable and terminates on the "I" section of the ground window. If no ground window exists, the customer will designate the termination point.

NOTE 3: The size of the cable is determined by the overall length of the cable run. Refer to the Site File Book.

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7. This procedure is complete.

Next, go to Procedure 6-3, "Connect Tekelec 1000 Chassis Ground: Tekelec 1000 Chassis to Frame," on page 6-7.

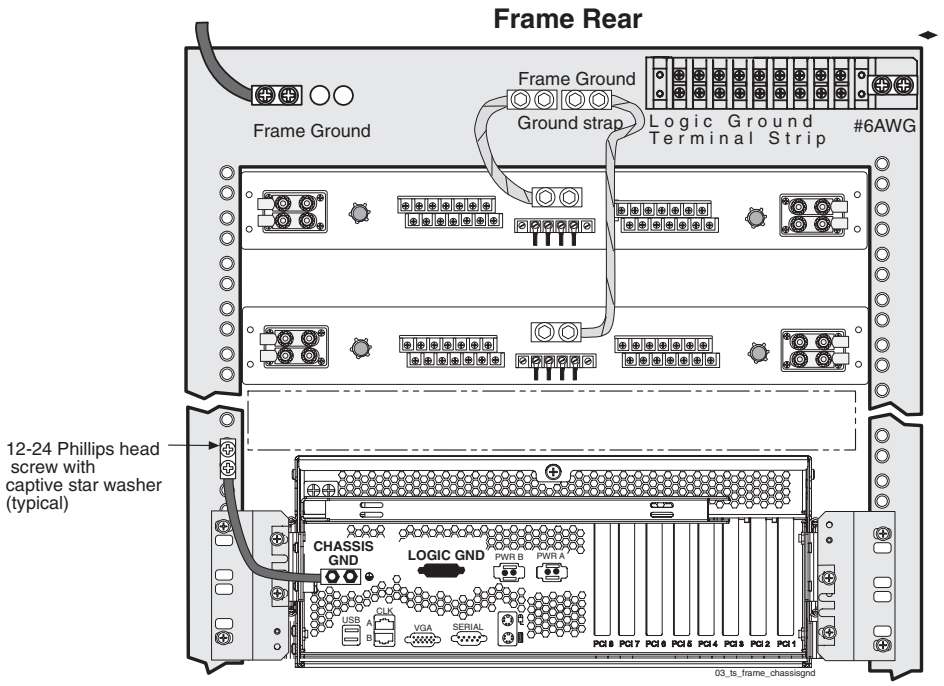
How to Connect Tekelec 1000 Chassis Ground from Tekelec 1000 Chassis to Frame in DC Environment

In a DC environment, use this procedure for each Tekelec 1000 unit in the heavy duty frame.

Procedure 6-3. Connect Tekelec 1000 Chassis Ground: Tekelec 1000 Chassis to Frame

1. Remove the nuts on the Tekelec 1000 chassis ground lugs on the back of the server (see Figure 6-3 on page 6-7).

   Figure 6-3. Chassis Ground Cable Attachment Location in DC Environment



2. Attach the ground cable (P/N 830-0977-01) to the server. The ground cable has a different lug at each end and will terminate only one way.

3. Tighten the nuts to secure the cable to the rear of the Tekelec 1000.

4. Connect the other end of the cable to the side of the frame nearest the Tekelec 1000 chassis (see Figure 6-2 on page 6-6). Be sure that the Tekelec 1000 can slide in and out on its rails without binding this cable.

5. This procedure is complete.

Next, go to Procedure 6-4, "Connect Logic Ground from Logic Ground Terminal Strip to Ground Window," on page 6-8.

How to Ground the Logic Connector in a DC Environment

This section describes how to attach the logic ground cables to the logic connector at the back of the server.

The logic ground cables are a part of the internal power distribution. They provide a ground connection between each server and the main ground. The logic ground is connected from each server to the terminal strip and from the terminal strip to the system bar or to the ground window by the consolidated power cables, cable #6 AWG (P/N 690-0131-01), terminal lug (P/N 804-0817-02), and heat-shrink (P/N 804-0228-01).

To complete the logic ground, both of the following procedures must be performed:

- Attach the logic ground from the logic ground terminal block to the system bar (EF00) or to the isolated ground of the Ground Window (Procedure 6-4 on page 6-8).
- Attach the logic ground cable from the logic ground port on the Tekelec 1000 to the logic ground screws on the logic ground terminal block (Procedure 6-5 on page 6-11).

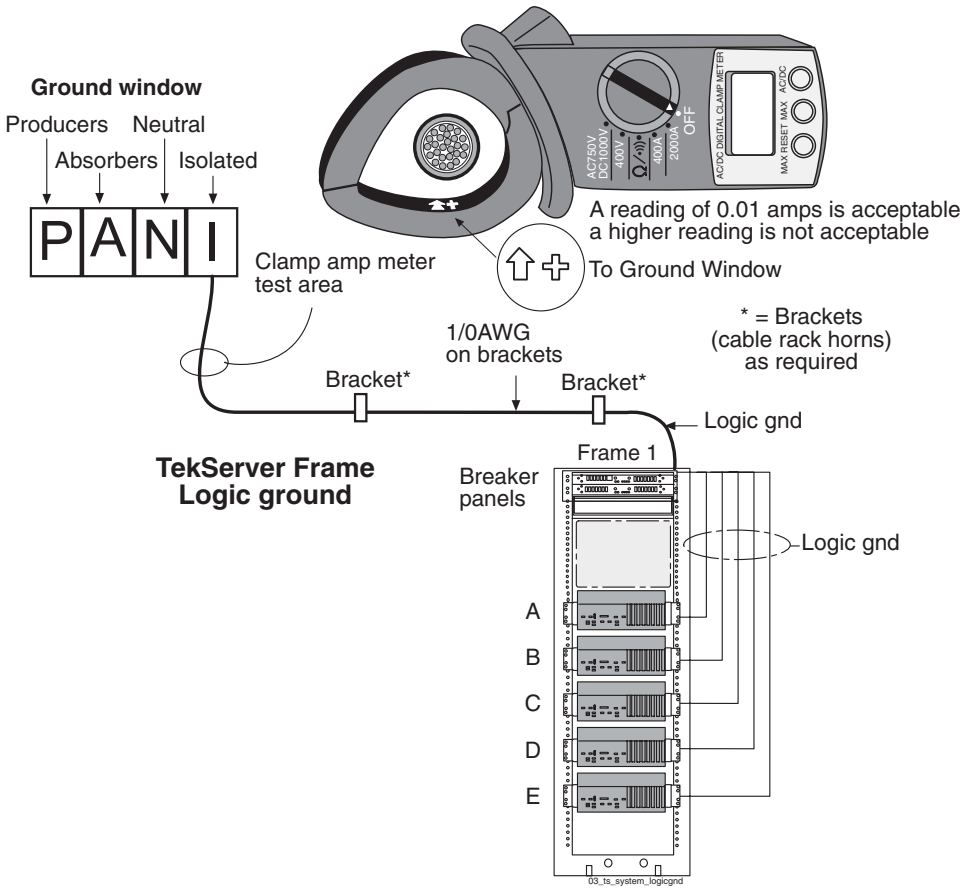
Procedure 6-4. Connect Logic Ground from Logic Ground Terminal Strip to Ground Window

1. Use Procedure 6-1 on page 6-3 to prepare the logic ground cable (P/N 690-0131-01).

   NOTE: It may be necessary to drill the central office ground window bar to accept the 3/8-inch bolts on one-inch centers.

2. Attach one of the ground cables to the logic ground terminal strip and the other end to the system ground bar (EF00) or the isolated ground of the ground window (see Figure 6-4 on page 6-9).

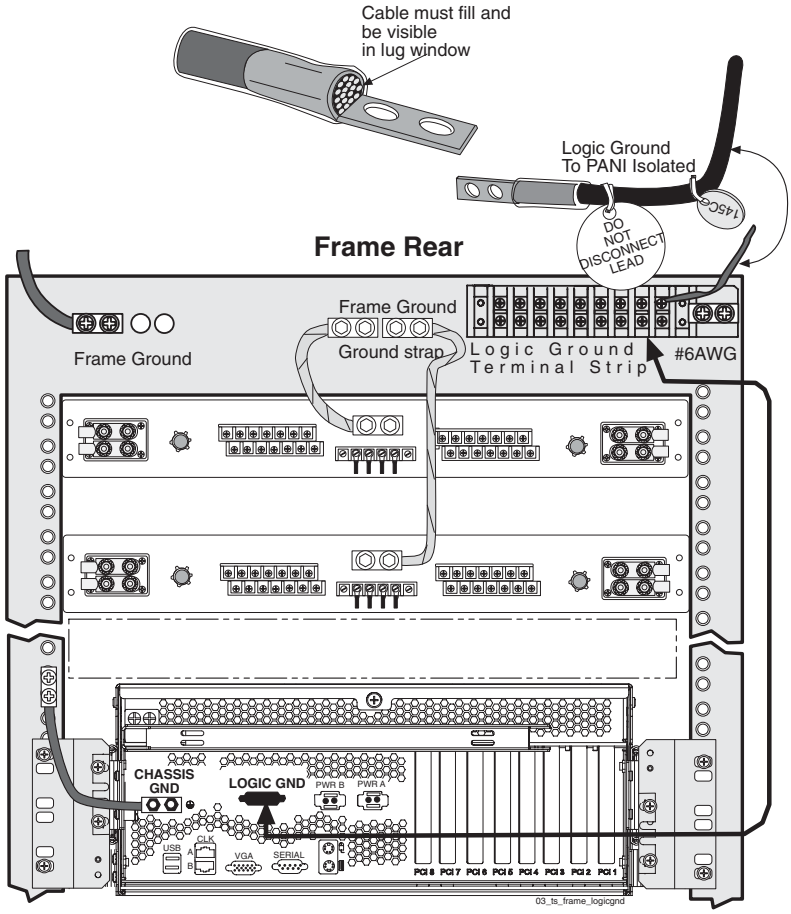
Figure 6-4. Logic Ground Cable Routes



NOTE: This figure shows the maximum configuration of five servers in the frame. For more complete information about the configuration used by the application, refer to the DC assembly drawing.

3. Apply the 145C cable tag (see Figure 6-5 on page 6-10) to both ends of the logic ground cable. Also, apply the "Do Not Disconnect" tag to both ends of the logic ground cable.

Figure 6-5. Frame and Logic Ground Cable Attachment Locations



NOTE 1: DO NOT run Logic Ground or Power Cables on the cable horns in the top middle of a frame.

NOTE 2: The number of inter-frame Logic Ground connections may vary from the example shown in Figure 6-5. (One logic ground connection per Tekelec 1000.)

4. This procedure is complete.

Next, go to Procedure 6-5, "Connect Logic Ground: Tekelec 1000 Logic Ground Port to Logic Ground Terminal Strip," on page 6-11.

Procedure 6-5. Connect Logic Ground: Tekelec 1000 Logic Ground Port to Logic Ground Terminal Strip

1. Connect one end of the logic ground cable with the 15-pin connector to the port labeled "Logic Ground" at the rear of the Tekelec 1000 chassis. This cable does not need any special preparation and can be used as delivered with the server.

2. Connect the other end of the cable to one of the screws on the logic ground terminal strip at the top right side of the frame. Do this for each server. See Figure 6-5 on page 6-10.

3. This procedure is complete.

Next, go to "How to Verify the Ground in a DC Environment" on page 6-11.

How to Verify the Ground in a DC Environment

After all frame components and all frame and logic ground cables are installed, the hardware tester must verify the frame and logic grounds. Power-up the frame using the procedure described in "How to Power Up" on page 6-14. Then, use the multi-meter to test the isolated continuous aisle ground at the position show in Figure 6-1 on page 6-5. The meter reading with the frame powered-up must be less than 0.01 Amps.

How to Ground in an AC Environment

Perform the procedures in the following sections:

- For each server in the heavy duty frame, use the procedure in "How to Connect Chassis Ground in an AC Environment" on page 6-11
- "How to Verify the Ground in an AC Environment" on page 6-12

How to Connect Chassis Ground in an AC Environment

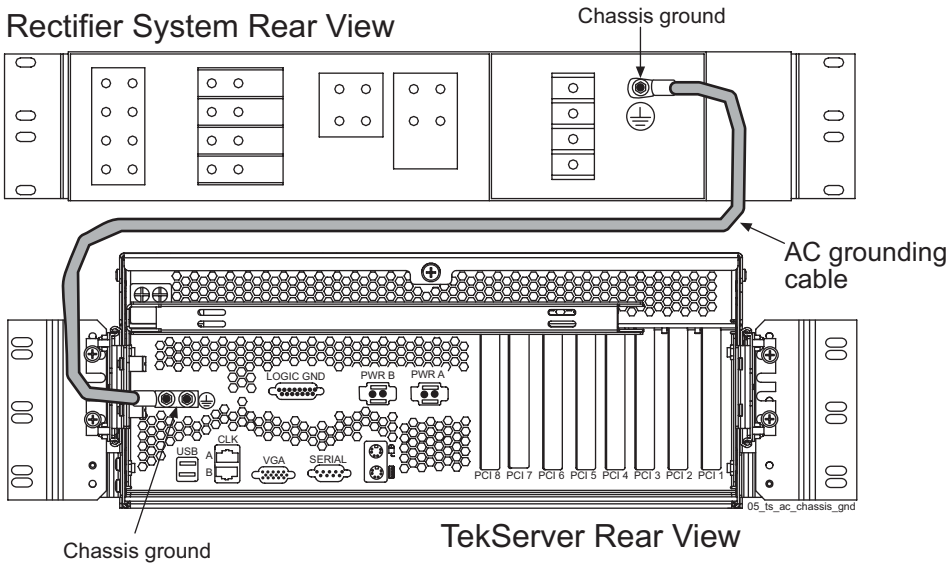
Use the following procedure to ground the Tekelec 1000 chassis to the rectifier chassis in an AC environment.

Procedure 6-6. Connect Chassis Ground: Tekelec 1000 Chassis to Ground on Rectifier

1. Attach the chassis cable into the back of the Tekelec 1000 chassis. This cable can be used as delivered with the server.

2. Connect the other end of the cable to the back of the rectifier chassis.

Figure 6-6. Ground Cable Attachment Locations for Tekelec 1000 in AC Environment



3. This procedure is complete.

How to Verify the Ground in an AC Environment

To verify ground in an AC environment, plug an AC tester into the AC outlet.

Post-Installation Checklist

After you have performed installation procedures in this manual, fill out the checklist shown in Table 6-1.

Table 6-1. Post-Installation Checklist

Check When Done	Verify that:
	All items listed in the Equipment Specification have been installed.
	Shipping container is properly packed with ramp and frame dollies and shipped to Tekelec. **NOTE: This check applies only after a heavy duty frame has been installed.**
	The site is clean.
	Systems are neat, clean, and level.
	All cable connections are checked to ensure a tight and complete connection.
	Cabling is neatly installed and the labels are correct and easily readable.
	Power cabling does not run through a cable rack.
	Power cabling is not routed together with any other cables and has at least six inches of clearance.
	Racks have protective paper between the rack and any cables that would otherwise touch the rack.
	The main ground cable is correctly labeled and is marked "TO and "FROM" with the "Do Not Remove" tag installed on both ends of the cable at the grounding.
	The -48 VDC power feeds are correctly labeled at the site power distribution panel. There should be an A feed and a B feed for each breaker panel. **NOTE: This check applies only in a DC environment.**
	The rectifier is plugged in to the AC power source. **NOTE: This check applies only in an AC environment.**
	Any -48 VDC BATT and RTN cables are correctly labeled.
	Earthquake bracing, if any, is properly installed.
	Adequate floor clearances have been maintained.
	Panels, if any, are correctly installed.
	Cable sheets are properly filled out.
	Documentation has been received and is properly stored.
	Modems, if any, are operational.

How to Power Up

WARNING: Only a certified Tekelec test engineer should power up a system after installation.

To power up, set the appropriate breakers to the ON position as described in one of the following sections.

- "How to Power Up a Heavy Duty Frame" on page 6-14
- "How to Power Up Added Tekelec 1000 Unit in DC Environment" on page 6-14
- "How to Power Up a Tekelec 1000 Unit in an AC Environment" on page 6-14

When the breakers that supply power to the Tekelec 1000 unit are switched ON, the unit will execute a power up sequence which includes a Power On Self Test (POST). For information about initializing the software that runs on Tekelec 1000 chassis, refer to the application manuals included with your documentation.

How to Power Up a Heavy Duty Frame

In a Direct Current (DC) environment, to power up the equipment installed in the heavy duty frame, turn ON (flip the switch toward the | indicator) all the breakers that correspond to servers in the frame, as shown in DC_BreakerSettings.pdf.

How to Power Up Added Tekelec 1000 Unit in DC Environment

WARNING: Before powering up a server that has been added to an existing frame in a DC environment, verify that the breakers that correspond to the position where the server has been added are set to the OFF (O) position.

To power up an added server, turn ON (flip the switch toward the | indicator) the breakers that correspond to the position where the server was added, as shown in DC_BreakerSettings.pdf.

How to Power Up a Tekelec 1000 Unit in an AC Environment

Use the following procedure to power up a Tekelec 1000 unit in an AC environment.

WARNING: Before powering up, verify that the breakers that all rectifier output breakers are set to the OFF (O) position.

Procedure 6-7. Power Up Tekelec 1000 Unit in an AC Environment

1. Ensure that all AC and DC connections have been secured and checked.
2. Verify the ground at the AC outlet.
3. Plug the rectifier into the AC outlet.
4. Check that the rectifier is operating with no alarms present. The rectifier controller should display "System OK." If there are alarms present, refer to the documentation that came with the rectifier for troubleshooting assistance before proceeding.
5. Set the rectifier output breakers to "ON" to send power to the Tekelec 1000 unit.
6. This procedure is complete.

How to Change Passwords

For security purposes, Tekelec recommends that all default passwords be changed to your own passwords. The new passwords should be kept in a secure location.

- To change the passwords for the Tekelec 1000 platforms, refer to the application manual for the application loaded on each server.
- To change the passwords for the Ethernet switches, refer to the documentation that accompanies that product.

NOTE: There should always be a person on-site who knows the new passwords. If there is a need to contact Tekelec Technical services, please provide the passwords on request.

7

Field Replaceable Units

Introduction

Tekelec 1000 AS hardware systems are designed for the high-availability environments required by telephony networks. They use redundant power supplies and many of the components within a single Tekelec 1000 chassis are redundant.

Even with the advanced reliability of the Tekelec 1000 design, hardware failures may still occur. The Tekelec 1000 hardware is designed for easy maintenance when replacements are needed.

CAUTION: Always contact Tekelec Technical Services before performing any troubleshooting or replacing components.

This chapter describes which Tekelec 1000 hardware system components are field-replaceable units (FRUs) and provides procedures for replacing them.

NOTE: This chapter does not describe how to diagnose which FRU may need to be replaced. For diagnostic information, refer to the applications documentation.

Tekelec 1000 Hardware System FRUs

The following Tekelec 1000 hardware system components can be replaced in the field:

- In a Direct Current (DC) environment:
  - — Breaker Panel (see "How to Replace a Breaker Panel" on page 7-4)
  - — Ethernet switch or hub (see "How to Replace a Console Server or Ethernet Switch or Hub" on page 7-7)
- In an Alternating Current (AC) environment:
  - — Rectifier (see "How to Replace a Rectifier" on page 7-8)
  - — Individual rectifier module (see "How to Replace a Rectifier Module" on page 7-8)
- In all environments, the following Tekelec 1000 FRUs (see "Tekelec 1000 FRUs" on page 7-3):
  - — Air filters
  - — Fan assemblies
  - — Hard drive assemblies
  - — Removable media drives assembly
  - — Peripheral Component Interface (PCI) cards
  - — Tekelec 1000 chassis (hard drive assemblies and PCI cards from the failed chassis can be moved to the replacement chassis)

Tekelec 1000 FRUs

Table 7-1 shows the Tekelec 1000 components that have been designed to be replaceable in the field. Most of these components are located for easy access; they can be replaced without completely removing them from the frame. In addition, some of them can even be replaced without needing to shut off power to the Tekelec 1000 chassis.

WARNING: When you need to replace a FRU for which the power must be shut off, always first attempt to perform a soft shutdown of the application systems (refer to the application manual).

Table 7-1. Tekelec 1000 Field Replaceable Units (FRUs)

FRU	Tekelec 1000 Power State Required before Replacement	Tekelec 1000 Location	Access
Air filters	ON or OFF	Behind front fascia	Remove front fascia while chassis in frame
Fan assemblies	ON or OFF	Under front lid	Open front top cover after either: • Sliding chassis out • Removing chassis from frame
Hard drive assemblies	OFF	Under front lid	
Removable media drives assembly	OFF	Under front lid	
PCI cards	OFF	Under rear lid	Open front top cover after removing chassis from frame
Tekelec 1000 chassis*	OFF	Entire unit	Remove chassis from frame

* When a Tekelec 1000 chassis needs to be replaced, the hard drive assemblies and the PCI cards can be moved from the failed chassis to the replacement chassis. Moving the hard drive assemblies from the failed server to the replacement server allows data to be preserved.

Tools Required

The following tools are required for performing procedures in this chapter:

- Safety glasses
- # 0 Phillips screwdriver
- # 1 Phillips screwdriver
- # 3 Phillips screwdriver

- 3/8 inch nutdriver
- Volt Ohm Meter (VOM)

How to Replace a Breaker Panel

Use the following procedure to replace a breaker panel in a Direct Current (DC) environment.

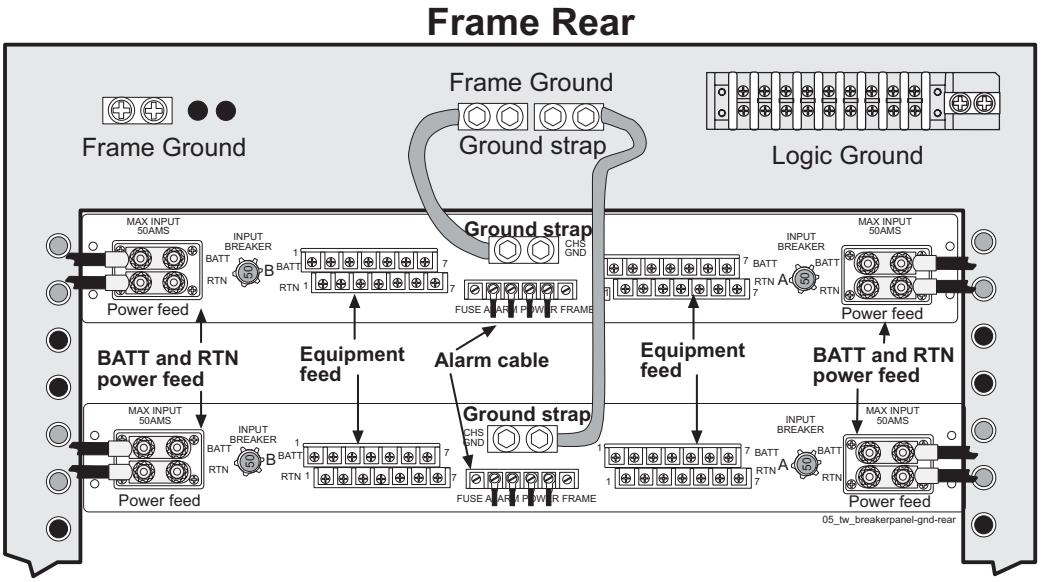
Procedure 7-1. Replace a Breaker Panel

1. Ensure that the following have been done:
   a. An RMA has been obtained (see "How to Obtain a Return Material Authorization" on page B-1)
   b. A spare part is available

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

2. At the power source, turn all the breakers to the OFF position (flip the switches to point to O)
3. Remove the covers that shield the power source connections on the rear of the panel.
4. Check the voltage with a VOM to verify that power is OFF.
5. Disconnect the BATT and RTN leads from the power source for "A" and "B" to the breaker panel (see Figure 7-1, which shows both breaker panels in an example frame).

Figure 7-1. Rear View of Breaker Panels



NOTE: The number of Logic Ground connections may vary from the example shown in Figure 7-1.

6. Disconnect the frame ground cable (see Figure 7-1).

   NOTE: One end of this cable is terminated to the rear of the panel and the other end is terminated to a vacant screw hole on top of the frame.

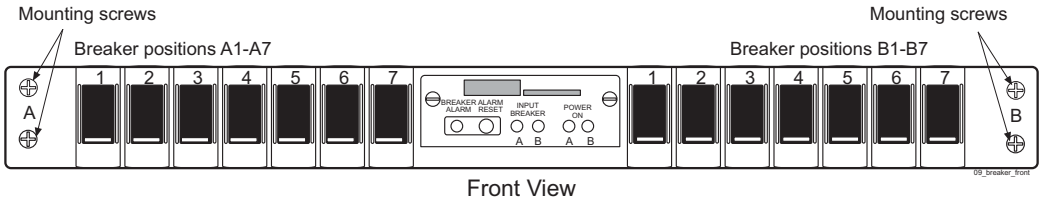
7. Disconnect the alarm cable (see Figure 7-1).

8. Disconnect the BATT and RTN leads for the Tekelec 1000 units and for the Ethernet switches (shown as "equipment feeds" in Figure 7-1).

9. Tape all dangling feeds.

10. From the front of the frame, unscrew the four mounting screws that secure the breaker panel to the frame (see Figure 7-2) and remove the failed breaker panel.

Figure 7-2. Breaker Panel Front View



11. Install the replacement breaker panel into the frame with the four mounting screws.

12. Connect the BATT and RTN leads for the Tekelec 1000 units and other equipment according to the interconnect diagram.

13. Connect the alarm cable according to the interconnect diagram.

14. Connect the frame ground cable according to the interconnect diagram.

NOTE: One end of this cable is terminated to the rear of the panel and the other end is terminated to a vacant screw hole on top of the frame.

WARNING: Before connecting the BATT and RTN leads from the power source, verify that power is not present by checking the leads with a VOM. Connecting the leads with power applied can cause arcing.

15. Connect the BATT and RTN leads from the power source for "A" and "B" to the breaker panel according to the interconnect diagram.

NOTE: The A and B power inputs have separate breakers.

16. Replace the covers that shield the power source connections.

17. Power up the breaker panel by turning on the breakers at the power source.

18. This procedure is complete.

How to Replace a Console Server or Ethernet Switch or Hub

Perform the following procedure to replace miscellaneous equipment (such as a console server or an Ethernet switch or hub) in a heavy duty frame.

Procedure 7-2. Replace an Ethernet Switch, Hub, or Console Server

1. Ensure that the following have been done:
   a. An RMA has been obtained (see "How to Obtain a Return Material Authorization" on page B-1)
   b. A spare part is available

2. Inventory to ensure that the replacement equipment including cables are on site.

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

3. Remove all cables from the part to be replaced.

4. While supporting the failed part, remove the screws holding the mounting bracket of the part to the frame.

5. Pull failed part out of the frame. Remove the mounting brackets from the old part.

6. Secure the mounting brackets to the replacement part. There are two screws per bracket.

7. While holding the replacement part in place, start the available screws 0.5 inch (P/N 601-0010-01) into the hole of the mounting bracket on either side of the part. Still supporting the part, install two screws into the hole though the bracket into the frame and tighten. Attach cables.

8. If this procedure has been performed to replace console server or an Ethernet switch, contact Tekelec Technical Services (see "Technical Services and Support" on page 1-7) to determine whether additional steps need to be performed.

9. This procedure is complete.

How to Replace a Rectifier Module

In an Alternating Current (AC) environment, a rectifier is used to convert the AC power of the environment to Direct Current (DC) power needed by the Tekelec 1000 unit. The rectifier contains two or more individual rectifier modules. The rectifier modules are hot-swappable (one can be replaced without turning off power to the entire rectifier). To replace an individual rectifier module, perform the following procedure.

Procedure 7-3. Replace a Rectifier Module

1. For information about replacing a rectifier module, refer to the documentation that was shipped with the rectifier

How to Replace a Rectifier

In an Alternating Current (AC) environment, a rectifier is used to convert the AC power of the environment to Direct Current (DC) power needed by the Tekelec 1000 unit. If the entire rectifier needs to be replaced, perform the following procedure.

Procedure 7-4. Replace a Rectifier

1. Shut down the application that runs on the Tekelec 1000 unit
2. Turn all the breakers in the rectifier to the OFF position.
3. Unplug the rectifier from the environment's power source.
4. Remove the cables from the back of the rectifier (refer to AC_InterconnectDiagram.pdf).

DANGER: Moving this equipment requires two people. Improper handling of this equipment may cause personnel injury or damage to the equipment's internal components due to shock and vibration.

5. Replace the rectifier (refer to the documentation that was shipped with the rectifier).

   NOTE: Ensure a gap of 3/4 inches above and below the rectifier to allow for sufficient air flow.

6. Connect the cables to the replacement rectifier (refer to AC_InterconnectDiagram.pdf).

7. Plug the rectifier back into the environment's power source.

8. Turn all the breakers in the rectifier to the ON position.

9. This procedure is complete.

How to Access Tekelec 1000 FRUs

A Tekelec 1000 FRU can be accessed in one of the following ways:

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

- Without moving the chassis from its position in the frame. The air filter can be accessed this way; see "How to Replace an Air Filter" on page 7-21).
- By sliding the chassis partway out of the frame (see "How to Slide Tekelec 1000 Chassis Out from Frame" on page 7-10). This method can be used to access one or more of the following:
  - — Fan assembly
  - — Hard drive assembly
  - — Removable media drives assembly
  - — PCI cards
- By removing the chassis from the frame and placing it on a workbench (see "How to Remove Tekelec 1000 Chassis from a Frame" on page 7-13)
  - — This method must be used to access the Tekelec 1000 chassis for replacement
  - — This method may be used to access one or more of the following:
    - –Fan assembly
    - –Hard drive assembly
    - –Removable media drives assembly
    - –PCI cards

How to Slide Tekelec 1000 Chassis Out from Frame

The following FRUs can be replaced without removing the Tekelec 1000 chassis entirely out of the frame:

- Fan assemblies
- Hard disk drive assemblies
- Removable media disk drives assembly
- PCI cards

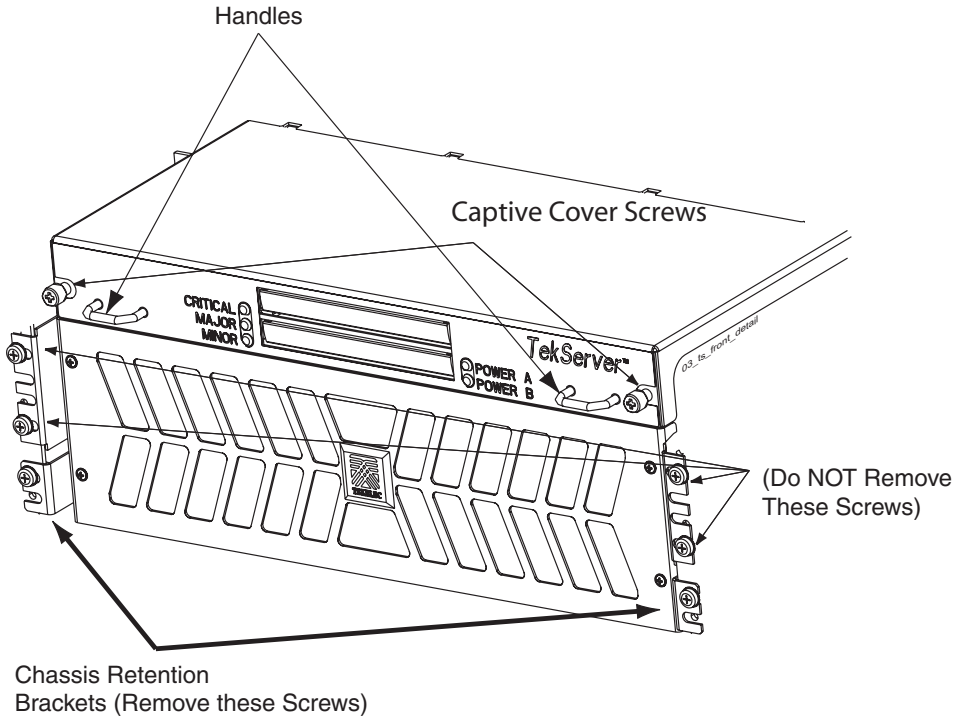
SHOW ME: To view a video (with sound) that shows some steps of the following procedure, click here. For personnel safety and to protect equipment and data, be sure to read all the steps in the following procedure. For more information about how to view this video, see "Programs Needed to View Linked Documents" on page 1-4.

Procedure 7-5. Slide Tekelec 1000 Chassis Out from Frame

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

1. From the front of the frame, remove the # 12-24 Phillips screw from each chassis retention bracket (see Figure 7-3). Do not remove the screws in the frame adapter brackets.

Figure 7-3. Tekelec 1000 Chassis Front View



2. From the front of the frame, using the handles on the front top cover of the chassis, pull forward until the release buttons on the inner arms of the slide assemblies pop into the holes on each side.

DANGER: If the Tekelec 1000 chassis is pulled too far out after the release buttons are disengaged, the inner slide members (attached to the chassis) could come out of the middle slide members (attached to the frame).

3. This procedure is complete.

Next, replace the desired FRU using one of the following procedures:

- Procedure 7-10, "Replace a Fan Assembly," on page 7-23
- Procedure 7-11, "Replace a Hard Disk Drive Assembly," on page 7-27
- Procedure 7-12, "Replace a Removable Media Disk Drive Assembly," on page 7-36
- Procedure 7-13, "Replace a PCI Card," on page 7-40

When the desired FRU has been replaced, perform Procedure 7-6, "Slide Tekelec 1000 Chassis Back into Frame," on page 7-12.

How to Slide Tekelec 1000 Chassis Back into Frame

Perform the procedure in this section to slide the Tekelec 1000 chassis back into the frame if one of the following FRUs was accessed by sliding the Tekelec 1000 chassis out of the frame:

- Fan assemblies
- Hard disk drive assemblies
- Removable media disk drive assemblies
- PCI cards

Procedure 7-6. Slide Tekelec 1000 Chassis Back into Frame

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

1. From the front of the frame, simultaneously press the round release buttons and slowly push the chassis into the frame while observing the cables to avoid binding or stretching.

   NOTE: When the chassis stops moving, the front of the Tekelec 1000 should be slightly recessed to allow clearance of the handles behind the frame door when closed.

2. Adjust the chassis retention brackets on the front of the Tekelec 1000 chassis to contact the frame adapter brackets when the chassis is positioned correctly in the frame.

3. Secure the chassis with one # 12-24 screw in the chassis retention brackets on each side.

4. This procedure is complete.

How to Remove Tekelec 1000 Chassis from a Frame

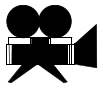
It may be necessary to remove a Tekelec 1000 chassis from its frame for either of the following reasons:

- To move the chassis to a workbench where one or more of the following FRUs can be replaced (be sure that a replacement FRU is on hand):
  - — Fan assemblies
  - — Hard disk drive assemblies
  - — Removable media disk drives assembly
  - — PCI cards

  NOTE: Alternatively, these FRUs can be replaced by sliding the Tekelec 1000 chassis partway out of the frame, using Procedure 7-5, "Slide Tekelec 1000 Chassis Out from Frame," on page 7-11.
- To remove and replace a failed Tekelec 1000 chassis.

  NOTE: If the hard disk drives and PCI cards in the failed chassis do not need to be replaced, they can be removed from the failed Tekelec 1000 chassis and placed in the replacement chassis. Moving the disk drives in this way allows data to be preserved.

Use the following procedure to remove a Tekelec 1000 chassis from the frame.



SHOW ME: To view a video (with sound) that shows some steps of the following procedure, click here. For personnel safety and to protect equipment and data, be sure to read all the steps in the following procedure. For more information about how to view this video, see "Programs Needed to View Linked Documents" on page 1-4.

Procedure 7-7. Remove a Tekelec 1000 Chassis from Frame

WARNING: This procedure CANNOT be performed while the Tekelec 1000 chassis is powered on. Never power OFF a Tekelec 1000 chassis until the application software and platform operating system (OS) are shut down. If possible, use the procedures in the application manual for a "soft shutdown." If the application interface is not operating or is not accessible, a hard shutdown (turning OFF the breakers) is sometimes required. Contact Tekelec Technical Services before doing a hard shutdown.

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

1. Turn OFF the circuit breakers that supply power to the Tekelec 1000 chassis to be removed.

   To locate the circuit breakers supplying power to the Tekelec 1000 chassis, refer to the system interconnect diagram for the system type and/or read the labels on the breakers. To access the circuit breakers on some frames, it may be necessary to remove the plastic covers on the front of the breakers. If the covers are removed, to maintain NEBS compliance, make sure they are replaced when the FRU replacement has been completed.

WARNING: A Tekelec 1000 chassis is redundantly powered from both A and B -48 VDC buses. Ensure that both the circuit breaker supplying A power to a chassis and the circuit breaker supplying B power to a Tekelec 1000 chassis are turned OFF by measuring the voltage with a VOM on the cable that connects the Tekelec 1000 chassis to its breakers. Both A and B power LEDs on the front panel of the Tekelec 1000 chassis should be OFF.

2. Remove the front door and any plastic panels from the rear of the frame.

3. From the rear of the frame, check all cables attached to the chassis for correct labeling. If any labels are missing or damaged, create a label that indicates what connection it is attached to and where the other end is connected.

4. Disconnect all cables from the rear of the chassis.

5. Do one of the following, depending upon the type of cable management system you have:

   - For Rear Cable Management Arm Systems, disconnect the cable management arm at the chassis end by removing the knurled captive fasteners attaching the arm to the chassis. See Figure 7-4 and Figure 7-5 for locations of the screw holes.
   - For Side Cable Management Arm Systems you do not have to remove the cable management arms from the frame. Proceed to the next step.

Figure 7-4. Rear Cable Management Arm

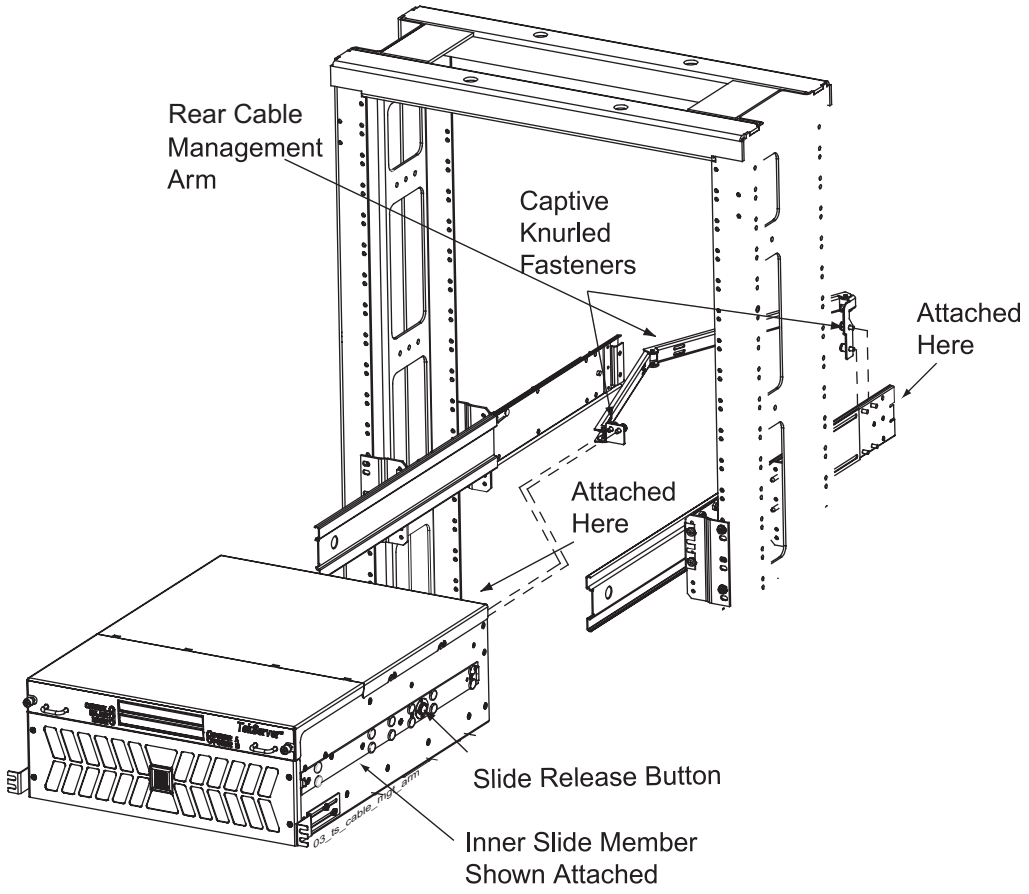
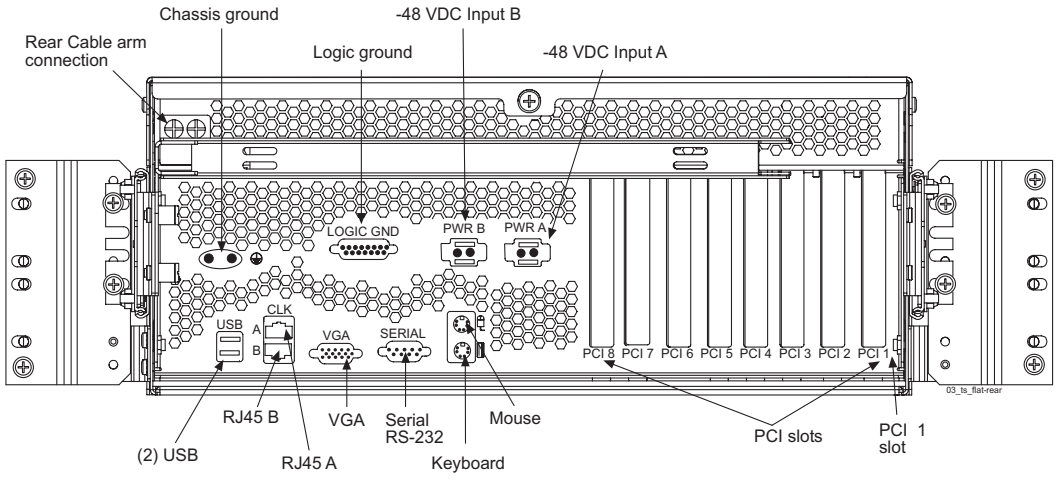


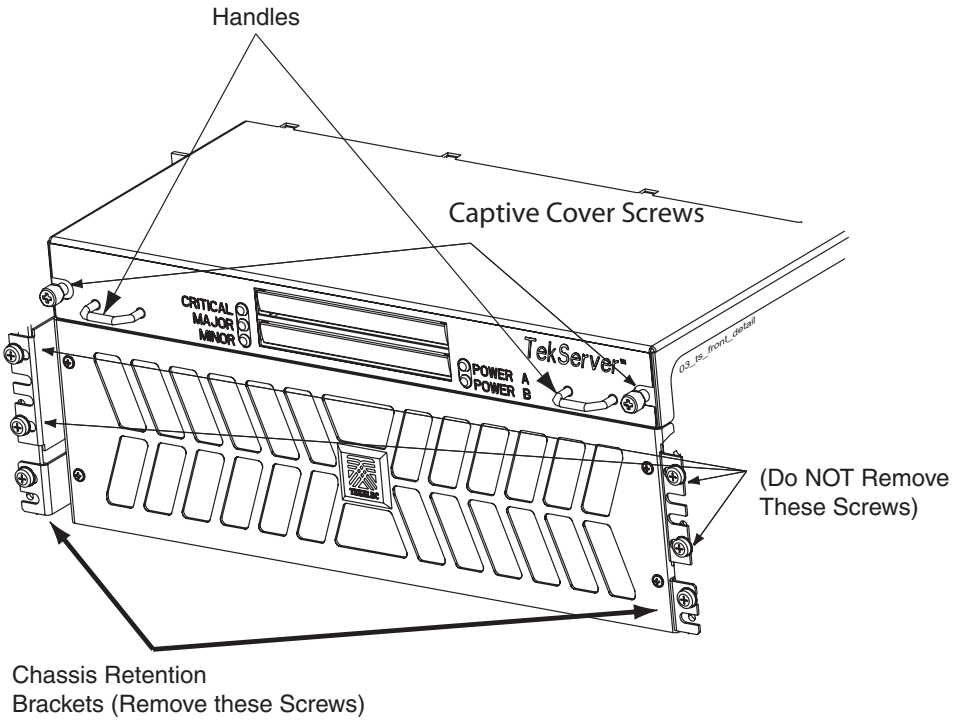
Figure 7-5. Tekelec 1000 Chassis Rear View



NOTE: For clarity, the Tekelec 1000 chassis is shown without any PCI cards installed.

6. From the front of the frame, remove the # 12-24 Phillips screw from each of the chassis retention brackets (see Figure 7-6). Do not remove the screws in the frame adapter brackets.

Figure 7-6. Chassis Retention Hardware



7. From the front of the frame, using the handles on the front top cover of the chassis, pull the Tekelec 1000 chassis forward until the release buttons on the inner arms of the slide assemblies pop into the holes on each side.

DANGER: Moving a Tekelec 1000 chassis requires two people. Each Tekelec 1000 chassis weighs approximately 25 kg (55 lbs) and may cause personnel injury or damage to the internal components due to shock and vibration if not handled properly.

8. Simultaneously depress the chassis release buttons on each side and slowly pull the chassis forward until the chassis and attached inner slide members are completely free of the slide assemblies. See Figure 7-4 on page 7-15 for locations of the release buttons.

9. Place the chassis on a grounded bench and attach the ground wrist strap to the bench.

10. This procedure is complete.

Continue with one of the following procedures:

- If the chassis has been removed from the frame to a workbench in order to replace one of the following FRUs, go the procedure shown:
  - — Procedure 7-10, “Replace a Fan Assembly,” on page 7-23
  - — Procedure 7-11, “Replace a Hard Disk Drive Assembly,” on page 7-27
  - — Procedure 7-12, “Replace a Removable Media Disk Drive Assembly,” on page 7-36
  - — Procedure 7-13, “Replace a PCI Card,” on page 7-40
- If the Tekelec 1000 chassis is being replaced, but the hard drives and/or the PCI cards from the failed chassis are to be used in the replacement chassis, go to:
  - — Procedure 7-14, “Replace a Tekelec 1000 Chassis FRU,” on page 7-46
  - — Then go to either of both of the following procedures:
    - –Procedure 7-11, “Replace a Hard Disk Drive Assembly,” on page 7-27
    - –Procedure 7-13, “Replace a PCI Card,” on page 7-40
- If the Tekelec 1000 chassis is being replaced, and it was ordered with replacements for the hard drives and PCI cards, go to Procedure 7-14, “Replace a Tekelec 1000 Chassis FRU,” on page 7-46.

When these procedures have been finished, return the chassis to the frame, using Procedure 7-8, “Return a Tekelec 1000 Chassis to the Frame,” on page 7-18.

How to Return a Tekelec 1000 Chassis to the Frame

Perform the procedure in this section when it is time to return the Tekelec 1000 chassis to the frame for one of the following reasons:

- A Tekelec 1000 chassis FRU is being replaced and the following procedures have been performed:
  - — Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13
  - — Procedure 7-14, "Replace a Tekelec 1000 Chassis FRU," on page 7-46. One of the following procedures may also have been performed:
    - –Procedure 7-11, "Replace a Hard Disk Drive Assembly," on page 7-27
    - –Procedure 7-13, "Replace a PCI Card," on page 7-40
- An internal FRU is being replaced and the following procedures have been performed:
  - — Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13
  - — One or more of the following procedures:
    - –Procedure 7-10, "Replace a Fan Assembly," on page 7-23
    - –Procedure 7-11, "Replace a Hard Disk Drive Assembly," on page 7-27
    - –Procedure 7-12, "Replace a Removable Media Disk Drive Assembly," on page 7-36
    - –Procedure 7-13, "Replace a PCI Card," on page 7-40

Procedure 7-8. Return a Tekelec 1000 Chassis to the Frame

1. Ensure that the circuit breakers that will be connected to the replaced Tekelec 1000 chassis are still turned OFF.

To locate the circuit breakers supplying power to the Tekelec 1000 chassis, refer to the system interconnect diagram for the system type and/or read the labels on the breakers. To access the circuit breakers on some frames, it may be necessary to remove the plastic covers on the front of the breakers. If the covers are removed, to maintain NEBS compliance, make sure they are replaced when the FRU replacement has been completed.

WARNING: A Tekelec 1000 chassis is redundantly powered from both A and B -48 VDC buses. Ensure that both the circuit breaker supplying A power to a chassis and the circuit breaker supplying B power to a Tekelec 1000 chassis are turned OFF by measuring the voltage with a VOM on the cable that connects the Tekelec 1000 chassis to its breakers. Both A and B power LEDs on the front panel of the Tekelec 1000 chassis should be OFF.

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

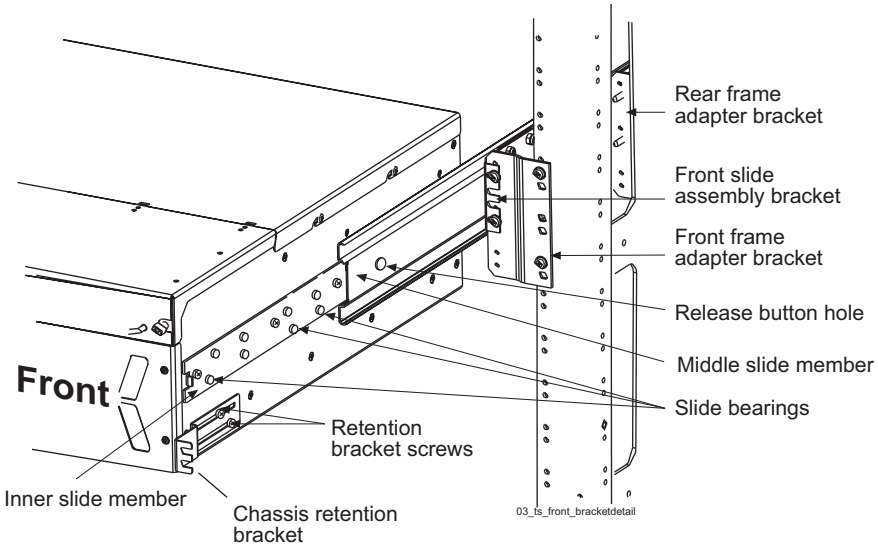
2. Remove the front door and any plastic panels from the rear of the frame.

3. From the front of the frame, extend the slide assemblies approximately 10 to 14 inches until the detent latches on the rear of the slides engage.

DANGER: Moving a Tekelec 1000 chassis requires two people. Each Tekelec 1000 chassis weighs approximately 25 kg (55 lbs) and may cause personnel injury or damage to the internal components due to shock and vibration if not handled properly.

4. Lift the Tekelec 1000 chassis and carefully insert the inner slide members into the middle slide members in the frame. See Figure 7-7.

Figure 7-7. Right Slide Assembly Mounting and Retention Bracket

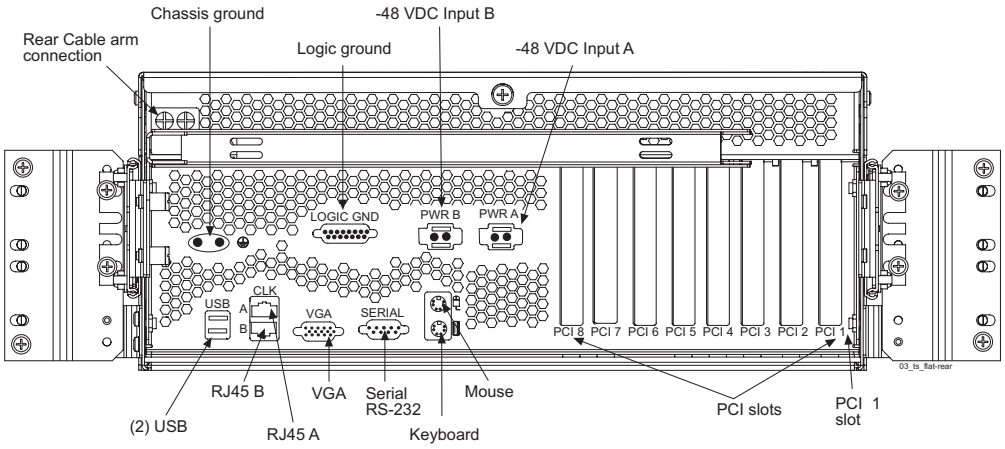


5. Push the Tekelec 1000 chassis toward the frame. When the buttons encounter the middle slide members, simultaneously press the release buttons on the inner slide members on both the left and right sides.

NOTE: The inner slide members will continue to travel until the release buttons pop into the round holes of the middle slide members.

6. At the rear of the frame, do one of the following:
   - For Rear Cable Management Arm Systems, attach the cable management arm to the chassis using the captive knurled fasteners. See Figure 7-8 for location of the cable management screw holes on the rear of the chassis.
   - For Side Cable Management Arm Systems attach the side cable management arms to the rear of the frame above the rails using the bolts provided (see Figure 5-9 on page 5-12).

Figure 7-8. Tekelec 1000 Chassis Rear View



7. Route and connect the power and data cables through the cable management system to the Tekelec 1000 chassis. Check the labels on the cables and attach them to the appropriate connectors on the rear of the Tekelec 1000 chassis. Consult the cable running list, labels on the cables, and PCI configuration labels on the right of the chassis as seen from the rear. See Figure 7-8.

8. Loosen the screws that attach the chassis retention brackets to the Tekelec 1000 chassis. The chassis retention brackets are adjusted in step 11. See Figure 7-7 on page 7-19 for screw locations.

9. From the front of the frame, simultaneously press the round release buttons and slowly push the chassis into the frame while observing the cables to avoid binding or stretching.

NOTE: When the chassis stops moving, the front of the Tekelec 1000 should be slightly recessed to allow clearance of the handles behind the frame door when closed.

10. Adjust the chassis retention brackets on the front of the Tekelec 1000 chassis to contact the frame adapter brackets when the chassis is positioned correctly in the frame.

11. Tighten the screws that attach the chassis retention brackets to the Tekelec 1000 chassis.

12. Secure the chassis with one # 12-24 screw in the chassis retention brackets on each side.

13. Replace any plastic panels and doors that were removed.

14. This procedure is complete.

Next, turn the power back on as described in "How to Power Up" on page 6-14the application manual.

How to Replace Tekelec 1000 FRUs

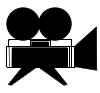
Use one of the following procedures in this section to replace a Tekelec 1000 FRU:

- Procedure 7-9, "Replace Air Filter," on page 7-22
- Procedure 7-10, "Replace a Fan Assembly," on page 7-23
- Procedure 7-11, "Replace a Hard Disk Drive Assembly," on page 7-27
- Procedure 7-12, "Replace a Removable Media Disk Drive Assembly," on page 7-36
- Procedure 7-13, "Replace a PCI Card," on page 7-40
- Procedure 7-14, "Replace a Tekelec 1000 Chassis FRU," on page 7-46

How to Replace an Air Filter

It is recommended that the air filter on the Tekelec 1000 chassis be replaced at least once a month. Before beginning this procedure, ensure that a spare filter is on hand. If the number of spare filters is running low, order additional filters.

NOTE: It is not necessary to slide out or remove the Tekelec 1000 chassis from its frame in order to replace the filter.



SHOW ME: To view a video (with sound) that shows some steps of the following procedure, click here. For personnel safety, be sure to read all the steps in the following procedure. For more information about how to view this video, see "Programs Needed to View Linked Documents" on page 1-4.

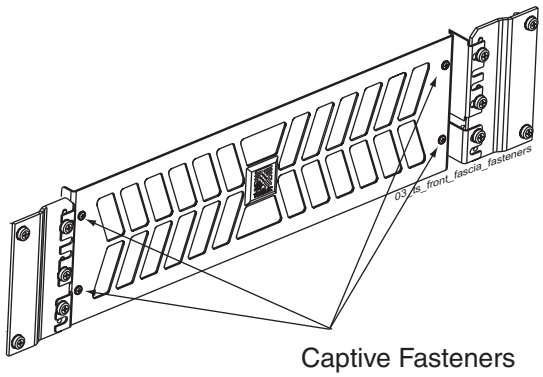
Procedure 7-9. Replace Air Filter

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

1. Using a Phillips screwdriver, remove the front fascia of the Tekelec 1000 chassis by loosening the four spring-loaded captive 1/4 turn screws. See Figure 7-9.

   NOTE: Fan filters can be removed from the chassis without turning off the power. A finger-safe perforated panel separates the moving fans from the filters. The Tekelec 1000 chassis does not have to be extended from the frame for this procedure.

   Figure 7-9. Tekelec 1000 Front Fascia Fasteners



2. Remove the old filter and discard.

3. Insert the new filter (P/N 551-0022-01).

   NOTE: The filter has an arrow to indicated direction of airflow. The arrow should point toward the rear of the chassis.

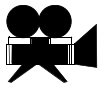
   NOTE: To orient the fascia when replacing, there is a label "TOP" that can be observed from the back of the fascia.

4. Using a Phillips screwdriver, replace the front fascia by tightening the four spring-loaded captive 1/4 turn screws.

5. This procedure is complete.

How to Replace a Fan Assembly

Perform the following procedure to replace a fan assembly. This procedure can be performed while the Tekelec 1000 chassis remains powered.



SHOW ME: To view a video (with sound) that shows some steps of the following procedure, click here. For personnel safety and to protect equipment and data, be sure to read all the steps in the following procedure. For more information about how to view this video, see "Programs Needed to View Linked Documents" on page 1-4.

Procedure 7-10. Replace a Fan Assembly

1. Ensure that the following have been done:
   a. An RMA has been obtained (see Procedure B-1, "Obtaining an RMA," on page B-2); for information about the part number to be supplied, see "Fan Assembly Part Number Information" on page B-3.
   b. A spare part is available

WARNING: The Tekelec 1000 chassis performance requires both fan assemblies be installed and operational for optimum performance. The procedure in this section can be done while the chassis remains powered. The Tekelec 1000 chassis can operate with one fan assembly for brief periods. Perform ALL of this procedure without delay. If the replacement fan assembly is not available, DO NOT begin this procedure.

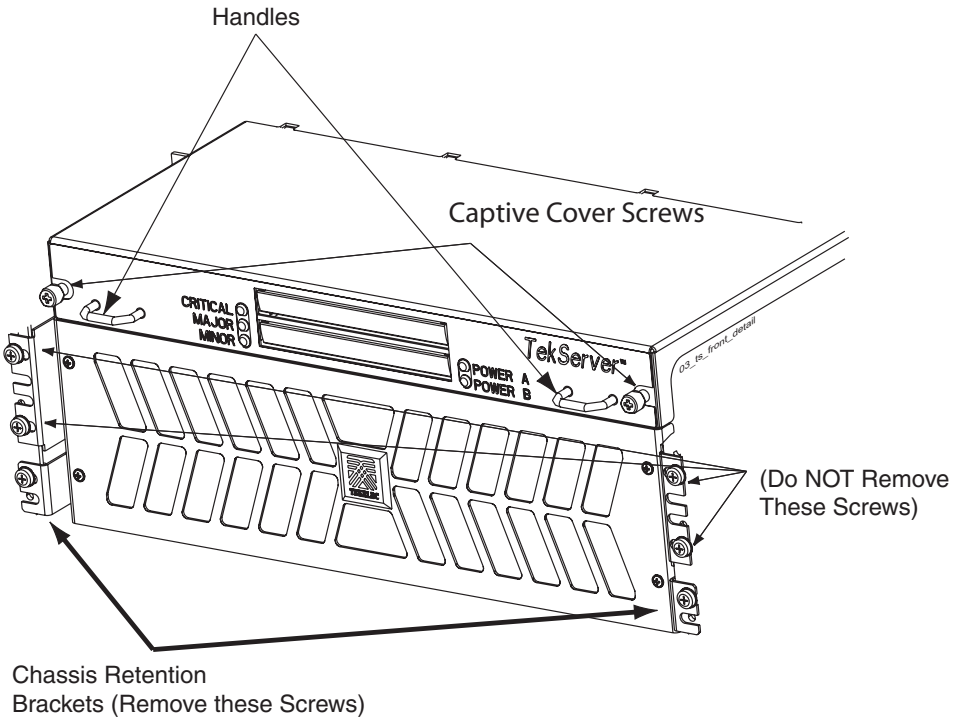
2. Prepare the Tekelec 1000 chassis for access to the FRU using one of the following procedures:

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

   - Procedure 7-5, "Slide Tekelec 1000 Chassis Out from Frame," on page 7-11
   - Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13 (do not use this procedure when the fan assembly is replaced while the chassis remains powered)

3. Using a Phillips screwdriver, loosen the captive spring-loaded screws on the Tekelec 1000 chassis top cover until they are free. See Figure 7-12 for locations.

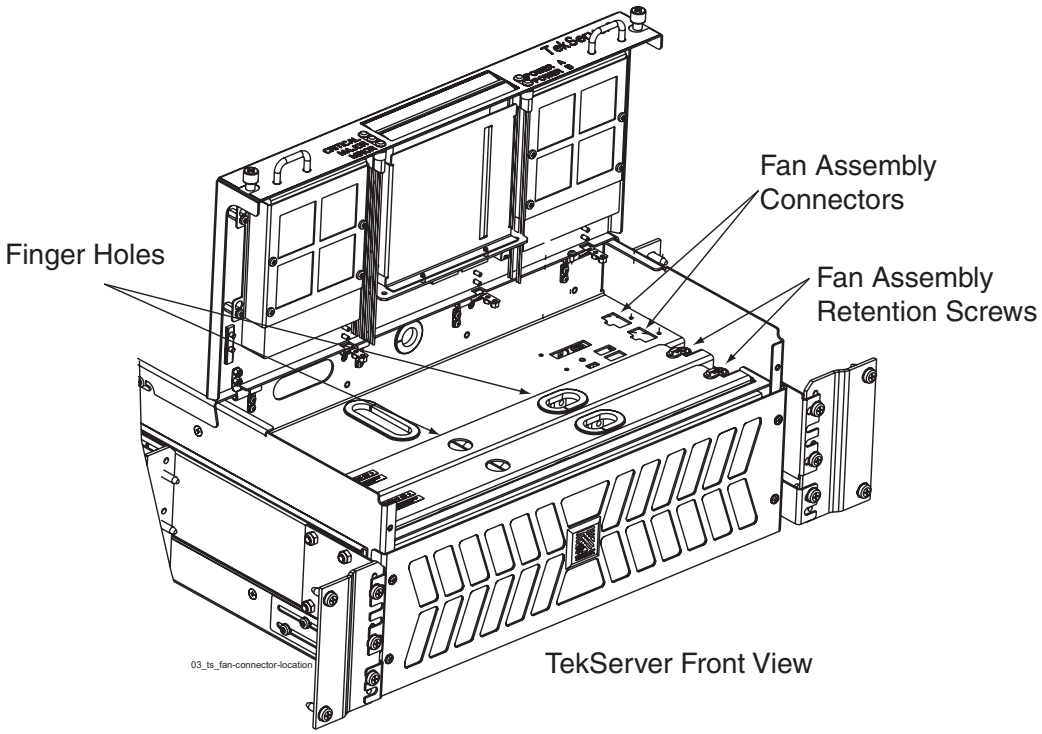
Figure 7-10. Tekelec 1000 Front Top Cover



4. Grasp the handles on the front top cover of the chassis and lift up until the constant torque hinges support the weight of the cover and the four attached disk drives located under the cover.

5. Disconnect the fan assembly cable of the fan to be removed from the connector on the midplane board. Components used in the following steps are shown in Figure 7-11.

Figure 7-11. Fan Assemblies and Connectors



6. Loosen the captive fan assembly retention screws on both ends of the fan assembly. See Figure 7-11.

DANGER: After disconnecting the fan assembly cable and before removing the fan assembly, allow sufficient time (about three minutes) for the fans to quit rotating. Fans will continue to rotate after this interval because of the airflow from the other fan assembly. The continued rotation will not cause injury.

7. Insert fingers into the finger holes on top of each fan assembly and lift the fan assembly up and out of the chassis.

8. Set the fan assembly aside.

9. Lower the new fan assembly inserting the guide edges into the chassis fan guides (black).

10. Using a Phillips screwdriver tighten the captive fan retention screws on both ends of the assembly.

11. Plug the fan assembly cable into the connector on the midplane board.

12. Close the chassis top cover.

13. Tighten the captive screws to secure the top cover.

14. Depending on how the fan assembly was accessed in step 2, return the Tekelec 1000 chassis to its original position using one of the following procedures:

- Procedure 7-6, "Slide Tekelec 1000 Chassis Back into Frame," on page 7-12
- Procedure 7-8, "Return a Tekelec 1000 Chassis to the Frame," on page 7-18

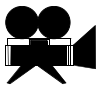
15. If requested, return the failed fan assembly to Tekelec. Arrange the return shipment by using the procedures in "How to Arrange Return Shipping" on page B-21.

16. This procedure is complete.

How to Replace Hard Disk Drive Assemblies

Use the procedure in this section for either of the following purposes:

- To replace a failed hard disk drive
- To remove both hard disk drive assemblies from a failed Tekelec 1000 chassis and place them in a replacement Tekelec 1000 chassis



SHOW ME: To view a video (with sound) that shows some steps of the following procedure, click here. For personnel safety and to protect equipment and data, be sure to read all the steps in the following procedure. For more information about how to view this video, see "Programs Needed to View Linked Documents" on page 1-4.

Procedure 7-11. Replace a Hard Disk Drive Assembly

1. Do one of the following:
   - If this procedure is being performed to move hard disk drive assemblies from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, skip to the next step.
   - If this procedure is being performed to replace a failed hard disk drive, ensure that the following have been done:
     — An RMA has been obtained (see Procedure B-1, "Obtaining an RMA," on page B-2); for information about part number information to be supplied, see "Hard Disk Drive Assembly Part Number Information" on page B-9.
     —A spare hard disk drive assembly is available. Ensure that the contents in the shipping container are complete; notify the site supervisor or Tekelec Technical Services of any discrepancies. In particular, verify that the contents include:
       – A part number label on the replacement hard disk drive assembly
       – "A" and "C" labels to be attached to the replacement hard disk drive assembly (see step 13 on page 7-32)
       – A label to attach to the base unit/hard disk label at the front of the left side of the Tekelec 1000 chassis (see step 21 on page 7-35)

WARNING: This procedure CANNOT be performed while the Tekelec 1000 chassis is powered on. Never power OFF a Tekelec 1000 chassis until the application software and platform operating system (OS) are shut down. If possible, use the procedures in the application manual for a "soft shutdown." If the application interface is not operating or is not accessible, a hard shutdown (turning OFF the breakers) is sometimes required. Contact Tekelec Technical Services before doing a hard shutdown.

2. Refer to the application manual to perform any procedures recommended to limit data loss or corruption. For example, the application manual may require:
   - Data mirroring before replacing a failed hard disk drive
   - Application shutdown before powering off a Tekelec 1000 chassis

3. Turn OFF the circuit breakers that supply power to the Tekelec 1000 chassis containing the hard disk drive assembly to be removed.

   To locate the circuit breakers supplying power to the Tekelec 1000 chassis, refer to the system interconnect diagram for the system type and/or read the labels on the breakers. To access the circuit breakers on some frames, it may be

necessary to remove the plastic covers on the front of the breakers. If the covers are removed, to maintain NEBS compliance, make sure they are replaced when the FRU replacement has been completed.

WARNING: A Tekelec 1000 chassis is redundantly powered from both A and B -48 VDC buses. Ensure that both the circuit breaker supplying A power to a chassis and the circuit breaker supplying B power to a Tekelec 1000 chassis are turned OFF by measuring the voltage with a VOM on the cable that connects the Tekelec 1000 chassis to its breakers. Both A and B power LEDs on the front panel of the Tekelec 1000 chassis should be OFF.

4. Prepare the Tekelec 1000 chassis for access to the FRU using one of the following procedures:

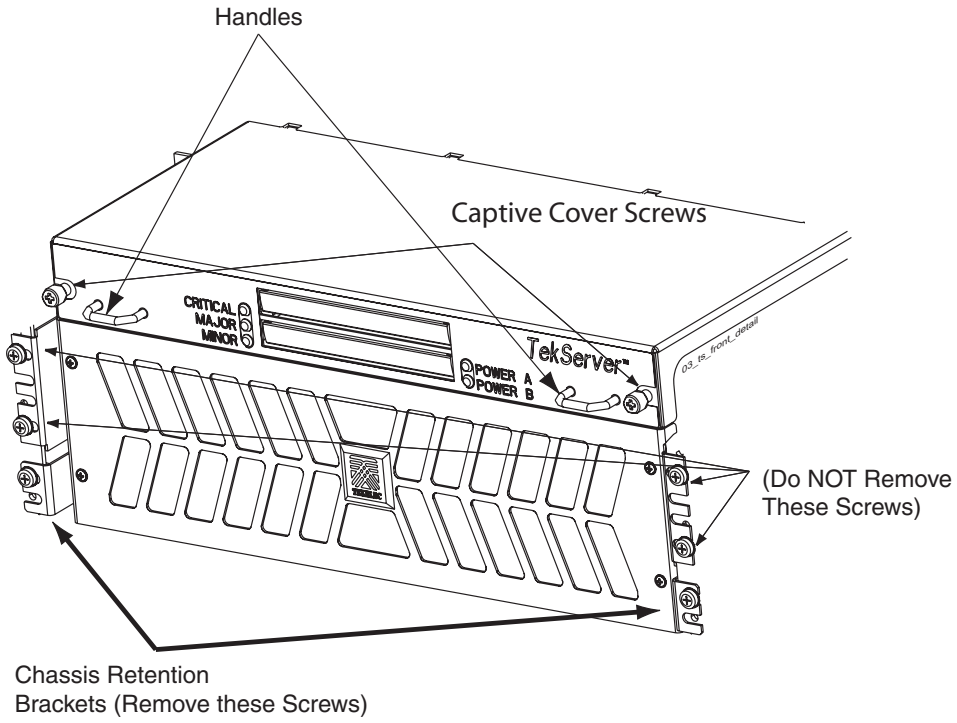
WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

- Procedure 7-5, "Slide Tekelec 1000 Chassis Out from Frame," on page 7-11
- Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13

NOTE: If this procedure is being performed to move hard disk drives from a failed Tekelec 1000 chassis to a replacement Tekelec 1000 chassis, Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13 is recommended.

5. Using a Phillips screwdriver, loosen the captive spring-loaded screws on the Tekelec 1000 chassis top cover until they are free. See Figure 7-12 for locations.

Figure 7-12. Tekelec 1000 Front Top Cover



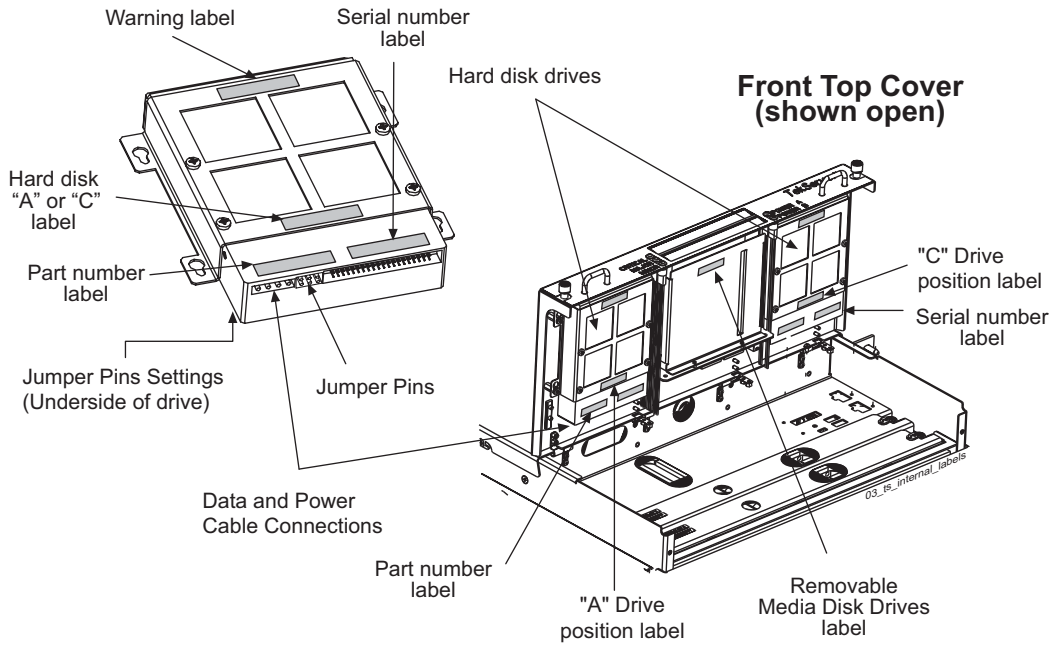
6. Grasp the handles on the front top cover of the chassis and lift up until the constant torque hinges support the weight of the cover and the four attached disk drives located under the cover.

7. Do one of the following:
   - If this procedure is being performed to replace a failed hard disk drive, skip to the next step.
   - If this procedure is being performed to move hard disk drive assemblies from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, note the position of the hard disk drive assembly that is about to be removed. The brackets on which the hard disk drives are mounted have position location labels. From the front of the chassis, the "A" drive is on the left and the "C" drive is on the right. It is recommended that this entire procedure be performed to remove the "A" hard disk drive assembly from the failed Tekelec 1000 chassis and replace it into the "A" position in the replacement chassis, and then the procedure be repeated to remove the "C" hard disk drive assembly from the failed chassis and replace it into the "C" position of the replacement chassis.

WARNING: When replacing both drives in a failed Tekelec 1000 chassis always place the drives in the locations they were removed from. Failure to replace the drives in the correct locations will cause data corruption and render the unit inoperable.

8. Disconnect the flat data cable and power cable from rear of the hard disk drive. See Figure 7-13 for drive locations and cable connections.

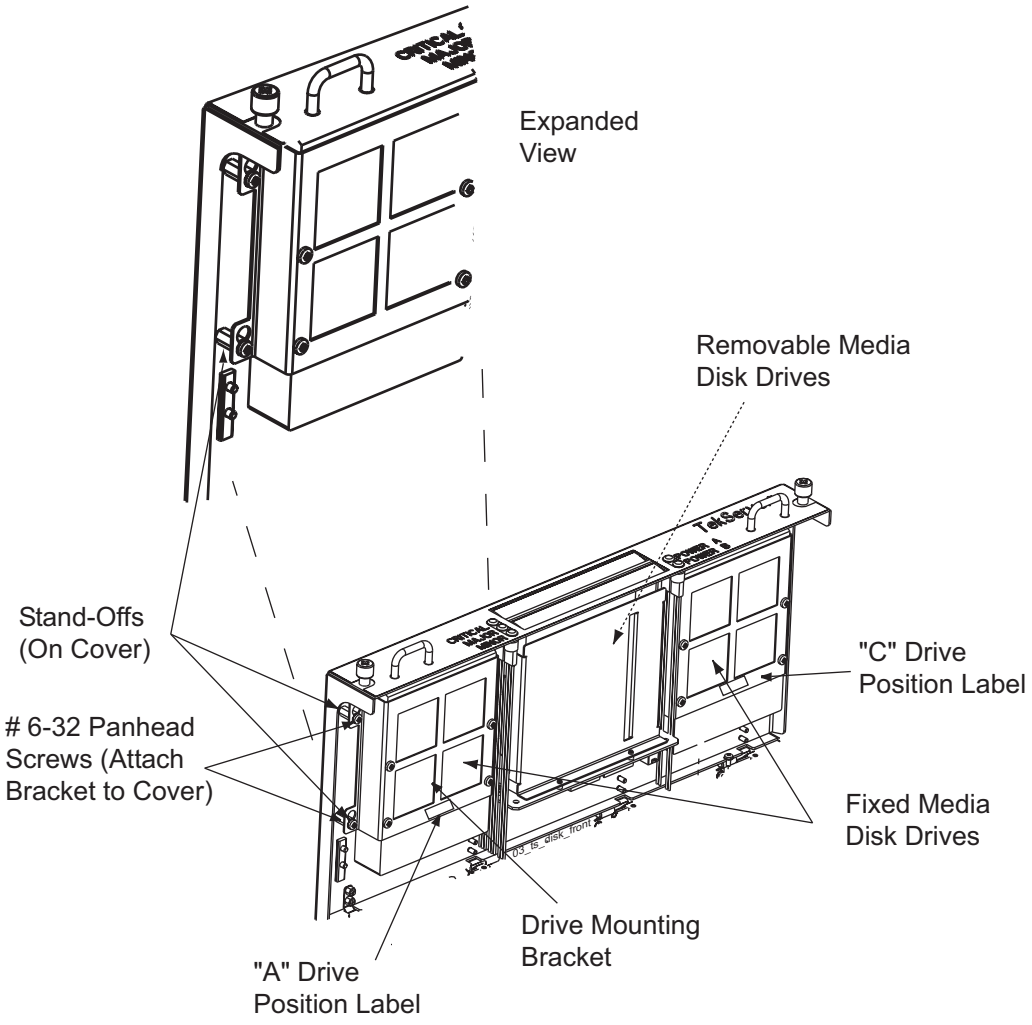
Figure 7-13. Chassis Front View Top Cover Open



9. Loosen, but do not remove, the four # 6-32 pan-head screws that attach the hard disk drive assembly mounting bracket to the stand-offs on the bottom of the front top cover. See Figure 7-14.

NOTE: The drive mounting brackets have four keyhole slots to allow removal of the brackets with the attached hard disk drive assemblies without completely removing the screws from the stand-offs in the cover.

Figure 7-14. Front Cover With Drive Mounting Brackets



10. Slide the drive mounting bracket with attached hard disk drive down until the # 6-32 screws in the stand-offs can slip though the larger holes in the keyhole slots.

11. Remove the hard disk drive with attached mounting bracket and store in an approved ESD package or place on a grounded bench.

NOTE: DO NOT remove the drive from the drive mounting bracket. The mounting bracket is part of the drive assembly. A replacement drive is shipped with the bracket. A replacement Tekelec 1000 chassis is not shipped with drive brackets installed.

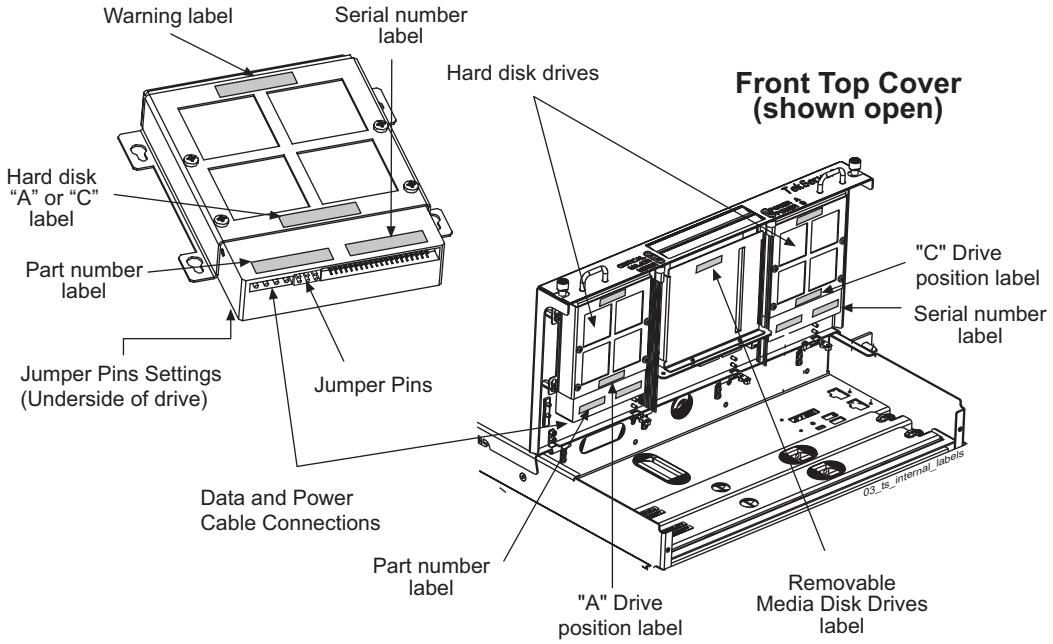
12. Inspect the four # 6-32 pan-head screws inserted in the cover standoffs for enough clearance (approximately 1/4 inch) to slide the disk mounting bracket over the large keyholes slots in the bracket. Add any missing screws or loosen screws if necessary. See Figure 7-14.

---

13. Do one of the following:

- If this procedure is being performed to replace a failed hard disk drive, do both of the following:
  - — Note the position label attached to the failed hard disk drive assembly. Select the matching label (“A” or “C”) from the contents of the shipping container in which the replacement hard disk drive assembly was received, and apply it to the bracket holding the hard disk drive. Figure 7-14 shows where the labels should be applied.
  - — Ensure that the jumper settings of the replacement hard disk drive match the jumper settings of the failed hard disk drive. For example, if the failed hard disk drive jumper settings are set to Master, ensure that the replacement hard disk drive jumper settings are also set to Master. Jumper settings may differ for different manufacturers. Figure 7-15 shows where the jumper pins are located and where the jumper settings are shown.

Figure 7-15. Hard Disk Drive Jumper Pins and Settings



- If this procedure is being performed to move hard disk drive assemblies from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, locate the part numbers on each of the hard disk drive assemblies (see Figure 7-15).

  Ensure that the part numbers on hard disk drive assemblies to be moved match the part numbers for both the A and C positions on the base unit/hard disk label on the front of the left side of the replacement Tekelec 1000 chassis (see Figure 7-16 and Figure 7-17). If the part numbers do not match, contact Tekelec Technical Services.

Figure 7-16. Tekelec 1000 Chassis Label Locations

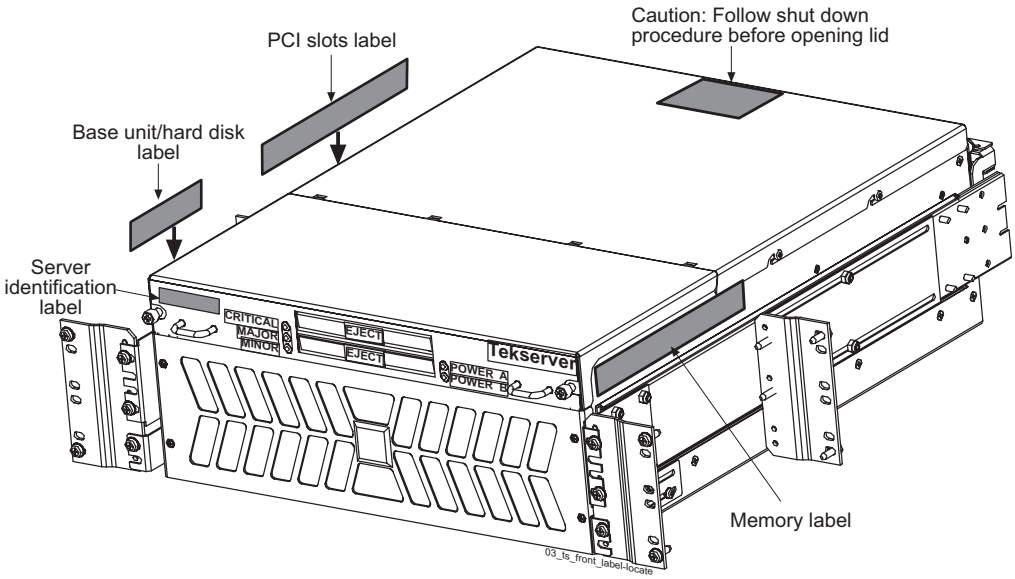
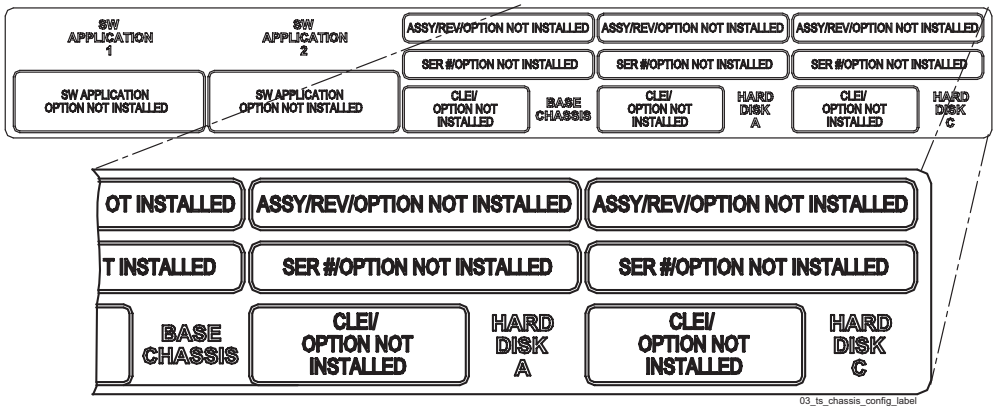


Figure 7-17. Hard Disk Drive Label on Tekelec 1000 Chassis



WARNING: When replacing both drives in a failed Tekelec 1000 chassis always place the drives in the locations they were removed from. Failure to replace the drives in the correct locations will cause data corruption and render the unit inoperable.

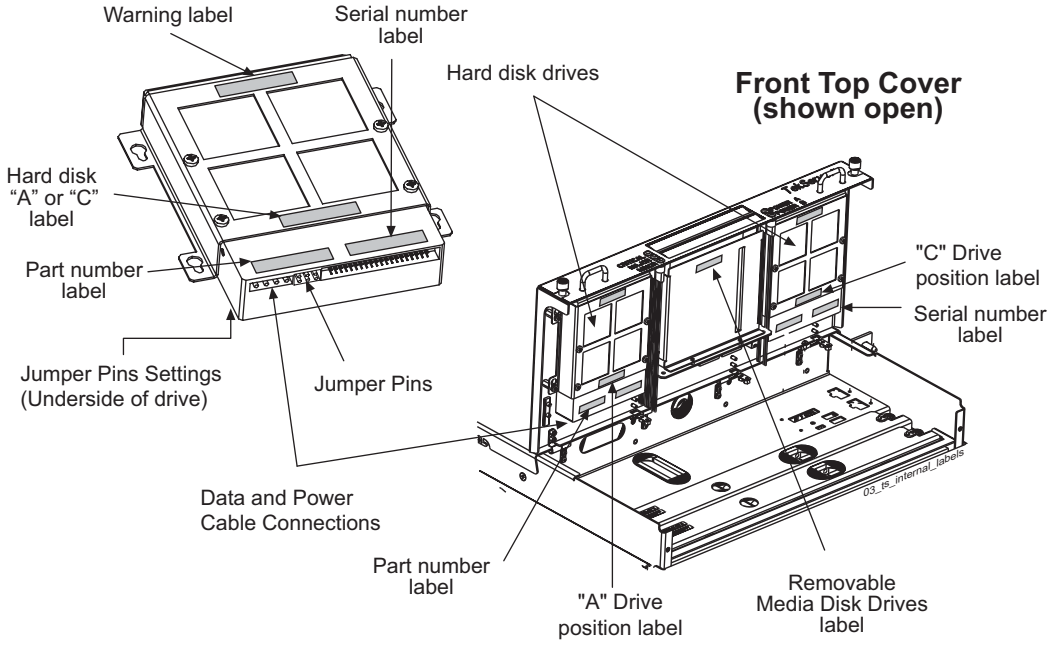
14. Place the hard disk drive and mounting bracket with the large sections of the keyholes slots over the # 4-32 pan-head screws in the cover standoffs. See Figure 7-14 for screw locations.

15. Slide the disk mounting bracket up until standoff screws are in the small sections of the keyhole slots.

16. Tighten the # 6-32 pan-head screws into the standoffs to secure the drive mounting bracket.

17. Attach the data and power cables on the back of the hard disk drive. See Figure 7-18 on page 7-34.

Figure 7-18. Hard Disk Drives



18. Do one of the following:

- If this procedure is being performed to replace a failed hard disk drive, skip to the next step.
- If this procedure is being performed to move hard disk drive assemblies from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, repeat step 7 through step 17 to move the other drive.

19. Close the chassis top cover.

20. Tighten the captive screws to secure the top cover.

21. Do one of the following:

- If this procedure is being performed to move hard disk drive assemblies from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, skip to the next step.
- If this procedure is being performed to replace a failed hard disk drive, do the following:
  - — Attach the label that was received with the replacement hard disk drive assembly on the base unit/hard disk label located on the front of the left side of the Tekelec 1000 chassis (for label placement, see Figure 7-16 on page 7-33).
  - — Return the failed hard disk drive assembly to Tekelec, using the shipping contained in which the replacement hard disk drive assembly was received. Arrange the return shipment by using the procedures described in “How to Arrange Return Shipping” on page B-21.

22. Depending on how the hard disk drive assembly was accessed in step 4, return the Tekelec 1000 chassis to its original position using one of the following procedures:

- Procedure 7-6, “Slide Tekelec 1000 Chassis Back into Frame,” on page 7-12
- Procedure 7-8, “Return a Tekelec 1000 Chassis to the Frame,” on page 7-18

23. Refer to applications documentation to determine whether additional steps are required.

24. This procedure is complete.

How to Replace Removable Media Disk Drives

Use the procedure in this section to replace the assembly that contains two removable media disk drives (also called CDRW/DVD drives). This assembly is located on the underside of the front top cover.

Procedure 7-12. Replace a Removable Media Disk Drive Assembly

1. Ensure that the following have been done:
   - An RMA has been obtained (see Procedure B-1, "Obtaining an RMA," on page B-2)
   - A spare removable media disk drive assembly is available. Inspect the replacement unit and its shipping container for indications of damage. If damage is noted, contact the site supervisor or report damage to the carrier. Ensure that the contents in the shipping container are complete; notify the site supervisor or Tekelec Technical Services of any discrepancies.

   NOTE: Tekelec 1000 removable media drives and adapter are considered one FRU. Remove and replace the entire adapter assembly including both removable media drives.

WARNING: This procedure CANNOT be performed while the Tekelec 1000 chassis is powered on. Never power OFF a Tekelec 1000 chassis until the application software and platform operating system (OS) are shut down. If possible, use the procedures in the application manual for a "soft shutdown." If the application interface is not operating or is not accessible, a hard shutdown (turning OFF the breakers) is sometimes required. Contact Tekelec Technical Services before doing a hard shutdown.

2. Turn OFF the circuit breakers that supply power to the Tekelec 1000 chassis containing the removable media disk drive assembly to be removed.

   To locate the circuit breakers supplying power to the Tekelec 1000 chassis, refer to the system interconnect diagram for the system type and/or read the labels on the breakers. To access the circuit breakers on some frames, it may be necessary to remove the plastic covers on the front of the breakers. If the covers are removed, to maintain NEBS compliance, make sure they are replaced when the FRU replacement has been completed.

WARNING: A Tekelec 1000 chassis is redundantly powered from both A and B -48 VDC buses. Ensure that both the circuit breaker supplying A power to a chassis and the circuit breaker supplying B power to a Tekelec 1000 chassis are turned OFF by measuring the voltage with a VOM on the cable that connects the Tekelec 1000 chassis to its breakers. Both A and B power LEDs on the front panel of the Tekelec 1000 chassis should be OFF.

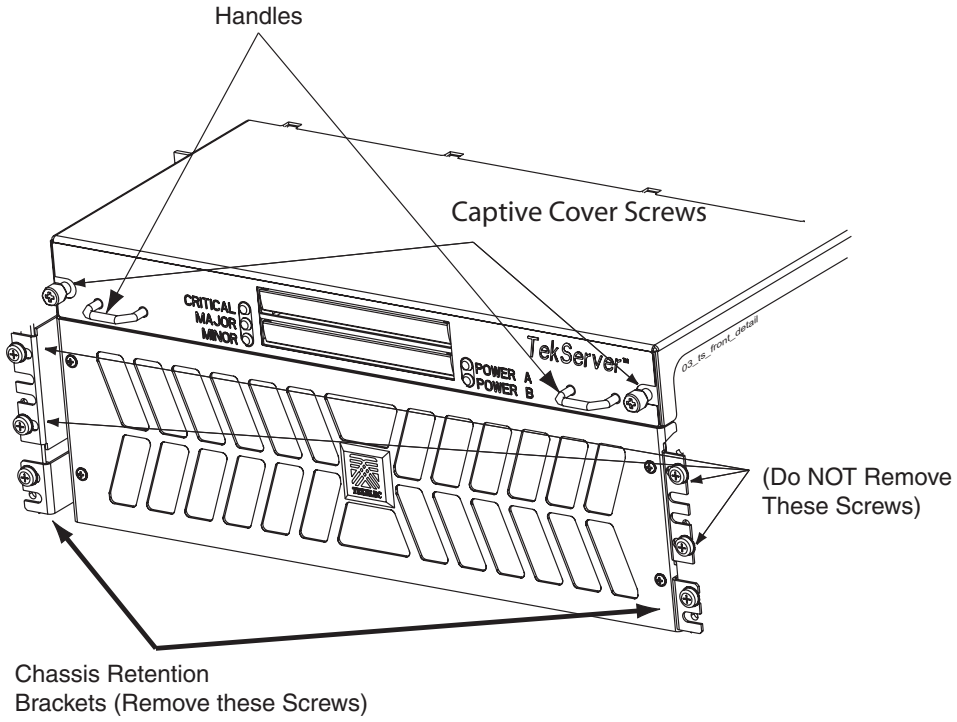
3. Prepare the Tekelec 1000 chassis for access to the FRU using one of the following procedures:

   WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

   - Procedure 7-5, "Slide Tekelec 1000 Chassis Out from Frame," on page 7-11
   - Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13

4. Using a Phillips screwdriver, loosen the captive spring-loaded screws on the Tekelec 1000 chassis top cover until they are free. See Figure 7-12 for locations.

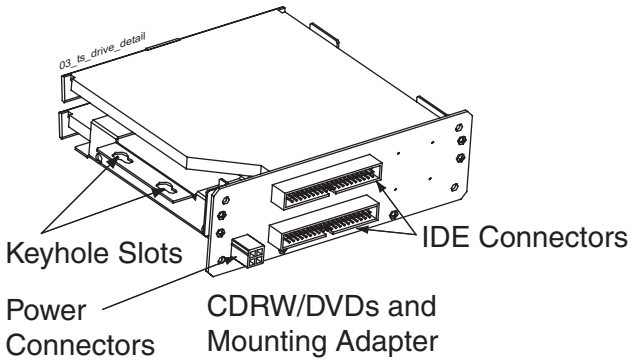
   Figure 7-19. Tekelec 1000 Front Top Cover



5. Grasp the handles on the front top cover of the chassis and lift up until the constant torque hinges support the weight of the cover and the four attached disk drives located under the cover.

6. Unplug the two flat 40-position IDE data cables and the single power cable from the drive adapter board. With a permanent marker, mark the IDE cable that is attached to the top IDE connector on the board. See Figure 7-20.

Figure 7-20. Removable Media Disk Drive Adapter Assembly



NOTE: Tekelec 1000 removable media drives and adapter are considered one FRU. Remove and replace the entire adapter assembly including both removable media drives.

7. Using the #1 Phillips screwdriver, loosen but do not remove the four 6-32 pan head screws that connect the slimline CDRW/DVD drive adapter assembly to the standoffs on the front lid.

8. Move the slimline CDRW/DVD drive adapter assembly down toward the chassis until the screws loosened in step 7 can slide through the larger openings in the keyhole slots.

9. Place the CDRW/DVD drive adapter assembly in an ESD container. If requested return the drive to Tekelec using the procedures described in Appendix B, "Hardware Repair and Return."

10. Place the disk mounting bracket with the large sections of the keyholes slots over the # 6-32 screws in the cover standoffs. (These screws were loosened in step 7.)

11. Slide the disk mounting bracket up until standoff screws are in the small sections of the keyhole slots.

12. Tighten the # 6-32 pan-head screws into the standoffs to secure the drive mounting bracket.

13. Attach the data and power cables on the back of the removable media disk drives. See Figure 7-20.

    NOTE: The location of the top cable was marked in step 6 on page 7-37.

14. Close the chassis top cover.

15. Tighten the captive screws to secure the top cover.

16. Depending on how the removable media disk drive assembly was accessed in step 3, return the Tekelec 1000 chassis to its original position using one of the following procedures:

- Procedure 7-6, "Slide Tekelec 1000 Chassis Back into Frame," on page 7-12
- Procedure 7-8, "Return a Tekelec 1000 Chassis to the Frame," on page 7-18

17. This procedure is complete.

How to Replace PCI Cards

Use the procedure in this section for either of the following purposes:

- To replace a failed PCI card
- To remove PCI cards from a failed Tekelec 1000 chassis and place them in a replacement Tekelec 1000 chassis

Procedure 7-13. Replace a PCI Card

1. Do one of the following:

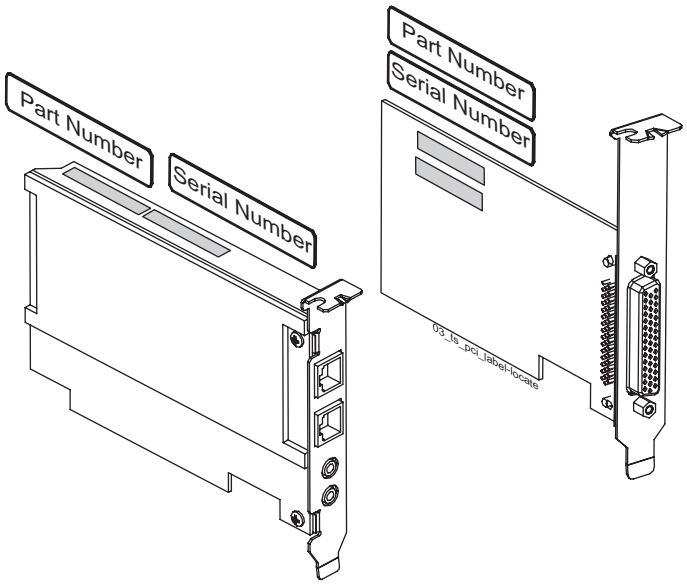
- If this procedure is being performed to move PCI cards from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, skip to the next step.
- If this procedure is being performed to replace a failed PCI card, ensure that the following have been done:

  — An RMA has been obtained (see Procedure B-1, "Obtaining an RMA," on page B-2)

  —A spare PCI card is available. Inspect the replacement card and shipping container for indications of damage. If damage is noted, contact the site supervisor or report damage to the carrier. Ensure that the contents in the shipping container are complete; notify the site supervisor or Tekelec Technical Services of any discrepancies. In particular, verify that the contents include:

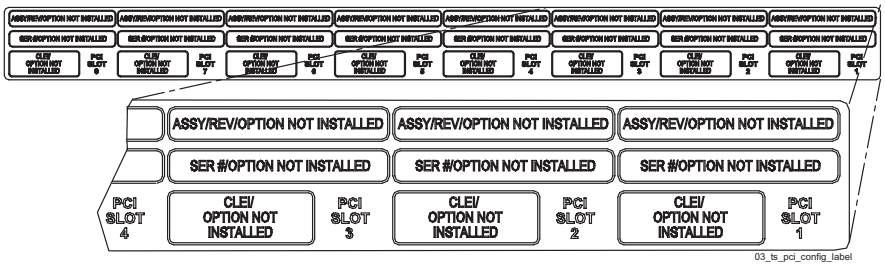
  – A part number label on the replacement PCI card (see Figure 7-21)

Figure 7-21. PCI Card Part Label



  – A label (see Figure 7-22) to attach to the PCI card label on the left side of the Tekelec 1000 chassis (see Figure B-7 on page B-9)

Figure 7-22. PCI Slots Label



WARNING: This procedure CANNOT be performed while the Tekelec 1000 chassis is powered on. Never power OFF a Tekelec 1000 chassis until the application software and platform operating system (OS) are shut down. If possible, use the procedures in the application manual for a "soft shutdown." If the application interface is not operating or is not accessible, a hard shutdown (turning OFF the breakers) is sometimes required. Contact Tekelec Technical Services before doing a hard shutdown.

2. Turn OFF the circuit breakers that supply power to the Tekelec 1000 chassis containing the PCI card to be removed.

   To locate the circuit breakers supplying power to the Tekelec 1000 chassis, refer to the system interconnect diagram for the system type and/or read the labels on the breakers. To access the circuit breakers on some frames, it may be necessary to remove the plastic covers on the front of the breakers. If the covers are removed, to maintain NEBS compliance, make sure they are replaced when the FRU replacement has been completed.

WARNING: A Tekelec 1000 chassis is redundantly powered from both A and B -48 VDC buses. Ensure that both the circuit breaker supplying A power to a chassis and the circuit breaker supplying B power to a Tekelec 1000 chassis are turned OFF by measuring the voltage with a VOM on the cable that connects the Tekelec 1000 chassis to its breakers. Both A and B power LEDs on the front panel of the Tekelec 1000 chassis should be OFF.

3. Prepare the Tekelec 1000 chassis for access to the FRU using one of the following procedures:

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

- Procedure 7-5, "Slide Tekelec 1000 Chassis Out from Frame," on page 7-11
- Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13

NOTE: If this procedure is being performed to move PCI cards from a failed Tekelec 1000 chassis to a replacement Tekelec 1000 chassis, Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13 is recommended.

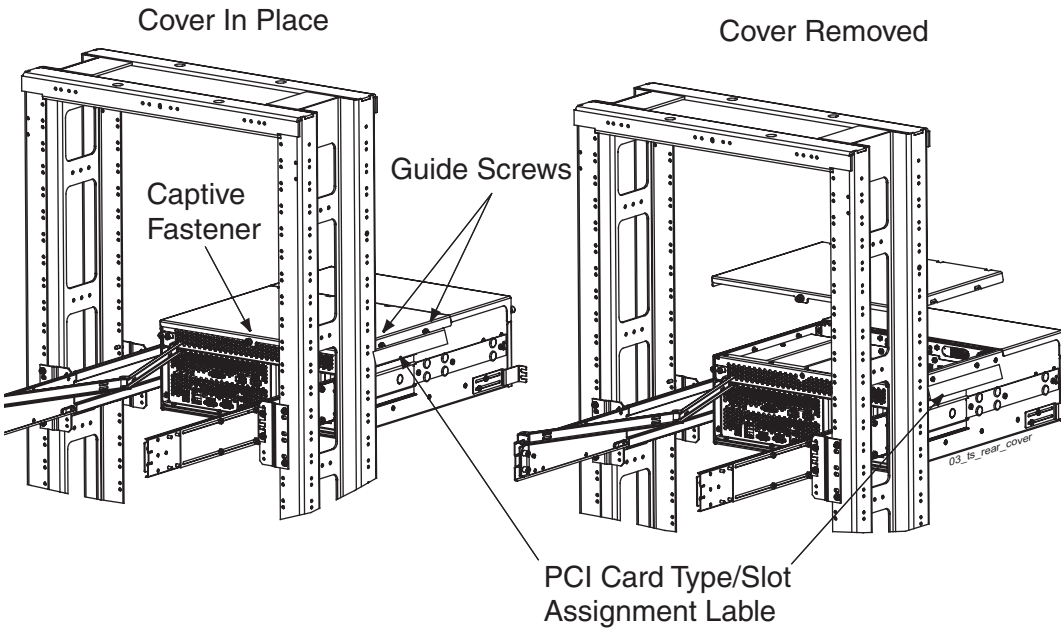
4. Determine the slot location of the PCI card to be removed using the Tekelec 1000 PCI slots label located on the left rear of the of the chassis. See Figure 7-23 on page 7-43.

   NOTE: Each Tekelec 1000 chassis has a unique PCI configuration label listing card types and slot arrangements.

5. From the rear of the frame remove any cables attached to the PCI card to be removed.

6. From the rear of the chassis remove the rear top cover.
   a. First loosen the four screws in the guide slots on both sides of the rear top cover.
   b. Unscrew the captive fastener at the rear of the cover until it releases.
   c. Pull the cover toward the rear until the screws are clear of the guide slots then lift up. See Figure 7-23.

Figure 7-23. Chassis Rear Cover Views.



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7. Using a #1 Phillips screwdriver remove the retention screw located at the top of the PCI faceplate.

NOTE: If a PCI card is being added, remove the PCI filler plate. When adding or removing cards apply the correct label to the PCI configuration label. Labels are shipped with PCI cards indicating card type and CLEI code.

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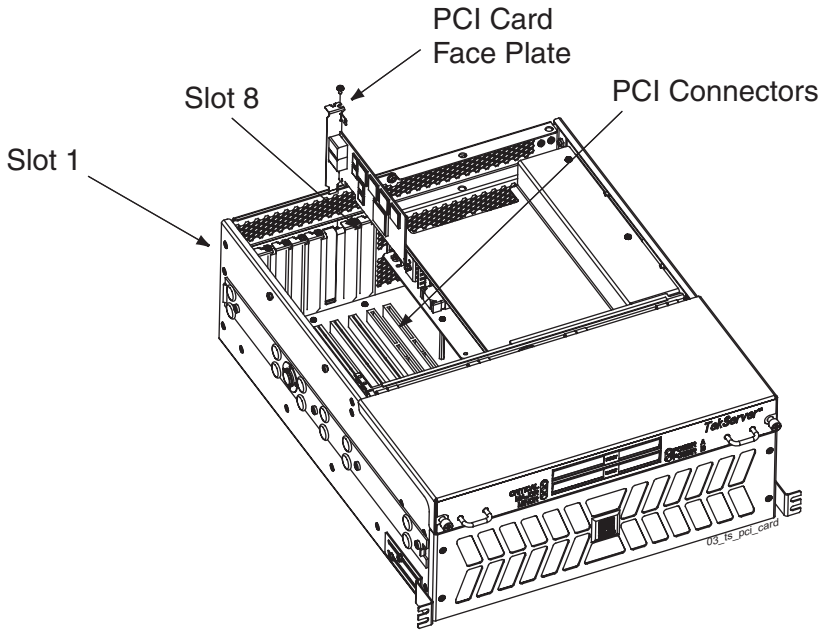
8. Remove the PCI card by grasping with both hands and lifting until the card is disconnected from the card connector. See Figure 7-24.

Figure 7-24. PCI Cards and Slot Assignments



9. Place the card in an approved ESD storage bag or container.

10. Store the card for later return or other disposition.

NOTE: If PCI cards are to be discarded they must be scrapped in accordance with accepted environmental recycling procedures.

11. Remove the replacement PCI card from the ESD container.

12. Inspect the replacement PCI card for damage and correct card type. Make sure the replacement card has the same information on the inventory label as the card that was removed. Card labels are located on the side of the card (see Figure 7-21 on page 7-40).

13. Insert the replacement PCI card into the correct card connector by grasping with both hands and pressing firmly down while maintaining alignment with the connector.

NOTE: When inserting full-length PCI cards align with the correct slot guide on the bulkhead toward the front of the chassis.

14. Using a #1 Phillips screwdriver replace the retention screw located at the top of the PCI faceplate.

15. From the rear of the frame attach the cable to the PCI card.

16. Do one of the following:

- If this procedure is being performed to replace a failed PCI card, skip to the next step.
- If this procedure is being performed to move PCI cards from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, repeat step 4 through step 15 for each PCI card to be moved.

17. Replace the rear cover on the Tekelec 1000 chassis. Slide the guide slots over and past the screws loosened in step 6 on page 7-42.

18. Tighten the four guide screws attaching the rear top cover to the Tekelec 1000 chassis.

19. Tighten the captive fastener at the rear of the cover.

20. Close the chassis top cover.

21. Tighten the captive screws to secure the top cover.

22. Do one of the following:

- If this procedure is being performed to move PCI cards from a failed Tekelec 1000 chassis to the replacement Tekelec 1000 chassis, skip to the next step.
- If this procedure is being performed to replace a failed PCI card, do the following:
  - — Attach the label that was received with the replacement PCI card on the appropriate section of the PCI card label located on the left side of the Tekelec 1000 chassis (for a diagram of the label, see Figure 7-22 on page 7-41; for placement of this label on the Tekelec 1000 chassis, see Figure B-7 on page B-9).
  - — Return the failed PCI card to Tekelec, using the shipping contained in which the replacement PCI card was received. Arrange the return shipment by using the procedures described in Appendix B, “Hardware Repair and Return.”

23. This procedure is complete.

How to Replace a Tekelec 1000 Chassis FRU

Replacing a Tekelec 1000 chassis requires that the slide assemblies be removed from the failed chassis and attached to the replacement chassis. A replacement chassis always contains fan assemblies and a removable media disk drive assembly. However, it does not contain replacement PCI cards or hard disk drives unless those parts are specified to be replaced when the Return Material Authorization (RMA) is obtained.

Usually, when a Tekelec 1000 chassis needs to be replaced, the PCI cards and hard disk drive assemblies are removed from the failed Tekelec 1000 chassis and placed in the replacement chassis. It is recommended that the slide assemblies be attached to the replacement chassis, using the procedure in this section, before moving the PCI cards and hard disk drive assemblies.

Use the following procedure when Tekelec Technical Services has determined that the Tekelec 1000 chassis needs to be replaced.

SHOW ME: To view a video (with sound) that shows some steps of the following procedure, click here. For personnel safety and to protect equipment and data, be sure to read all the steps in the following procedure. For more information about how to view this video, see "Programs Needed to View Linked Documents" on page 1-4.

Procedure 7-14. Replace a Tekelec 1000 Chassis FRU

1. Ensure that the following have been done:
   a. An RMA has been obtained (see Procedure B-1, "Obtaining an RMA," on page B-2); for information about the part numbers to be supplied, see "Tekelec 1000 Chassis Part Number Information" on page B-15.
   b. A spare part is available

2. Inspect the unit and shipping container for indications of damage. If damage is noted, contact the site supervisor or report damage to the carrier.

3. Inventory the material in the shipping container and notify the site supervisor or Tekelec Production Control of any discrepancies.

WARNING: Observe proper ESD procedures when handling the Tekelec 1000 chassis. Always wear an ESD wrist strap connected to a grounded bench or frame.

4. Unpack the Tekelec 1000 chassis from the shipping container and place the unit on a secure workbench that is grounded for ESD protection. Save the container and packing material for use in step 9.

WARNING: This procedure CANNOT be performed while the Tekelec 1000 chassis is powered on. Never power OFF a Tekelec 1000 chassis until the application software and platform operating system (OS) are shut down. If possible, use the procedures in the application manual for a "soft shutdown." If the application interface is not operating or is not accessible, a hard shutdown (turning OFF the breakers) is sometimes required. Contact Tekelec Technical Services before doing a hard shutdown.

5. Remove the failed Tekelec 1000 chassis from the frame using Procedure 7-7, "Remove a Tekelec 1000 Chassis from Frame," on page 7-13.

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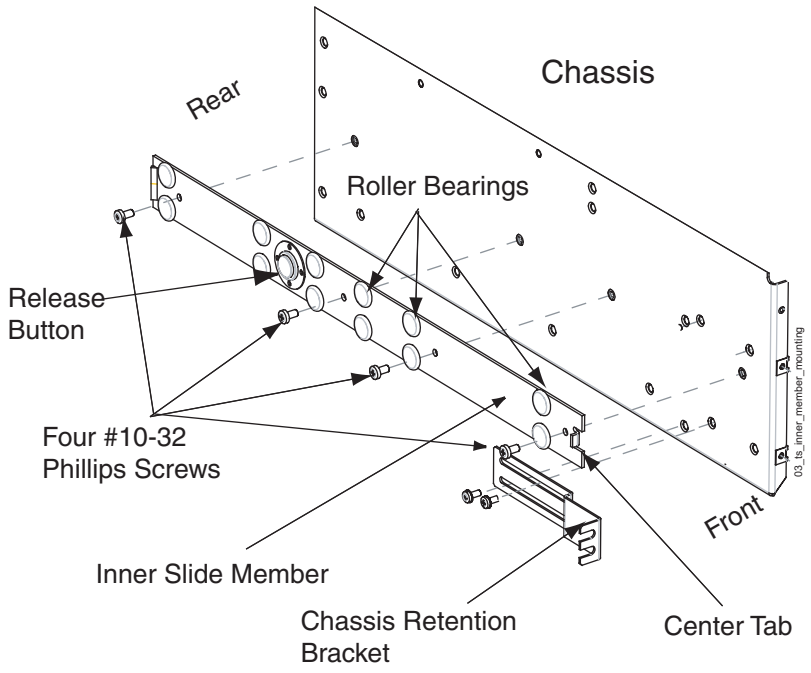
6. Using a Phillips screwdriver remove, the four # 10-32 screws that attach each inner slide member to the chassis and set the slide members aside.

   NOTE: Observe the orientation of the inner slide members with the roller bearings outward and the center tabs toward the front of the chassis. The inner slide members are attached to the replacement Tekelec 1000 chassis in step 7.

   Figure 7-25. Left Slide Member Mounting



7. Attach inner slide members on both sides of the replacement Tekelec 1000 chassis with four # 10-32 Phillips screws each. Orient the inner slide members with the roller bearings outward and the center tabs toward the front of the Tekelec 1000 chassis. See Figure 7-25.

8. If the hard disk drives and/or PCI cards from the failed Tekelec 1000 chassis need to be moved to the replacement chassis, perform either or both of the following procedures:
   - Procedure 7-11, "Replace a Hard Disk Drive Assembly," on page 7-27
   - Procedure 7-13, "Replace a PCI Card," on page 7-40

9. If requested, return the failed Tekelec 1000 chassis to Tekelec. Arrange the return shipment by using the procedures in Appendix B, "Hardware Repair and Return."

10. This procedure is complete.

Next, perform Procedure 7-8, "Return a Tekelec 1000 Chassis to the Frame," on page 7-18.

A

Tekelec 1000 AS Hardware Feature Information

Introduction

This appendix provides additional information about Tekelec 1000 AS hardware features.For an overview of Tekelec 1000 hardware features, see Chapter 3, "Tekelec 1000 AS Hardware System Overview."

Hardware Components

The Tekelec 1000 platform offers the following standard hardware components:

- Intel® E7501 chipset
- Dual Intel Pentium® 4 Xeon™ processors
- Redundant BIOS architecture
- 266-MHz DDR RAM, registered, with ECC and Chipkill(TM) support
- 533 megahertz (MHz) processor bus speed
- Light Emitting Diode (LED) diagnostic display
- Battery-backed real-time clock

- Hardware monitors that read and report:
  - — Supply, battery, and core voltages
  - — Fan speed inputs
  - — Ambient and processor temperatures
- E1/T1 composite clock signals
- Four devices for storage media (for example, hard disk drives and CD-RW/DVD ROMs) for internally supporting persistent storage

In addition, the Tekelec 1000 platform has a variety of internal and external interfaces, as described in "Interfaces" on page A-2.

Interfaces

The Tekelec 1000 platform includes interfaces for accommodating expansion, control and configuration, network connectivity, and peripheral support.

- Table A-1shows the basic interfaces supplied to all implementations that use the Tekelec 1000 platform.
- Table A-2 on page A-3 shows additional interface types that can be added, using PCI cards, depending on product application.

Table A-1. Basic Interfaces

Interface	Description
PCI Slots	Eight Peripheral Computing Interface (PCI) expansion slots can accommodate Tekelec-designed or commercial-off-the-shelf (COTS) expansion modules.
Serial interface	A standard RS-232D serial interface is usually used for connecting to other servers. However, this connection can be disconnected so that a terminal can be connected to perform error recovery or system upgrade. Additional serial interfaces can be added optionally (see Table A-2).
USB ports	Four Universal Serial Bus (USB) ports to support direct connectivity to peripherals, including keyboard and mouse. The USB ports are accessible as follows: • Two from the rear. • Two under the lid.

Table A-1. Basic Interfaces (Continued)

Interface	Description
External timing interface	External timing interface for synchronizing operations with network timing standards, as required for specific configurations. This timing interface may be implemented on Signaling Link modules as applicable.
Video port	Direct connection to standard video graphic array (VGA) color monitors for applications that require direct workstation connectivity.

Table A-2. Optional Interfaces (on PCI Cards)

Interface	Description
Dial-up access	An internal modem for remote dial-up access for troubleshooting and provisioning purposes.
Ethernet	The Tekelec 1000 platform can support Ethernet ports of 10Mbps, 100Mbps, or 1Gb operation as needed for specific product configurations. Each PCI slot can support a qualified Ethernet card that can support two Ethernet ports (although it is not typical that all PCI slots contain Ethernet cards).
Serial	PCI cards that supply additional serial interfaces can be added to the Tekelec 1000 platform. These serial interfaces are used to connect to other servers located in the same frame.

Electrical Features

The Tekelec 1000 platform offers the following standard electrical features:

- Operates from -48 VDC +/- 5% power input according to Network Equipment Building System (NEBS) requirements in accordance with typical telecommunications applications
- Includes short-circuit protections and safety precautions in accordance with common standards

Mechanical Design

The Tekelec 1000 mechanical design meets all applicable NEBS requirements and is designed to protect all of the active components. The design has efficient component cooling using low-impedance air paths, and its compact size allows multiple units to be configured in a frame with zero top and bottom clearance when stacked.

Mechanical Maintenance Features

The Tekelec 1000 hardware has been designed for easy maintenance. The following components are field-replaceable units (FRUs):

- Fans
- Fan filters
- Disk drives (located on the removable lid)
- CD/DVD drive assemblies (located on the removable lid)
- Peripheral Component Interconnect (PCI) cards
- Complete Tekelec 1000 Chassis

The fans, filters, and disk drives have lower mean time between failures (MTBF) and can be easily replaced, so they have been grouped together. The fans and fan filters are grouped in the front panel (for more information, see "Fans, Fan Trays, and Air Filters" on page A-5). The disk drives are located in the removable lid (for more information, see "Component Access Front Lid" on page A-4). The PCI cards are located at the rear of the Tekelec 1000 chassis and plug into the main board.

All other components, which are less likely to fail and are more difficult to replace, are located in the Tekelec 1000 main unit. If one of the components in the main unit fails, the hard disk drive assemblies (preserving the data which is stored on the hard disk drives in the lid) can be removed from the failed chassis and installed in the replacement chassis.

NOTE: Use the procedures in Chapter 7, "Field Replaceable Units" when removing or replacing FRUs. Always perform a soft shutdown of the Tekelec 1000 chassis before switching OFF both circuit breakers supplying redundant power. For more information about troubleshooting systems and performing soft shutdowns, see the appropriate maintenance manual for the application.

Component Access Front Lid

The Tekelec 1000 platform has a hinged lid at the front that is locked in place by captive screws during normal operation. This lid allows access to the fan trays, BIOS select switch, reset button, and two USB ports that are located under the lid. The front lid also has the following features:

- Light emitting diode (LED) alarm indicators, mounted to the front surface of the lid.
- Space for routing and strain relief of cables to the media device, LED's, and fan trays.
- Constant torque hinges, which are a safety feature to protect the attached components from shock by preventing sudden closure of the lid.

- The following devices, mounted to the bottom side:
  - — Two 3.5 disk drives (HDD) mounted separately. Each HDD is mounted to a bracket. This assembly is then mounted to the front lid.
  - — Two slimline drives (for removable media devices) and drive adapter board, mounted together with a dual CD-RW/DVD ROM bracket. These assemblies are then mounted to the front lid.

  For both these assemblies, non-conducting stand-offs are used to isolate the assembly from the lid to maintain isolation between chassis ground and logic ground. The metal parts of the media devices are at logic ground due to the construction methods.

Fans, Fan Trays, and Air Filters

The Tekelec 1000 platform has two fan trays to provide a redundant air source. This enables the system to run with a single fan failure and allows for replacement of a fan tray while the Tekelec 1000 platform is operational. The fan trays are mounted in the Tekelec 1000 platform with captive hardware.

The fans have a tachometer output that is monitored by the platform software. If a fan fails, the platform software generates an alarm. All Tekelec 1000 internal cables are routed for minimal impact to airflow.

The fan tray front support provides the mounting locations for the fan tray and provides mounting for guides that facilitate the insertion and removal of the fan trays. The fan tray front support also is part of the retaining component for the air filter and provides finger protection from the spinning fan blades during air filter replacement.

The front fascia attaches to the front of the Tekelec 1000 platform with four ¼ turn fasteners. It is the air inlet cover and also serves to retain the air filter. The fascia can be removed for air filter replacement while the drive is still mounted in the frame. Finger guards between the filter and the fan assemblies located behind it allow removal of the filter while the Tekelec 1000 chassis is in operation.

The air filter is a disposable assembly and one of the field replaceable units (FRUs). The filter material is held in an aluminum frame for ease of handling. Recommended replacement interval for the filters is monthly or more frequently depending on the operating environment.

Tekelec 1000 Main Board

The main board has eight PCI card slots. PCI cards are plugged directly into the main board, and the PCI cards bulkhead panels are fixed to the Rear I/O Panel with screws. Slots one through six support full length (12.283 inch) PCI cards, slots seven and eight support cards 6.875 inches long, or less.

Tekelec 1000 Diagnostics

All components that comprise the Tekelec 1000 platform are designed for testability to ensure that operational status can be accurately determined and that appropriate levels of fault detection and isolation are possible with a minimum of effort.

The following levels of diagnostics are provided:

1. Power-On Self Test (POST) diagnostics run once at start-up to determine whether all required devices are installed and functional. POST can also be run by Tekelec Technical Services to verify that the Tekelec 1000 platform is operational.
2. Online diagnostics actively monitor the health of a running Tekelec 1000 platform. When online diagnostics encounter a problem, an alarm is raised and front panel light-emitting diodes (LEDs) are illuminated to indicate a problem. Online diagnostics can be run while maintaining in-service operation of node. Individual links undergoing tests will be out-of-service.
3. Offline diagnostics can be used by Tekelec Technical Services to detect system hardware problems that POST cannot detect. Offline diagnostics can also provide load simulation and stress testing

Diagnostics enable troubleshooting of installed systems by verifying:

- Operational capability of Field Replaceable Units (FRU).
- Operational status of peripheral system components (such as cables and connectors) through automated testing initiated by FRU components. Examples are loop-back and Bit Error Rate Test (BERT) tests.

B

Hardware Repair and Return

Introduction

Any system components being returned for repair or replacement must be processed through the Tekelec Return Material Authorization (RMA) procedures. A hardware repair is defined as an item returned to Tekelec due to a failure, with the returned item being repaired and returned to the customer or replaced with a functionally identical item.

How to Obtain a Return Material Authorization

Use the following procedure to obtain an Return Material Authorization (RMA).

Procedure B-1. Obtaining an RMA

1. Contact Tekelec Technical Services (see "Technical Services and Support" on page 1-7"Technical Services and Support" on page 1-7) and obtain a Return Material Authorization (RMA) number. Verify the:
   - Shipping and billing address in North Carolina
   - Individual who is to receive the item at the address
   - Prime customer contact
2. Provide any part number information requested by the Tekelec Technical Services representative. To locate the part number information, use the indicated procedure below:
   - Fan assembly, use Procedure B-2 on page B-4
   - Removable Media Disk Drive assembly, use Procedure B-3 on page B-7
   - Hard Disk Drive assembly, use Procedure B-4 on page B-10
   - PCI cards, use Procedure B-5 on page B-13
   - Tekelec 1000 AS chassis, use Procedure B-6 on page B-16
3. Provide a detailed description of the problem and failure symptoms:
   - Dead On Arrival 1 (DOA1) refers to a component that has failed in the initial powering up process or early testing procedures.
   - DOA2 refers to a component that has been returned from Repair and Maintenance Support (RMS) and fails.
4. This procedure is complete.

How to Locate Tekelec 1000 AS Part Numbers

Each Tekelec 1000 AS FRU (except for air filters) has labels that contain the following information that may be needed for the RMA:

- Part number (to identify the type of FRU)
- Serial number (to provide more information about the specific FRU)
- CLEI (Common Language Equipment Identifier, an identifier used by some customers which indicates the customer, the manufacturer, and the part)

In addition to part numbers on each FRU, the Tekelec 1000 AS chassis has several labels that contain part number information for FRUs that are internal to the chassis. These labels allow part number information to be gathered without needing to open the chassis.

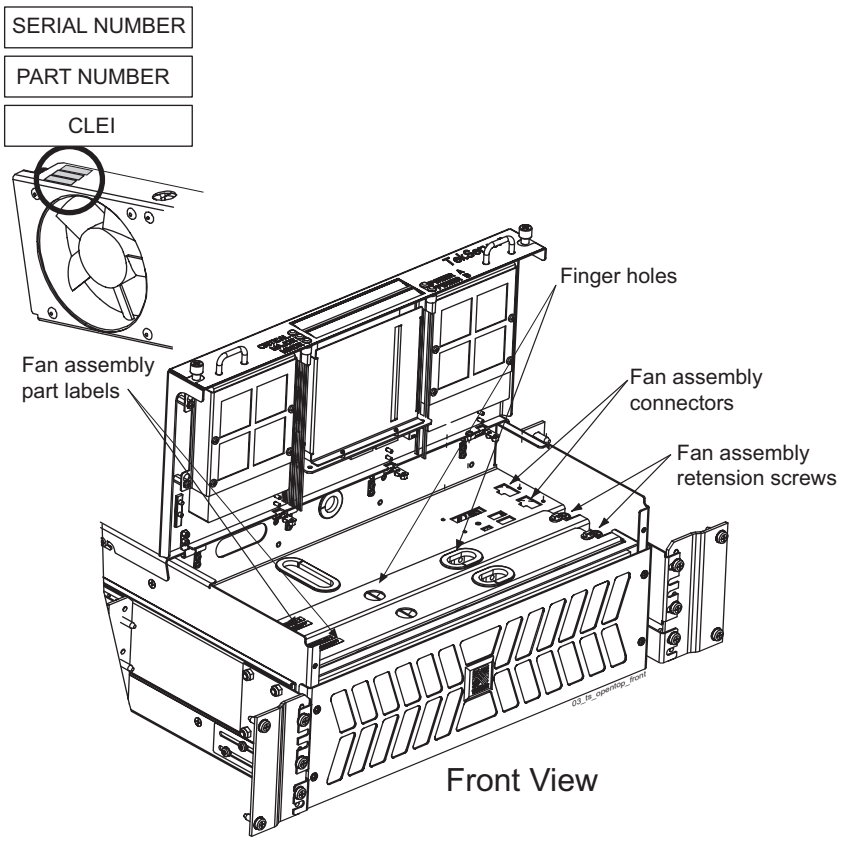
Air Filter Part Number Information

Air filters do not have labels to identify the part numbers. To order replacement air filters, contact a sales representative.

Fan Assembly Part Number Information

The part number information for fan assemblies is located only on the labels on the fan assemblies. Figure B-1 on page B-3 shows where the fan assembly part labels are located and shows a closeup of the label contents. Procedure B-2 on page B-4 provides instructions about how to access these labels.

Figure B-1. Fan Assembly Part Label

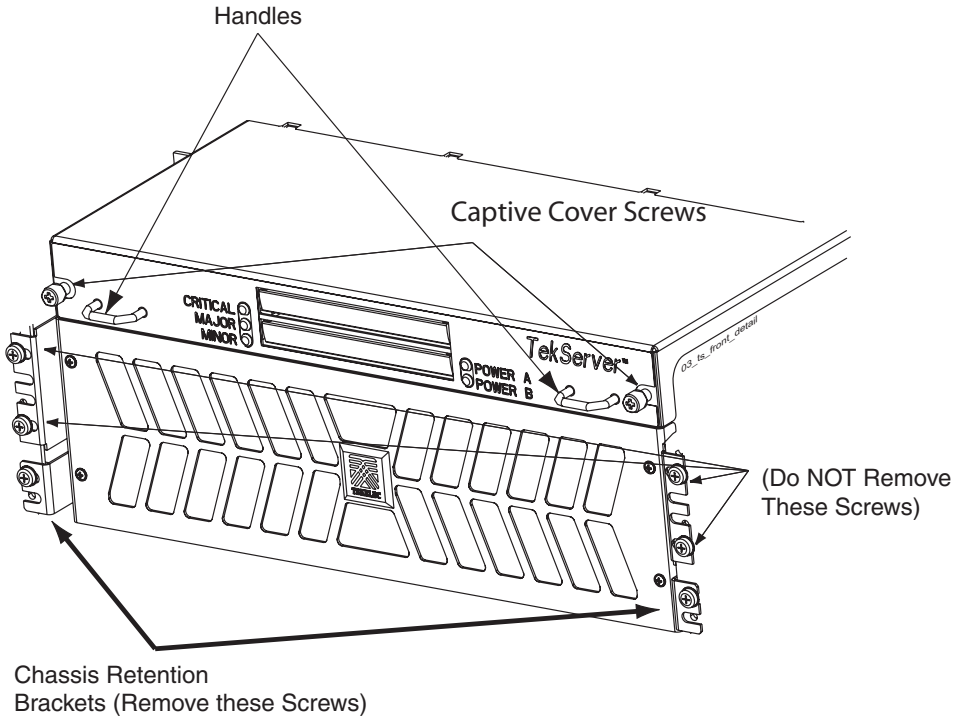


Procedure B-2. How to Locate RMA Numbers for Fan Assembly

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

1. From the front of the frame, remove the # 12-24 Phillips screw from each chassis retention bracket (see Figure B-2). Do not remove the screws in the frame adapter brackets.

Figure B-2. Tekelec 1000 Chassis Front View

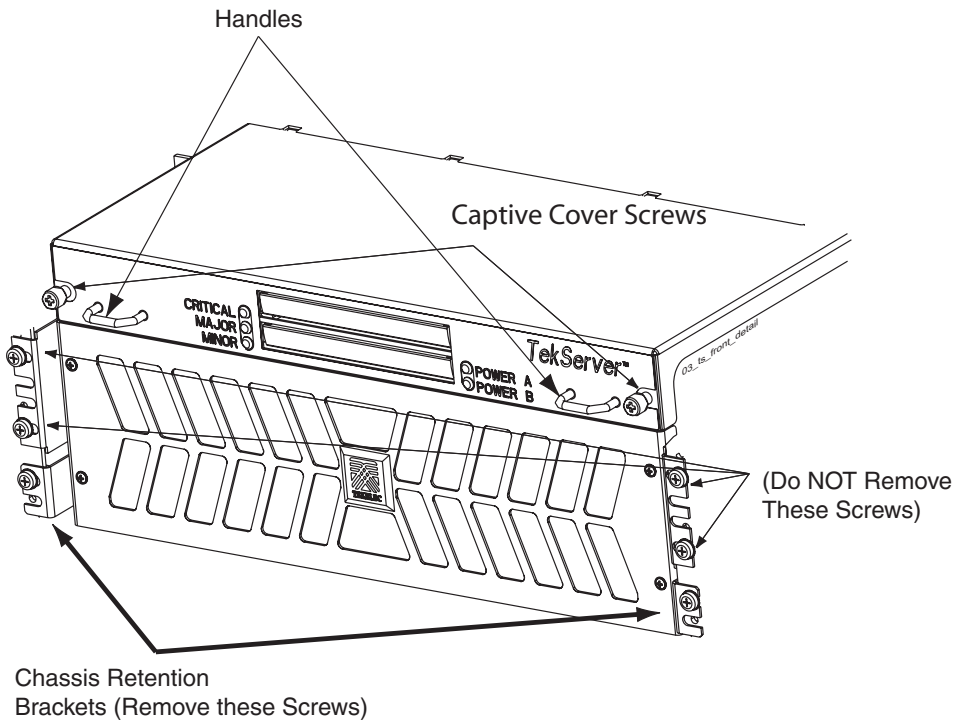


2. From the front of the frame, using the handles on the front top cover of the chassis, pull forward until the release buttons on the inner arms of the slide assemblies pop into the holes on each side.

DANGER: If the Tekelec 1000 chassis is pulled too far out after the release buttons are disengaged, the inner slide members (attached to the chassis) could come out of the middle slide members (attached to the frame).

3. Using a Phillips screwdriver, loosen the captive spring-loaded screws on the Tekelec 1000 chassis top cover until they are free. See Figure B-6 for locations.

Figure B-3. Tekelec 1000 Front Top Cover



4. Grasp the handles on the front top cover of the chassis and lift up until the constant torque hinges support the weight of the cover and the four attached disk drives located under the cover.

5. Figure B-1 on page B-3 shows the location of the fan assembly part labels and an expanded view of the labels.

6. Close the chassis top cover.

7. Tighten the captive screws to secure the top cover.

8. From the front of the frame, simultaneously press the round release buttons and slowly push the chassis into the frame while observing the cables to avoid binding or stretching.

NOTE: When the chassis stops moving, the front of the Tekelec 1000 should be slightly recessed to allow clearance of the handles behind the frame door when closed.

9. Adjust the chassis retention brackets on the front of the Tekelec 1000 chassis to contact the frame adapter brackets when the chassis is positioned correctly in the frame.

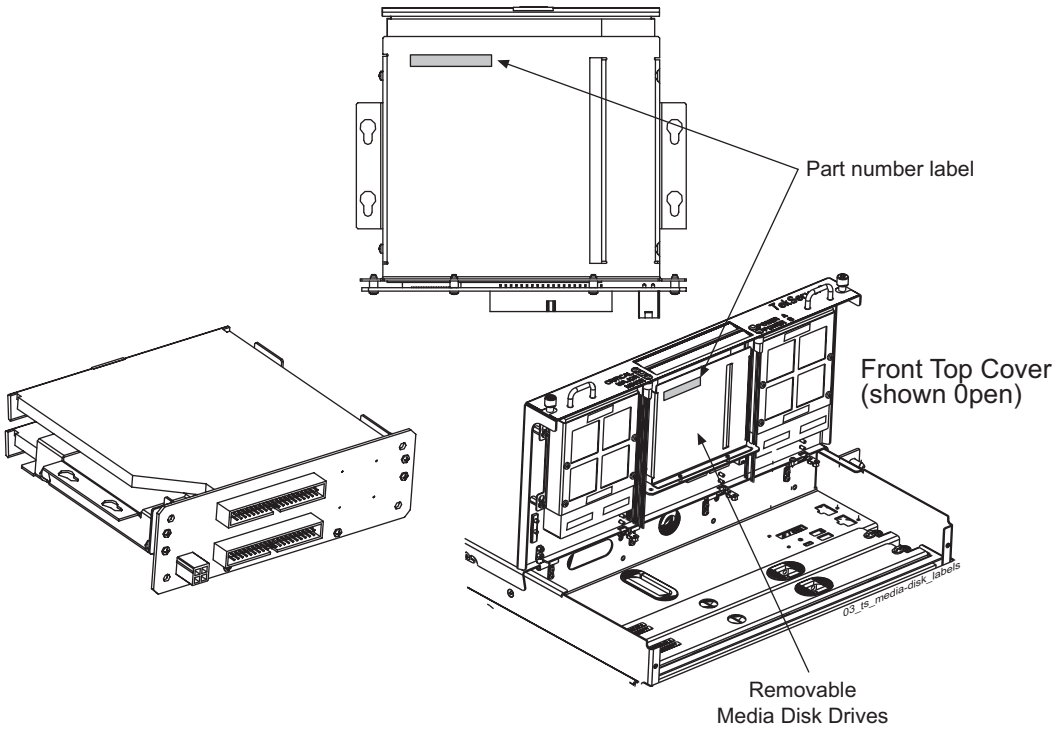
10. Secure the chassis with one # 12-24 screw in the chassis retention brackets on each side.

11. This procedure is complete.

Removable Media Disk Drive Assembly Part Number Information

The part number information for removable media disk drive assemblies is located only on the labels on the those assemblies. Figure B-4 on page B-6 shows where the removable media disk drive assembly part label is located. Procedure B-3 on page B-7 provides instructions about how to access this label.

Figure B-4. Removable Media Disk Drive Assembly Part Label

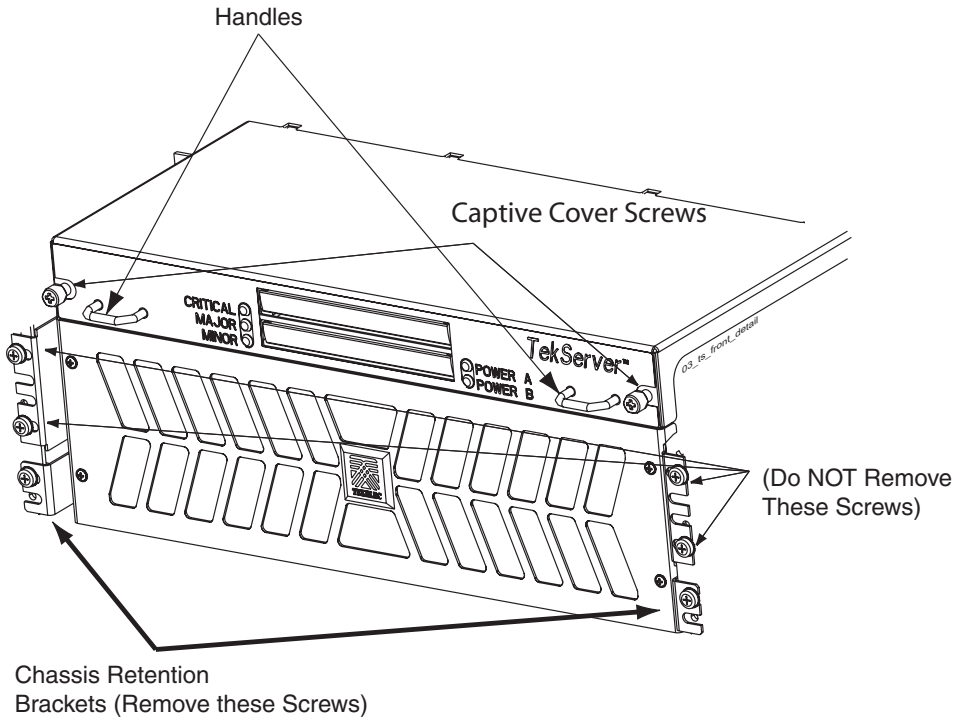


Procedure B-3. How to Locate RMA Numbers for Removable Media Disk Drive Assembly

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

1. From the front of the frame, remove the # 12-24 Phillips screw from each chassis retention bracket (see Figure B-2). Do not remove the screws in the frame adapter brackets.

Figure B-5. Tekelec 1000 Chassis Front View

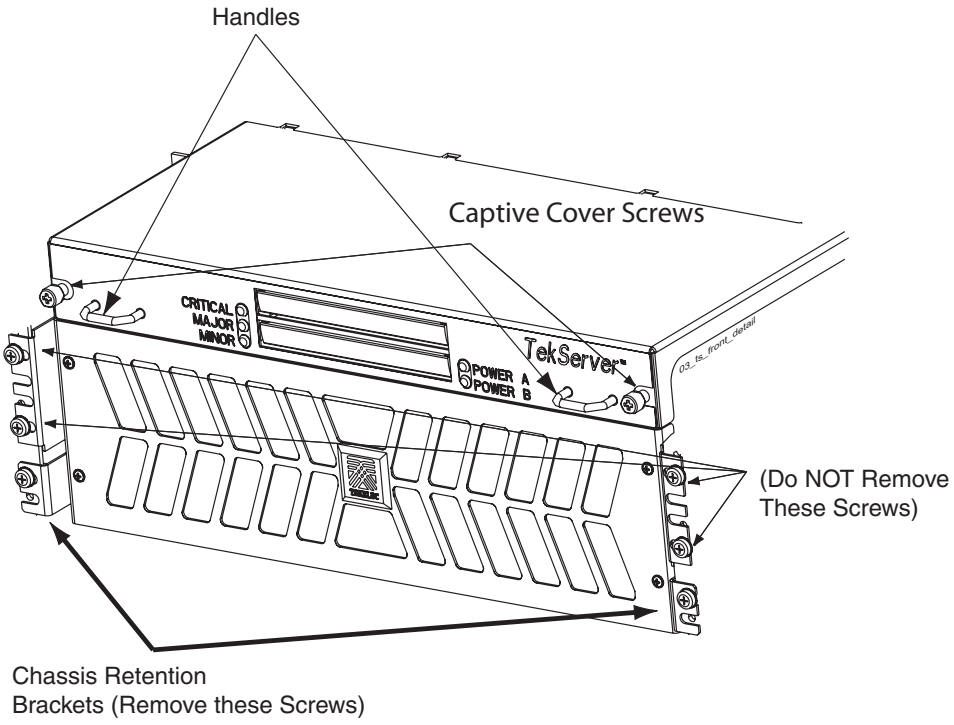


2. From the front of the frame, using the handles on the front top cover of the chassis, pull forward until the release buttons on the inner arms of the slide assemblies pop into the holes on each side.

DANGER: If the Tekelec 1000 chassis is pulled too far out after the release buttons are disengaged, the inner slide members (attached to the chassis) could come out of the middle slide members (attached to the frame).

3. Using a Phillips screwdriver, loosen the captive spring-loaded screws on the Tekelec 1000 chassis top cover until they are free. See Figure B-6 for locations.

Figure B-6. Tekelec 1000 Front Top Cover



4. Grasp the handles on the front top cover of the chassis and lift up until the constant torque hinges support the weight of the cover and the four attached disk drives located under the cover.

5. Figure B-4 shows the location of the removable media disk drive assembly part label.

6. Close the chassis top cover.

7. Tighten the captive screws to secure the top cover.

8. From the front of the frame, simultaneously press the round release buttons and slowly push the chassis into the frame while observing the cables to avoid binding or stretching.

NOTE: When the chassis stops moving, the front of the Tekelec 1000 should be slightly recessed to allow clearance of the handles behind the frame door when closed.

9. Adjust the chassis retention brackets on the front of the Tekelec 1000 chassis to contact the frame adapter brackets when the chassis is positioned correctly in the frame.

10. Secure the chassis with one # 12-24 screw in the chassis retention brackets on each side.

11. This procedure is complete.

Hard Disk Drive Assembly Part Number Information

The part number information for hard disk drive assemblies is located on both of the following labels:

- Label on the hard disk drive assembly (see Figure 7-17 on page 7-33).

  Use this label during replacement of the part to verify that the correct part number was ordered (see Procedure 7-11, "Replace a Hard Disk Drive Assembly," on page 7-27).

- The Base Unit/Hard Disk Drive Label on the outside of the Tekelec 1000 chassis. Figure B-7 shows where this label is located and Figure B-8 shows a closeup view of a blank label. Use this label when requesting an RMA. Procedure B-4 on page B-10 provides instructions about how to access view this label.

Figure B-7. Tekelec 1000 Chassis Label Locations

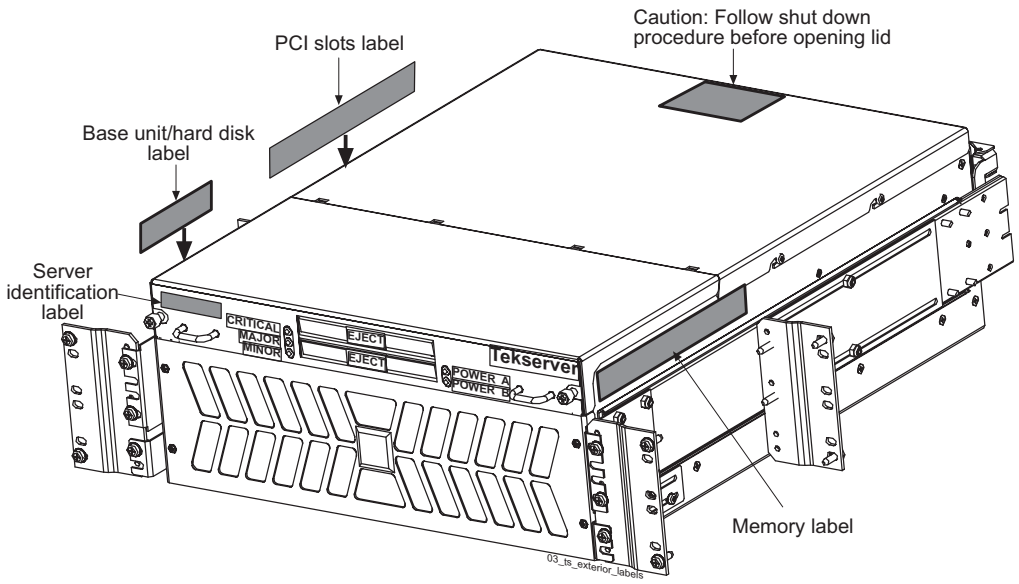
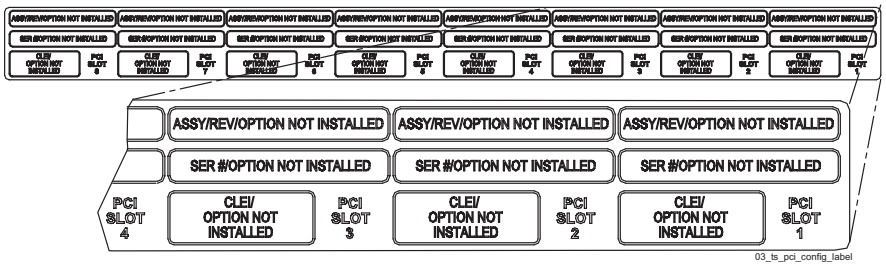


Figure B-8. Base Unit/Hard Disk Label on Tekelec 1000 Chassis



Procedure B-4. How to Locate RMA Numbers for Hard Disk Drive Assembly

1. Request that Tekelec Technical Services assist you in determining whether the hard disk drive assembly that needs to be replaced is in position "A" or position "C".

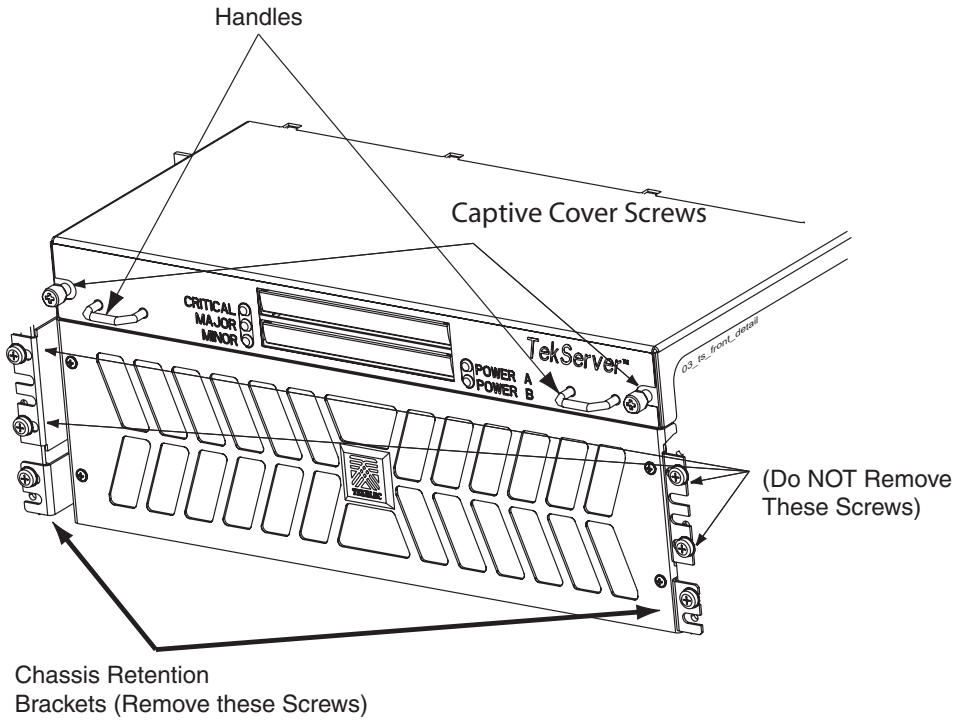
2. Determine whether the required Hard Disk area (A or C) of the base unit/hard disk label on the front of the left side of the Tekelec 1000 chassis can be viewed from the side of the frame without sliding the chassis out from the frame. See Figure B-7 for the placement of the label on the chassis and Figure B-8 for the location of the Hard Disk information on the label.

3. If the necessary Hard Disk area of the base unit/hard disk label shown in Figure B-8 on page B-10 can be viewed, report the requested information from the label, and skip to step 10. Otherwise, perform the remaining steps.

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

4. From the front of the frame, remove the # 12-24 Phillips screw from each chassis retention bracket (see Figure B-2). Do not remove the screws in the frame adapter brackets.

Figure B-9. Tekelec 1000 Chassis Front View



5. From the front of the frame, using the handles on the front top cover of the chassis, pull forward until the release buttons on the inner arms of the slide assemblies pop into the holes on each side.

DANGER: If the Tekelec 1000 chassis is pulled too far out after the release buttons are disengaged, the inner slide members (attached to the chassis) could come out of the middle slide members (attached to the frame).

6. Report the requested part number information on the base unit/hard disk label.

7. From the front of the frame, simultaneously press the round release buttons and slowly push the chassis into the frame while observing the cables to avoid binding or stretching.

NOTE: When the chassis stops moving, the front of the Tekelec 1000 should be slightly recessed to allow clearance of the handles behind the frame door when closed.

8. Adjust the chassis retention brackets on the front of the Tekelec 1000 chassis to contact the frame adapter brackets when the chassis is positioned correctly in the frame.

9. Secure the chassis with one # 12-24 screw in the chassis retention brackets on each side.

10. This procedure is complete.

PCI Card Part Number Information

The part number information for PCI cards is located on both of the following labels:

- Label on each PCI card (see Figure 7-21 on page 7-40).

  Use this label during replacement of the part to verify that the correct part number was ordered (see Procedure 7-13, "Replace a PCI Card," on page 7-40).

- The PCI slots label on the outside of the Tekelec 1000 chassis. Figure B-10 shows where this label is located and Figure B-11 shows a closeup view of a blank label. Use this label when requesting an RMA. Procedure B-5 on page B-13 provides instructions about how to view this label.

Figure B-10. Tekelec 1000 Chassis Label Locations

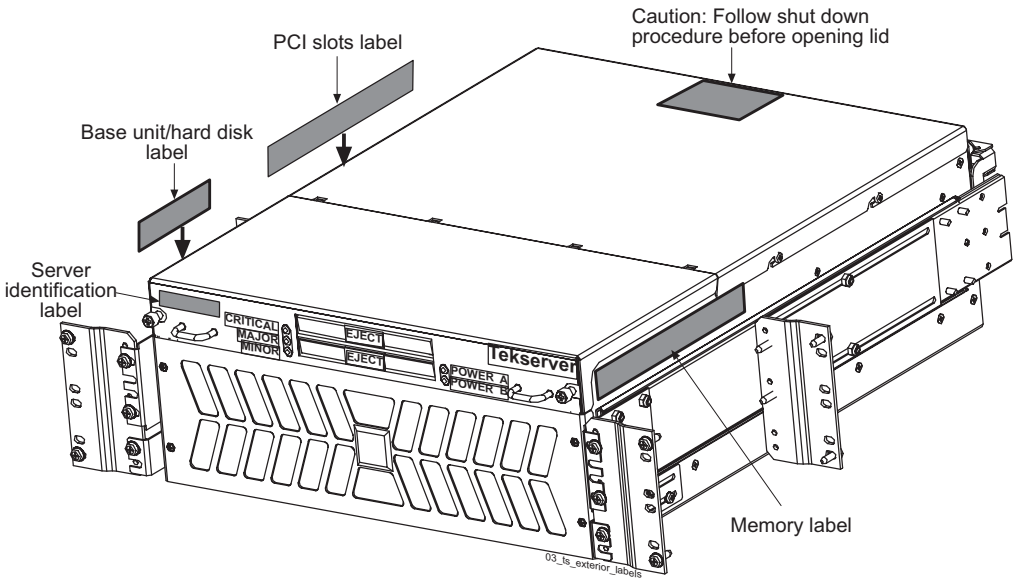
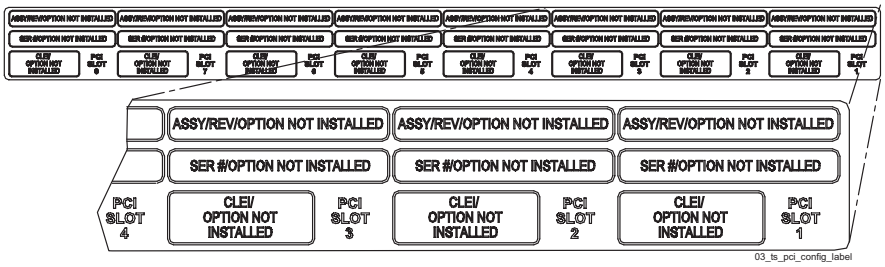


Figure B-11. PCI Slots Label on Tekelec 1000 Chassis



Procedure B-5. How to Locate RMA Numbers for PCI Cards

1. Request that Tekelec Technical Services assist you in determining the which slot (1 through 8) contains the PCI card that needs to be replaced.

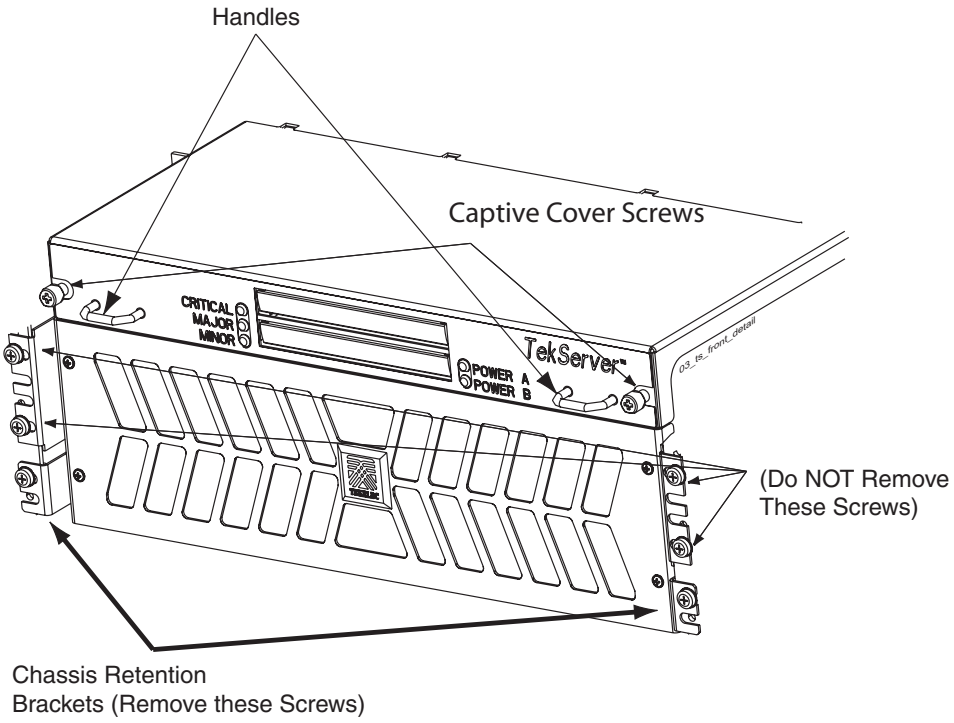
2. Determine whether the required PCI slot area of the PCI slots label on the rear of the left side of the Tekelec 1000 chassis can be viewed from the side of the frame without sliding the chassis out from the frame. See Figure B-10 for the placement of the label on the chassis and Figure B-11 for the location of each PCI slot information on the label.

3. If the necessary PCI slot area of the PCI slots label shown in Figure B-10 can be viewed, report the requested information from the label, and skip to step 10. Otherwise, perform the remaining steps.

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

4. From the front of the frame, remove the # 12-24 Phillips screw from each chassis retention bracket (see Figure B-2). Do not remove the screws in the frame adapter brackets.

Figure B-12. Tekelec 1000 Chassis Front View



5. From the front of the frame, using the handles on the front top cover of the chassis, pull forward until the release buttons on the inner arms of the slide assemblies pop into the holes on each side.

DANGER: If the Tekelec 1000 chassis is pulled too far out after the release buttons are disengaged, the inner slide members (attached to the chassis) could come out of the middle slide members (attached to the frame).

6. Report the requested part number information from the PCI slots label.

7. From the front of the frame, simultaneously press the round release buttons and slowly push the chassis into the frame while observing the cables to avoid binding or stretching.

NOTE: When the chassis stops moving, the front of the Tekelec 1000 should be slightly recessed to allow clearance of the handles behind the frame door when closed.

8. Adjust the chassis retention brackets on the front of the Tekelec 1000 chassis to contact the frame adapter brackets when the chassis is positioned correctly in the frame.

9. Secure the chassis with one # 12-24 screw in the chassis retention brackets on each side.

10. This procedure is complete.

Tekelec 1000 Chassis Part Number Information

When a Tekelec 1000 chassis needs to be replaced, part number information from all of the following labels needs to be supplied:

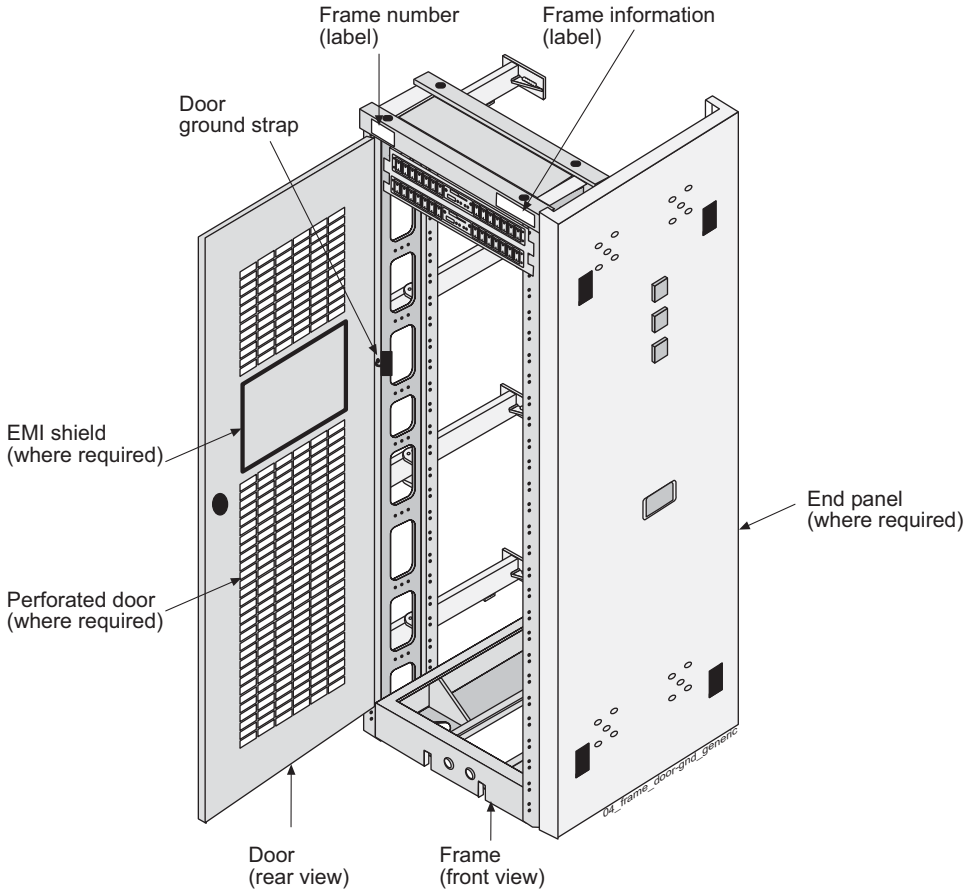
- Frame identification from a label on the frame
- Server identification from a label on the front of the Tekelec 1000 chassis
- Base unit and hard disk information from the base unit/hard disk label on the left side of the Tekelec 1000 chassis
- Memory information from a label on the right side of the Tekelec 1000 chassis
- PCI card information from a label on the left side of the Tekelec 1000 chassis

Use the following procedure to locate the necessary part information:

Procedure B-6. How to Locate RMA Numbers for a Tekelec 1000 Chassis

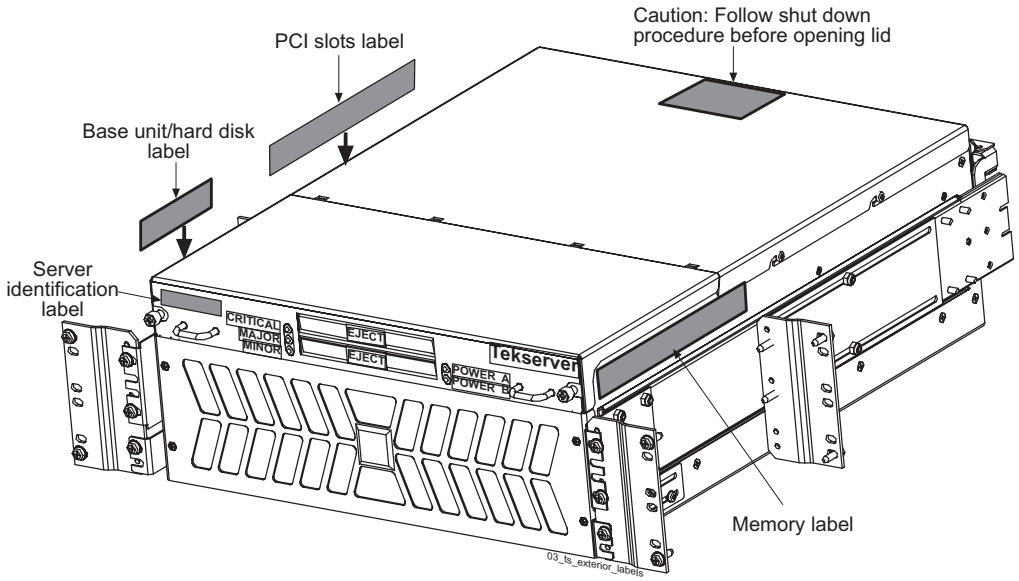
1. Supply the frame number for the frame in which the failed Tekelec 1000 chassis is located (this label is located at the top left of the frame; see Figure B-13).

   Figure B-13. Frame Identification Label



2. Supply the server identification letter (A through E) from the top left corner of the front of the chassis (see Figure B-14).

Figure B-14. Tekelec 1000 Chassis Label Locations

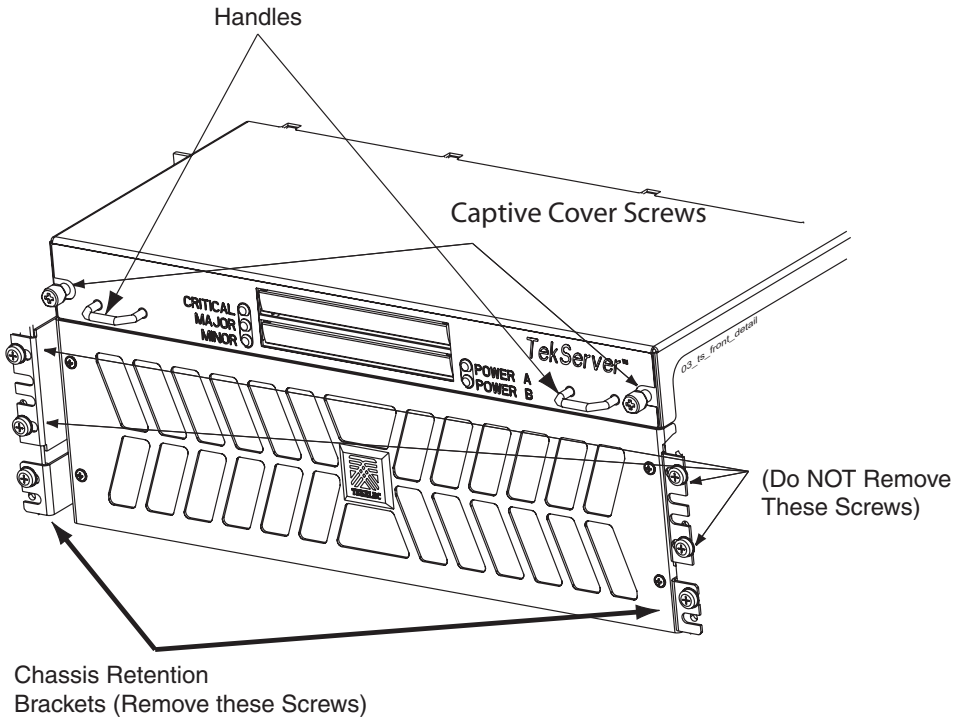


3. Determine whether the base unit/hard disk label, PCI slots label, and memory label on the sides of the Tekelec 1000 chassis (see Figure B-14) can be viewed from the sides of the frame without moving the chassis:
   - If all labels can be viewed, go to step 6 on page B-18.
   - If one or more labels cannot be viewed, go to the next step.

WARNING: Always wear an ESD wrist strap grounded to the bench or frame when working on electronic components.

4. From the front of the frame, remove the # 12-24 Phillips screw from each chassis retention bracket (see Figure B-2). Do not remove the screws in the frame adapter brackets.

Figure B-15. Tekelec 1000 Chassis Front View

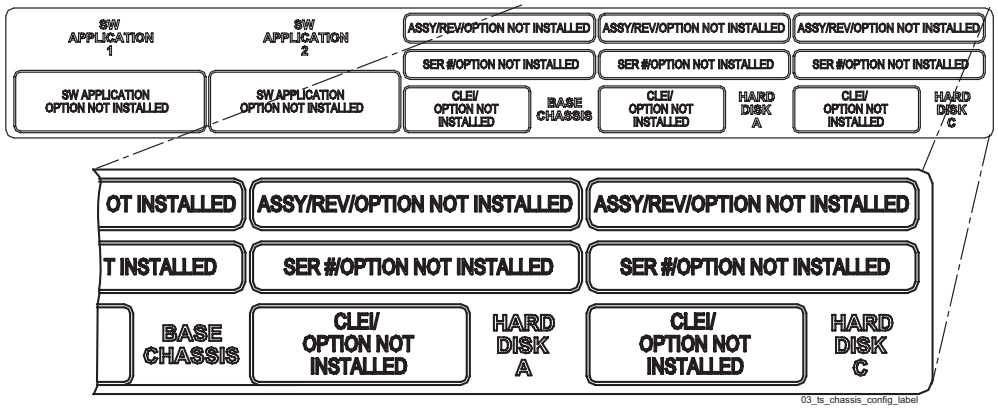


5. From the front of the frame, using the handles on the front top cover of the chassis, pull forward until the release buttons on the inner arms of the slide assemblies pop into the holes on each side.

DANGER: If the Tekelec 1000 chassis is pulled too far out after the release buttons are disengaged, the inner slide members (attached to the chassis) could come out of the middle slide members (attached to the frame).

6. Supply the requested part number information from the following areas of the base unit/hard disk label (Figure B-16 shows an expanded view of the label):

Figure B-16. Base Unit/Hard Disk Label on Tekelec 1000 Chassis



- Base chassis part number, serial number, and CLEI (in the middle of label)
- Software applications (at the left side of label)
- Part number, serial number, and CLEI for both Hard Disk A and Hard Disk C (at the right side of label). Report whether the replacement chassis is to also contain replacement hard drives.These numbers are needed in either case:
  - — If the replacement chassis does not need to contain replacement hard disk drives, Tekelec manufacturing will use these numbers to create the new base unit/hard disk label and apply it to the replacement chassis
  - — If the replacement chassis does need to contain replacement hard disk drives, Tekelec manufacturing will use these numbers both to install replacement hard disk drive assemblies in the chassis and also to create the new base unit/hard disk label and apply it to the replacement chassis

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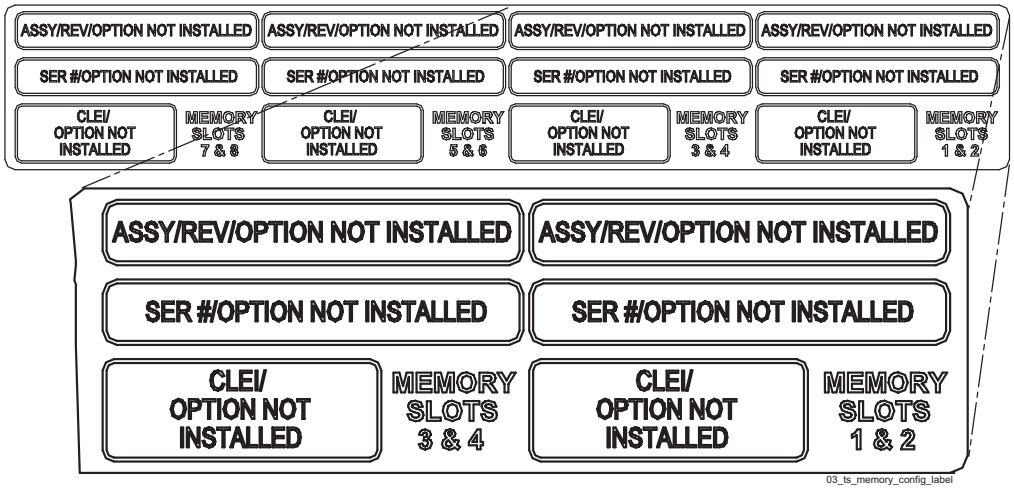
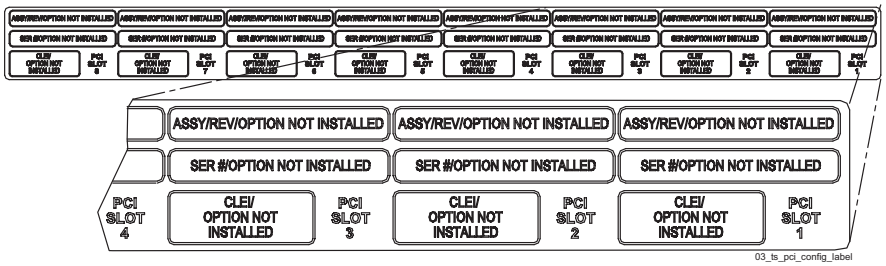
7. To ensure that the replacement chassis has the same memory configuration as the failed chassis, supply all the requested information from the stickers on the memory label (see Figure B-17).

Figure B-17. Memory Label on Tekelec 1000 Chassis



8. Supply all the information from the PCI slots label (see Figure B-18) and report whether the replacement chassis is to also contain replacement PCI cards. The information for all slots is needed in either case:
   - If the replacement chassis is to contain replacement PCI cards as well, Tekelec manufacturing will use the information to install the replacement PCI cards and also to create the new PCI slots label and apply it to the replacement chassis
   - If the replacement chassis does not need to contain replacement PCI cards, Tekelec manufacturing will use the information to create a new PCI slots label and apply it to the replacement chassis

Figure B-18. PCI Card Label on Tekelec 1000 Chassis



9. If the chassis was not slid out, skip to step 13. Otherwise, complete the remaining steps.

10. From the front of the frame, simultaneously press the round release buttons and slowly push the chassis into the frame while observing the cables to avoid binding or stretching.

    NOTE: When the chassis stops moving, the front of the Tekelec 1000 should be slightly recessed to allow clearance of the handles behind the frame door when closed.

11. Adjust the chassis retention brackets on the front of the Tekelec 1000 chassis to contact the frame adapter brackets when the chassis is positioned correctly in the frame.

12. Secure the chassis with one # 12-24 screw in the chassis retention brackets on each side.

13. This procedure is complete.

How to Arrange Return Shipping

See one of the following:

- If the equipment to be returned is a Specifically Targeted Printed Circuit Board, see “Specifically Targeted PCBs” on page B-21
- For all other equipment types, see “General Instructions” on page B-22

Specifically Targeted PCBs

For any reason the Director of Quality Assurance (QA), with input from other groups such as NSD Customer Service, Hardware Systems, Repair and Maintenance Support (RMS) and/or Manufacturing, can authorize a board type to be "captured" and sent to the North Carolina facility for evaluation and analysis. NSD QA receives the board(s), records board information, such as part number and serial number and problem description on the appropriate forms and sends the PCB to a Hardware Systems representative who initiates the design engineering evaluation. Once the evaluation and repair, if applicable, is complete, the results are documented and the PCB returned to NSD QA.

Manufacturing may be involved in the investigations. In certain unique circumstances the capture of an individual PCB, for evaluation, can be initiated through a customer request.

General Instructions

Returned equipment, assemblies, or subassemblies that are not Specifically Targeted PCBs must be shipped to the Tekelec Repair and Return Facility specified by the Technical Services engineer. Ensure that the following requirements are met:

- A returned item must be shipped in the original carton or equivalent container, assuring proper static handling procedures and with the freight charges prepaid.
- The assigned RMA number must be printed clearly on the "Attn:" line of the shipping label on the outside of the shipping package.
- A returned item must also be tagged with the reason it is being returned. If the RMA number is not placed on the label, the return could be delayed.

Ship to:

Tekelec
Attn: RMA ####
26604 West Agoura Road
Calabasas, California 91302

Returning a Crate

Use the following procedure to return a shipping crate and dollies to Tekelec.

Procedure B-7. Preparing Crate and Dolly for Return to Tekelec

1. Replace the retaining brace.

2. Replace the shipping container front panel using the bolts saved previously and arrange the return shipment by contacting:

   Shipping Manager
   Tekelec
   26604 West Agoura Road
   Calabasas, California 91302
   (818) 880-7848

3. After the frame is positioned and the dollies are removed from the frame, the dollies are returned to the same address as the shipping container listed above. Ship the dollies in **either** the crate **or** the box supplied with the crate, as described below:

   - If the equipment is being immediately installed, ship the dollies back to Tekelec in the crate after use. After installing the equipment, bolt the dollies securely in the crate and return to Tekelec.

- If the equipment is not being immediately installed, ship the dollies back to Tekelec in the box supplied with the crate. After unpacking the equipment, return the crate to Tekelec and retain the box to return the dollies. After installing the equipment, return the dollies to Tekelec in the supplied box.

NOTE: It is the site supervisor's responsibility to assure the crate and dollies are returned to Tekelec.

Glossary

BIOS	Basic Input Output System.
CD	Compact Disk.
CD-RW	Compact Disk-Read/Write.
CLEI	Common Language Equipment Identifier, a code used by some telephony companies to identify manufacturer, part number, and customer.
CPU	Central Processing Unit, the computing part of a computer.
E1	European Digital Signal Level-1 (2.048 Mbits/sec).
ECC	Error Correction Coded.
FRU	Field Replaceable Unit, any unit of hardware that can be replaced in the field by the customer.
HD	Heavy Duty.
IDE	Integrated Drive Electronics, an interface standard for connecting hard drives to PCs.
I/O	Input/Output.
LED	Light Emitting Diode.
MHz	Megahertz (1,000,000 Hertz).
NE	Network Element.
NEBS	Network Equipment Building System.
PCI	Peripheral Component Interconnect, a peripheral bus commonly used in PCs, Macintoshes and workstations that provides a high-speed data path between the CPU and peripheral devices (such as video, disk, and network).
RAM	Random Access Memory.
RMA	Return Material Authorization.
ROM	Read-only memory.
RTTE	Radio & Telecommunication Terminal Equipment.

T1	The North American telecommunications standard defining a circuit that multiplexes and switches 24 channels and operates at speeds of 1.544 Mbps.
UL	Underwriters Laboratories.
USB	Universal Serial Bus, a hardware interface for low-speed peripherals such as the keyboard, mouse, joystick, scanner, printer and telephony devices. It also supports MPEG-1 and MPEG-2 digital video. USB version 1.1 has a maximum bandwidth of 12 Mbits/sec (equivalent to 1.5 Mbytes/sec), and up to 127 devices can be attached. Fast devices can use the full bandwidth, while lower-speed ones can transfer data using a 1.5 Mbits/sec subheading.
VDC	Volts Direct Current.
VGA	Videographic array.
VOM	Volt Ohm Meter.

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