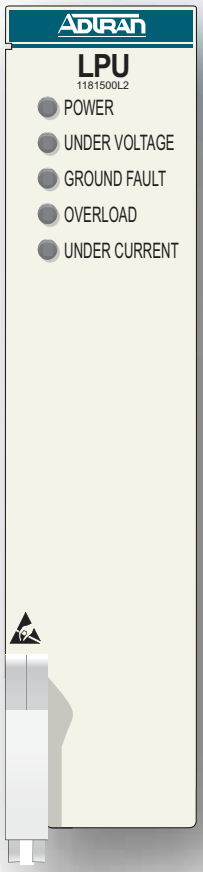

Total Access 3000/3010
4-Pair Line Power Unit
Installation and Maintenance Practice

Document Number: 61181500L2-5B
CLEI: SIPQ0CTF_ _
April 2007

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Revision History

Revision	Date	Description
A	August 2005	Initial Release
B	April 2007	Second Issue. Updated product description.

Conventions

The following typographical conventions are used in this document:

This font indicates a cross-reference link.

This font indicates screen menus, fields, and parameters.

THIS FONT indicates keyboard keys (ENTER, ESC, ALT). Keys that are to be pressed simultaneously are shown with a plus sign (ALT+X indicates that the ALT key and X key should be pressed at the same time).

This font indicates references to other documentation and is also used for emphasis.

`This font` indicates on-screen messages and prompts.

`This font` indicates text to be typed exactly as shown.

This font indicates silk-screen labels or other system label items.

This font is used for strong emphasis.

NOTE

Notes inform the user of additional, but essential, information or features.

CAUTION

Cautions inform the user of potential damage, malfunction, or disruption to equipment, software, or environment.

WARNING

Warnings inform the user of potential bodily pain, injury, or death.

Training

ADTRAN offers training courses on our products. These courses include overviews on product features and functions while covering applications of ADTRAN product lines. ADTRAN provides a variety of training options, including customized training and courses taught at our facilities or at customer sites.

For inquiries concerning training, contact ADTRAN:

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Total Access 3000/3010
4-Pair Line Power Unit

GENERAL

This practice is an installation and maintenance guide for the ADTRAN Total Access® 3000/ 3010 4-Pair Line Power Unit (LPU). Figure 1 illustrates the LPU (P/N 1181500L2) front panel.

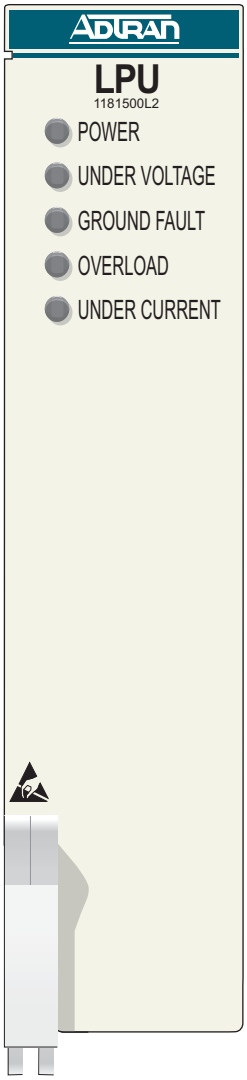

Figure 1. LPU Front Panel

Description

The LPU is a span powering Total Access 3000/3010 module, which is used to supply 100 watts of DC power over multiple twisted pairs of various standard gauges to a Total Access 11xx OSP Digital Subscriber Line Access Multiplexer (DSLAM). The LPU can be installed either at a Central Office (CO) or a remote facility in close proximity to the associated DSLAM. The LPU provides ±145 VDC power and can span distances up to 60 kft (approximately 11 miles).

Features

The basic features of the LPU include the following:

- Provides 100 watts of power
- Provides power to remote DSLAMs for distances up to 60 kft
- Provides ±145 VDC power rails
- Provides powering over any combination of the four available pairs
- Provides alarms for Under Voltage, Ground Fault, Overload, and Under Current
- Provides five LEDs: **POWER**, **UNDER VOLTAGE**, **GROUND FAULT**, **OVERLOAD**, and **UNDER CURRENT**
- LPU can be provisioned In Service, Out of Service-Maintenance, or Out of Service-Unassigned.
- Meets Total Access 3000/3010 dual module form factor
- Provides SNMP management
- Provides TL1 Network Management Access alarm support
- Menu access via the Total Access 3000/3010 Controller Unit
- Application software can be upgraded in the field
- Meets all requirements over an ambient temperature range of –40°C to +70°C

Compliance

WARNING

The span voltages are up to ±145 VDC with respect to ground and up to 290 VDC between the tip/ring pairs.

CAUTION

Electrostatic Discharge (ESD) can damage electronic modules. When handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

Table 1 lists the compliance codes for the LPU. The LPU is NRTL Listed to the applicable UL standards. The LPU meets or exceeds all the applicable requirements of NEBS, Telcordia GR-63-CORE, and GR-1089-CORE.

The LPU is intended for deployment in Central Office type facilities, EEEs and EECs. Install the LPU in a Total Access 3000/3010 Chassis located in a restricted access location.

Table 1. Compliance Codes

Configuration Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	–	X
Installation Code (IC)	A	–

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

CAUTION

Per GR-1089-CORE the Total Access 3000/3010 System is designed and intended for installation as part of a Common Bonding Network (CBN). The Total Access 3000/3010 System is not designed nor intended for installation as part of an Isolated Bonding Network (IBN).

CAUTION

Per GR-1089-CORE Section 9, the LPU does not have an internal DC connection between –48 VR and frame ground. The LPU can be installed in a DC-I (isolated) or DC-C (common) installation. For installations where other cards or the host system have internal connections between –48 VR and frame ground, the system would be intended for deployment only in a DC-C installation.

CAUTION

The Total Access 3000/3010 Chassis frame ground terminal must be connected to an earth ground to ensure that the front panel of the LPU is properly grounded via the backplane connector.

NOTE

The powering ports of the LPU are classified as Type 1, 3, and 5, as defined in Appendix B of GR-1089-CORE Issue 4, and meet the lightning and power fault criteria with primary protectors that meet any of the voltage limits of GR-974-CORE or GR-1361-CORE (for example, carbon blocks, gas tubes, solid states).

NOTE

Current limiting protectors are not required.

NOTE

The LPU is designed to operate with a nominal operating voltage of –48 VDC and a minimum operating voltage of –40 VDC. The LPU will not be damaged by any steady state voltage below –56.7 VDC.

INSTALLATION

After unpacking the Total Access 3000/3010 LPU, inspect it for damage. If damage has occurred, file a claim with the carrier then contact ADTRAN Customer Service.

Refer to "Appendix A, Warranty" for further information. If possible, keep the original shipping container for returning the LPU for repair or for verification of shipping damage.

Installation Considerations

The number of LPUs installed in a system is significant, because overloading the Total Access 3000/3010 shelf with too many LPUs can cause the 20 amp current limit to be reached or exceeded. An LPU producing 100 watts draws approximately 2.6 amps of current from the Total Access 3000/3010 backplane. A fully loaded Total Access 3000/3010 shelf with fourteen LPUs, each drawing 2.6 amps, would draw a total of 36.4 amps of current from the Total Access 3000/3010 backplane. This is over the Total Access 3000/3010 shelf limit and can cause the shelf fuse to blow. Therefore, it is recommended for safety reasons that no more than seven LPUs be placed into a Total Access 3000/3010 shelf supplying power to the DSLAMs with sub-full rate ADSL modules. If deployed in a configuration which requires heavier loads, this maximum number of seven LPUs should be reduced to keep the Total Access 3000/3010 backplane current at ≤ 20 amps.

The gauge and length of the wire used to transfer power is significant, because impedance increases as the gauge and length of the wire increases and a greater impedance causes power to be wasted during transmission.

Shipping Contents

The contents include the following items:

- Total Access 3000/3010 4-Pair Line Power Unit
- *Total Access 3000/3010 4-Pair Line Power Unit Job Aid* (P/N 61181500L2-22)
- T*otal Access 3000/3010 4-Pair Line Power Unit Compliance Notice* (P/N 61181500L2-17)

Instructions for Installing the Module

The LPU installs in any two adjacent slots in a Total Access 3000/3010 chassis. The Total Access 3000/3010 backplane connectors allow for either odd-even or even-odd slot insertion.

For installations residing in a CO or other controlled environment, fan cooling is not required. However, a heat baffle is required directly above each Total Access 3000/3010 chassis. For installations in remote locations, fan cooling is required for each two-stack arrangement of Total Access 3000/3010 chassis.

If heat-generating equipment is installed below the Total Access 3000/3010 chassis, an additional heat baffle may be required between the heat-generating unit and the bottom of the Total Access 3000/3010 chassis.

CAUTION

Installations in a CO or other controlled environment require heat baffles.

CAUTION

Installations in remote locations require fans.

NOTE

A maximum of seven LPUs with a nominal load of about 0.3 amps can currently be inserted into the Total Access 3000/3010 shelf. This limitation is due in part to the 30 amp fuse used with the Total Access 3000/3010 shelf and because the Total Access 3000/3010 backplane traces that supply the –48 VDC current cannot handle more than a consistent 20 amps.

To install the LPU, perform the following steps:

1. If present, remove the Access Module Blank (P/N 1181953L1) from the appropriate access module slot of the Total Access 3000/3010 chassis.
2. Pull the ejector latch, located on the lower left-hand side of the LPU front panel, from its closed position.
3. Hold the LPU by the front panel while supporting the bottom edge of the module with the ejector latch opened to engage the chassis edge.
4. Align the module edges to fit in the lower and upper guide grooves for the access module slot.
5. Slide the module into the access module slot. Simultaneous thumb pressure at the top (above the **POWER** LED) and at the bottom (below the electrostatic caution symbol) of the module ensures that the module is firmly positioned against the backplane of the chassis.
6. Secure the LPU in place by pushing in on the ejector latch.

Upon installation, the LPU initiates a self-test. Once the power up self-test is completed, the front panel LEDs reflect the true state of the hardware. For LED descriptions, refer to “Front Panel LEDs” on page 9.

Wiring

WARNING

Disconnect power at the source and provision the service state as Out of Service before making power connections.

Each LPU 96-pin edge connector inserts into a 96-pin backplane socket. The main edge connector has pins for ground, alarms, provisioning, and card input power, plus output power for the remote DSLAM. The daughter card has pins for ground and input power. Output power is available on the 64-pin amphenol connectors on the Total Access 3000/3010 backplane.

The Total Access 3000/3010 chassis has eight 64-pin amphenols on the backplane. They are labeled as follows:

- **PAIR 1**
- **PAIR 2**
- **PAIR 3**
- **PAIR 4**
- **PAIR 5**
- **PAIR 6**
- **PAIR 7**
- **PAIR 8**

As shown in Table 2, if the LPU inserts into slots 1 and 2 of the Total Access 3000/3010, the power pairs appear at loop connections 1 through 4 of slot 1. If the LPU inserts into slots 9 and 10, the power pairs appear at loop connections 1 through 4 of slot 9. If the LPU inserts into slots 20 and 21, the power pairs appear at loop connections 1 through 4 of slot 20, etc. for a maximum allowable number of LPUs based on the Total Access 3000/3010 amperage input limit.

Table 2. Wiring Example

LPU	Slots Used	Slot Where Power Pairs Appear
1	1, 2	1
2	9, 10	9
3	20, 21	20

Powering

The LPU operates on a –40 VDC to –56.7 VDC input voltage range.

The LPU uses about 10 watts of total power on the board, as follows:

- 2 watts are in the following input circuitries:
  - input diodes (A and B diodes)
  - inrush limiting Field Effect Transistor (FET)
  - input inductor
  - input fuse
- 1 watt is dissipated in the locally powered micro-controller and power supply components
- 7 watts are in the span supply

The output voltages are ±145 VDC and are provided on the four loop pairs as shown in Table 3.

Table 3. Span Powered Pair Assignments

Total Access 3000/3010 Backplane Pair Number	Module Edge Connector Pin Number (Tip, Ring)
Pair 1	C6, B6
Pair 2	C5, C4
Pair 3	B5, A5
Pair 4	B4, A4

The LPU current and voltage limits are shown in Table 4.

Table 4. Current and Voltage Limits

Voltage Supply	Minimum Current	Maximum Current
290 VDC ±5%	0.004 amps	0.4 amps
–40 VDC to –56.7 VDC	N/A	2.6 amps

NOTE

Both A and B inputs should be wired to limit the amount of current flowing into the powering pins on the Total Access 3000/3010 backplane connector.

Deployment Guidelines

The number of powering pairs required for powering a DSLAM is dependent on the total resistance in the loop serving the powering pairs. For more information, refer to “Line Powering” in the specific DSLAM Installation and Maintenance Practice.

Front Panel LEDs

The 4-Pair Line Power Unit Access Module provides front panel LEDs to display status information. The 4-Pair Line Power Unit LEDs and status descriptions are shown in Table 5.

Table 5. Front Panel LEDs

Label	Status		Description
POWER	○	Off	LPU has completely failed or the shelf has no power
	●	Green	LPU is In Service and supplying power
	●	Yellow	LPU is Out of Service-Maintenance or Out of Service-Unassigned
	●	Red	LPU has failed self-test
	☼	Flashing (all colors)	LPU is being accessed (terminal, four-character display, TFTP, etc.)
UNDER VOLTAGE	○	Off	Voltage normal: ±145 volts per T/R (±5%)
	●	Red	Less than 115 VDC per T or R Less than 230 VDC per T/R pair
GROUND FAULT	○	Off	No ground fault
	●	Red	Ground fault detected
OVERLOAD	○	Off	No overload
	●	Red	Greater than 0.4 amps at 290 VDC
UNDER CURRENT	○	Off	Current normal
	●	Red	Less than 0.004 amps

Alarms

The faults displayed by the LEDs also produce alarms, which can be reported on the Total Access 3000/3010 Controller Unit. The Controller Unit supports the following alarms:

- SNMP alarms to be used along with the Total Access EMS
- Local alarm contacts
- TL1 NMA alarms

Table 6 shows the alarm descriptions and possible causes.

Table 6. Alarm Descriptions and Causes

Alarm	Description	Possible Cause
Under Voltage	The output voltage is too low.	There is damage to the LPU that caused the output voltage to be lower than 230 VDC (between tip and ring).
Ground Fault	There is a path to ground.	There is a connection between one of the output wires and ground.
Overload	LPU is sourcing too much current.	The output current is greater than 0.4 amps.
Under Current	LPU is sourcing very low current.	The LPU is not connected to any load or a connected load is drawing less than 0.004 amps.

SYSTEM MANAGEMENT

The Controller Unit is the user access point to the Total Access 3000/3010 shelf and the installed modules. The Controller Unit supports a number of interfaces for system management as follows:

- Craft interface
- Admin interface
- Network Management interface
- Ethernet interface
- Inband Management interface

Craft Interface

Connection to the Total Access 3000/3010 system menus can be made through the DB-9 connector, labeled **CRAFT**, on the front panel of the Controller Unit.

Most personal computers or laptops can run communications software that will emulate a VT100 terminal. Windows programs such as Terminal or HyperTerminal are two such examples in the Windows format, but there are many other adequate, commercially available software packages, virtually all of which allow the PC or laptop to emulate a VT100 terminal. Certain configuration items must be set on a PC or laptop to act as a VT100 terminal for the Total Access 3000/3010.

1. Set the parameters of the communications software to the following settings:
   - 9600 baud rate
   - 8 data bits
   - No parity
   - 1 stop bit
   - No flow control
2. Set the PC for direct connect on the appropriate communications port (as opposed to a dial-up connection).
3. Plug the male end of the data cable into the Total Access 3000/3010 Controller Unit. Make connections to the PC or laptop as appropriate to the equipment.

Logging on to the Total Access 3000/3010

At the Total Access 3000/3010 System login screen (Figure 2), enter the account name and password. The default account name is “ADMIN” and the password is “PASSWORD”. An account with ADMIN privileges is required to change the account name and password. For more information, refer to the Controller Unit Installation and Maintenance Practice.

NOTE

The account name and password fields are case-sensitive.

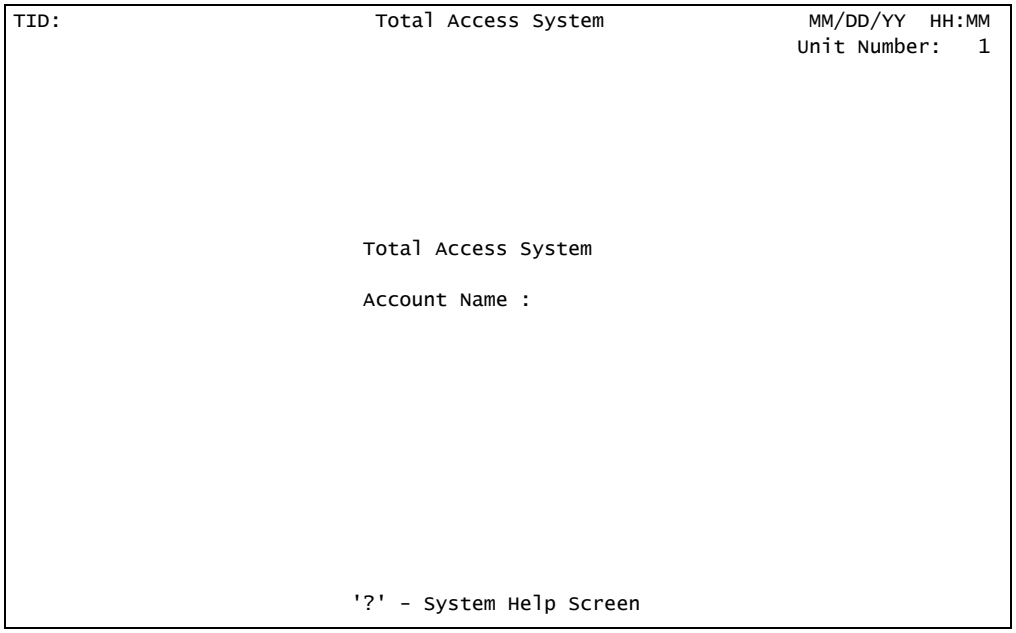

Figure 2. Total Access System Logon Screen

After successful logon, the Total Access Main Menu (Figure 3) displays.

NOTE

Basic menu navigation is accomplished by selecting the desired option number and then pressing ENTER. To return to the previous menu, press the ESC (escape) key. To access the System Help screen, press the question mark (?) key, and press ENTER.

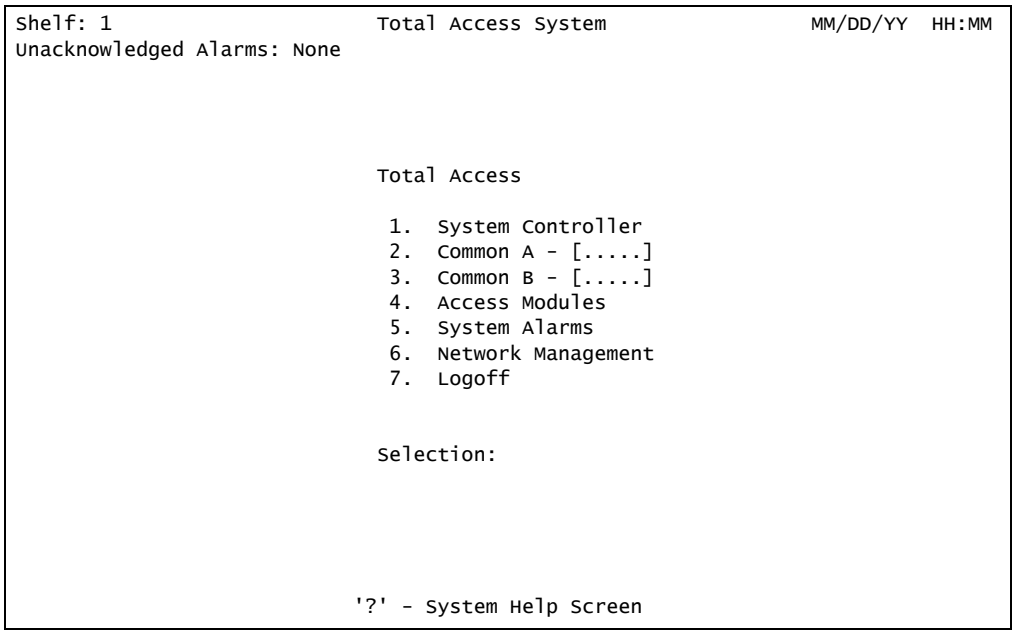

Figure 3. Total Access Main Menu

The Access Module Menus menu (Figure 4) displays the access modules occupying the Total Access 3000/3010 shelf. To the right of each listed access module, the current alarm state is indicated. To access the LPU menus, select the corresponding slot number.

NOTE

The LPU may not appear in the same slot as shown in Figure 4. When accessing the LPU, verify the slot before continuing.

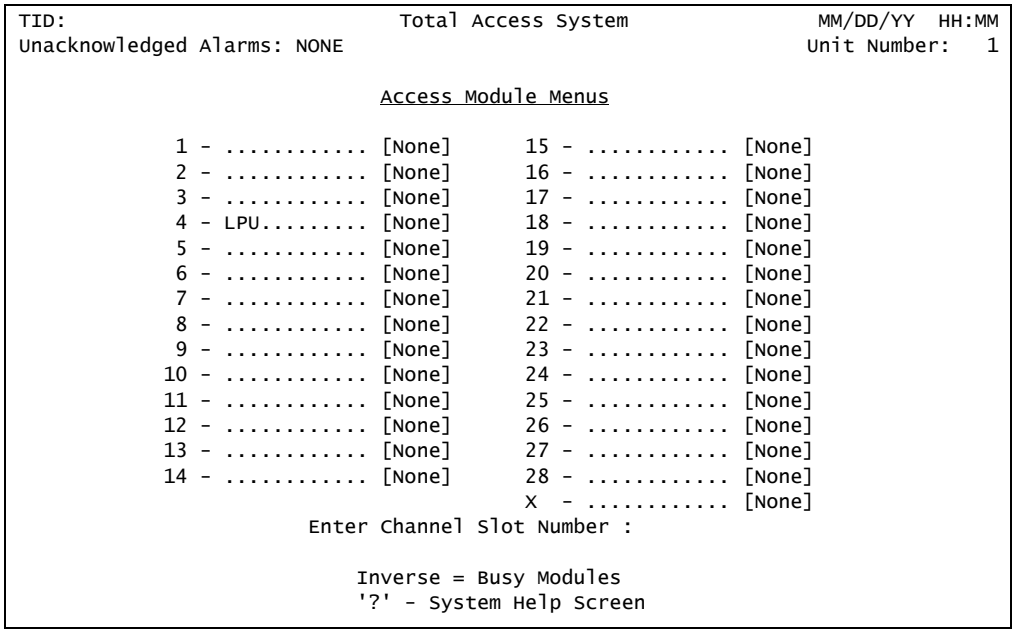

Figure 4. Access Modules Menus Menu

USER INTERFACE

This section provides detailed information on the following:

Menu Structure

The menu structure for the LPU is a layered menu tree. Each layer of the menu tree is displayed as a menu or a screen.

Menus

A menu is a display that provides numbered selections that are used to navigate to related menus, modify provisioning information, or display information screens. A menu can contain the following objects:

- Menu Option: A menu option is indicated by a number, which when selected navigates the display to another menu layer or is used to change the option setting.
- Read-only Field: A read-only field displays information that cannot be changed. The information displayed in a read-only field can be static or can be automatically updated by the unit.
- Read-write Field: A read-write field displays information that when selected can be modified.
- Hot Key: A hot key is a key or combination of keys that are assigned to a function. Hot keys are indicated by the required key(s) and a brief description (i.e., "?" - Help).

Screen

A screen is a display that usually indicates the end of a menu tree path. A screen can contain the following objects:

- Read-only Field: A read-only field displays information that cannot be changed. The information displayed in a read-only field can be static or can be automatically updated by the unit.
- Read-write Field: A read-write field displays information that when selected can be modified.
- Hot Key: A hot key is a key or combination of keys that are assigned to a function. Hot keys are indicated by the required key(s) and a brief description (i.e., "?" - Help).

Menu Navigation

Basic menu navigation is accomplished by selecting the desired option number and then pressing ENTER. To return to the previous menu, press the ESC (escape) key. To access the System Help screen, press the question mark (?) key, and press ENTER.

General Keyboard Commands

Table 7 shows the general keyboard commands for the LPU.

Table 7. General Keyboard Commands

Keyboard Command	Description
BACKSPACE	This keyboard command is used to delete the character to the left of the cursor during keyboard input.
ENTER (or Return)	This keyboard command is used to terminate input.
CTRL+R (Control and r)	This keyboard command is used to refresh the display.
CTRL+X (Control and x)	This keyboard command is used to force the terminal menu display to the top level.
ESC (Escape)	This keyboard command is used to return to the previous menu.
SPACEBAR	This keyboard command is used to toggle the setting choices for a text field.

Menu Tree

There are a number of menu screens designed to aid in the maintenance and troubleshooting of the LPU. The LPU menu tree (see Figure 5) is a visual map that can be used to locate configuration information and provisioning options.

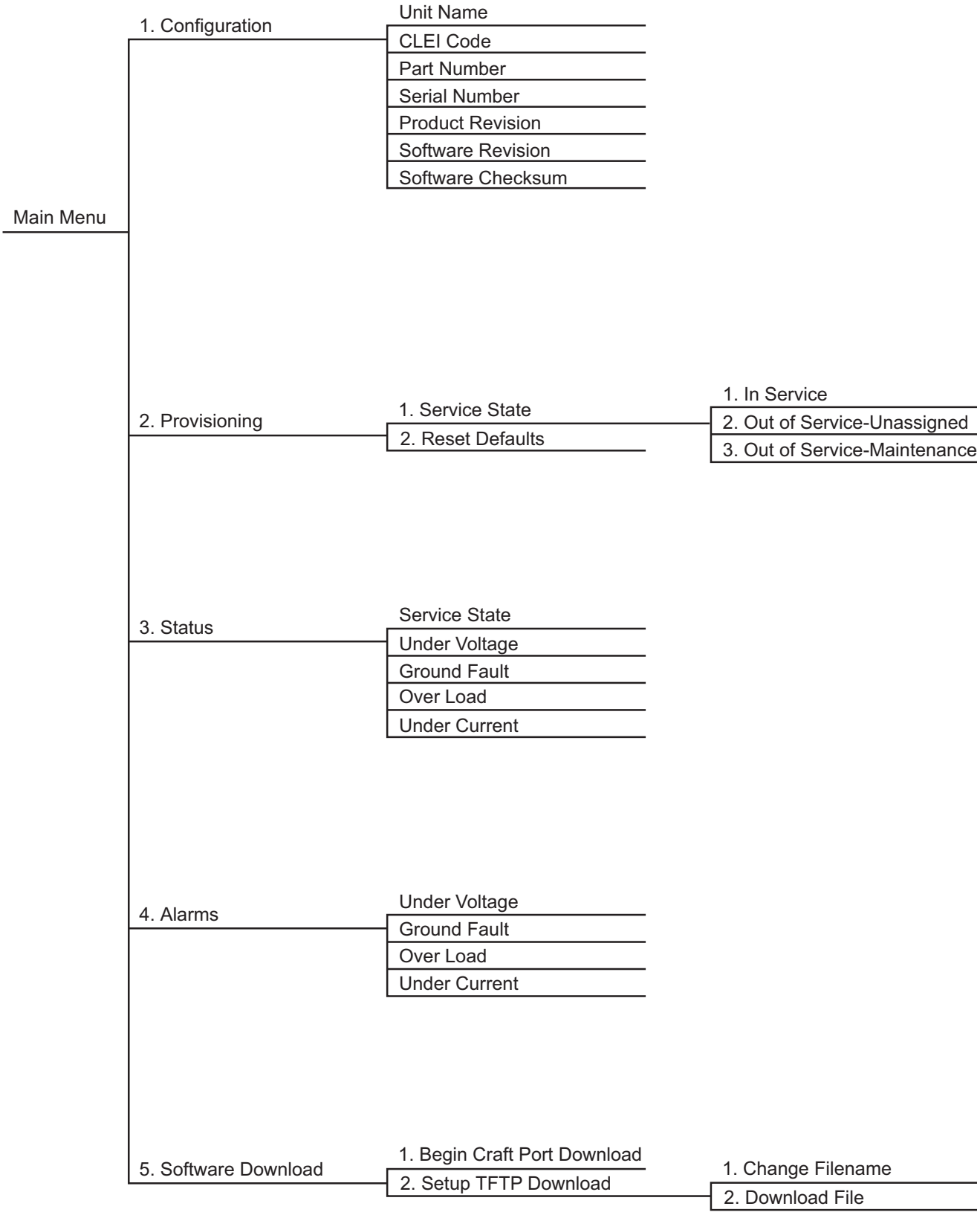

Figure 5. LPU Menu Tree

MENU DESCRIPTIONS

The LPU Main Menu (see Figure 6) is the access point to all other operations. The Main Menu options have several functions and submenus that identify and provide access to specific operations and parameters.

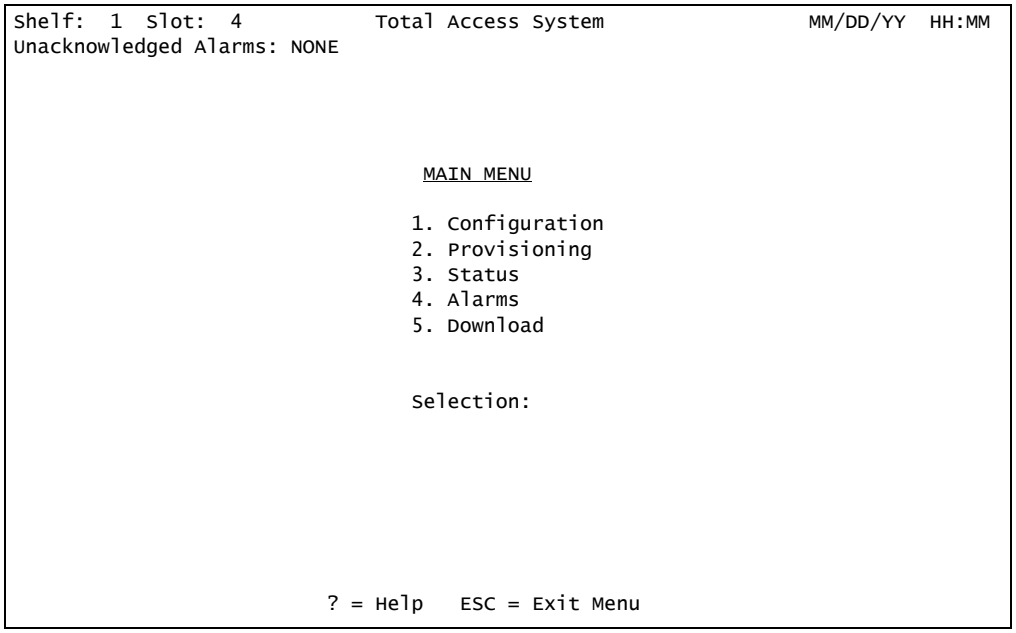

Figure 6. LPU Main Menu

The LPU Main Menu options are shown in Table 8.

Table 8. LPU Main Menu Options

Option	Description	Function
1	Configuration	This option displays the "Configuration Screen" on page 18.
2	Provisioning	This option displays the "Provisioning Menu" on page 19.
3	Status	This option displays the "Status Screen" on page 20.
4	Alarms	This option displays the "Alarms Screen" on page 21.
5	Download	This option displays the "Software Download Menu" on page 22.

Configuration Screen

The Configuration screen (see Figure 7) displays information about the system. For instance, the CLEI Code and Part Number can be used to search for related information on the ADTRAN web site or to order additional parts. The software revision may be required when calling the ADTRAN Technical Support.

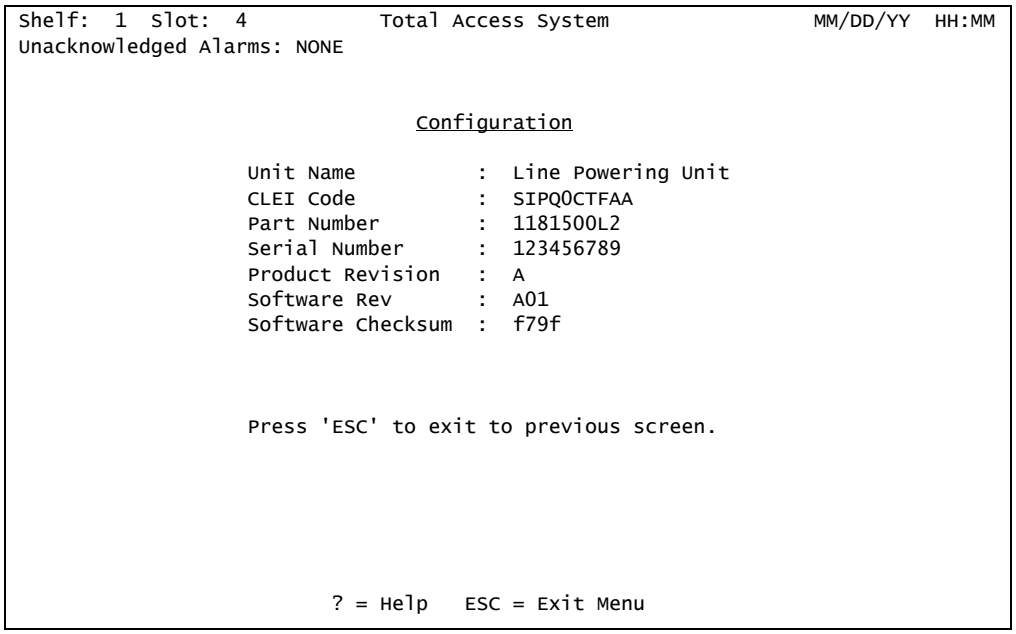

Figure 7. Configuration Screen

The Configuration screen fields are shown in Table 9.

Table 9. Configuration Screen Fields

Field	Description
Unit Name	This field displays the unit name of the LPU.
CLEI Code	This field displays the Common Language Equipment Identifier (CLEI) code of the LPU.
Part Number	This field displays the part number of the LPU.
Serial Number	This field displays the serial number of the LPU.
Product Revision	This field displays the current product revision of the LPU.
Software Rev	This field displays the software revision of the LPU. This field updates automatically when a software download is completed.
Software Checksum	This field displays the application checksum.

Provisioning Menu

The Provisioning menu (see Figure 8) is used to set the service state.

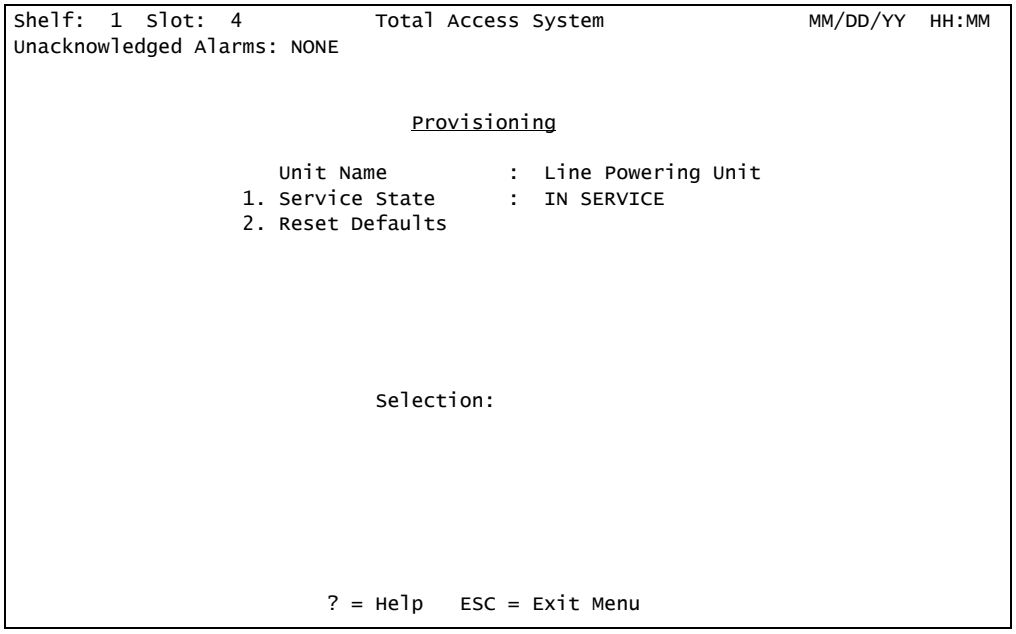

Figure 8. Provisioning Menu

The Provisioning menu options are shown in Table 10.

Table 10. Provisioning Menu Options

Option	Description	Function
1	Service State	This option indicates the service state of the LPU. The following service states are available: • In Service: Power supply output is turned on, and all alarms are reported. • Out of Service-Maintenance: Power Supply output is turned on, alarms reported at LPU only, alarm reporting to the Controller Unit is suppressed. • Out of Service-Unassigned: Power Supply output is turned off, and all alarms are suppressed (default).
2	Reset Defaults	This option is used to reset the LPU to factory defaults.

Status Screen

The Status screen (see Figure 9) displays the status of the LPU alarms.

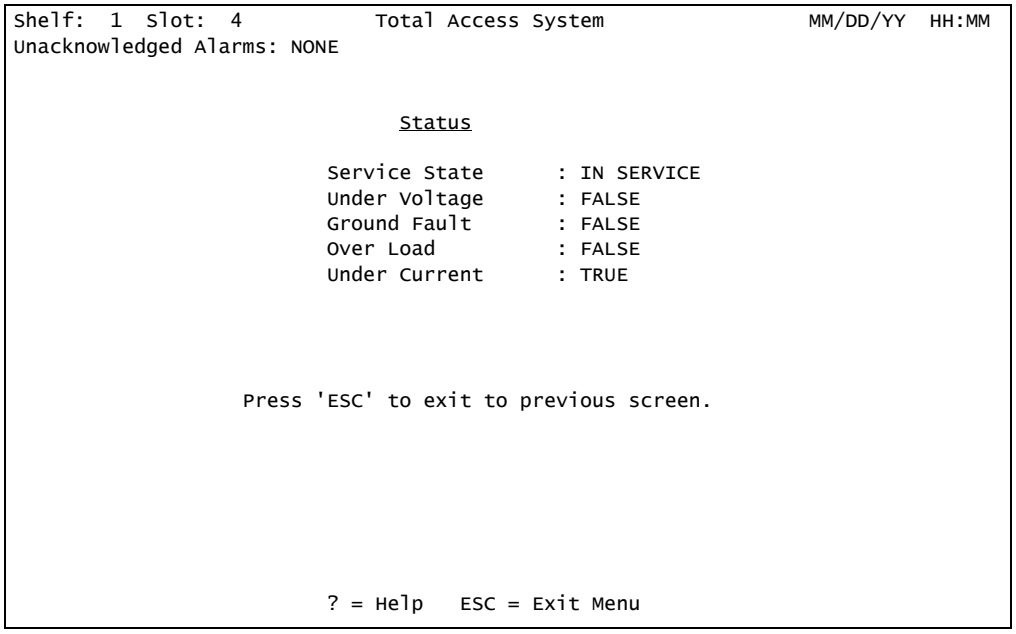

Figure 9. Status Screen

The Status screen fields are shown in Table 11.

Table 11. Status Screen Fields

Field	Description
Service State	This field displays the current service state.
Under Voltage	A true status indicates the Under Voltage alarm is active. A false status indicates the Under Voltage alarm is not active.
Ground Fault	A true status indicates the Ground Fault alarm is active. A false status indicates the Ground Fault alarm is not active.
Over Load	A true status indicates the Over Load alarm is active. A false status indicates the Over Load alarm is not active.
Under Current	A true status indicates the Under Current alarm is active. A false status indicates the Under Current alarm is not active.

Alarms Screen

The Alarms screen (see Figure 10) displays the status of the LPU alarms.

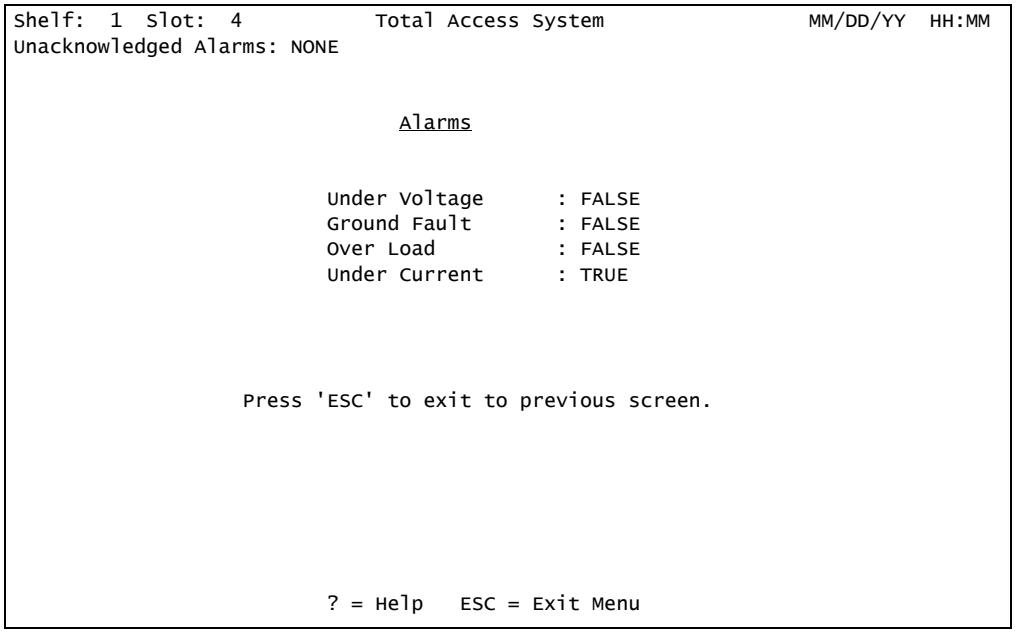

Figure 10. Alarms Screen

The Alarms screen fields are shown in Table 12.

Table 12. Alarms Screen Fields

Field	Description
Under Voltage	A true indicates the Under Voltage alarm is active. A false status indicates the Under Voltage alarm is not active.
Ground Fault	A true status indicates the Ground Fault alarm is active. A false status indicates the Ground Fault alarm is not active.
Over Load	A true status indicates the Over Load alarm is active. A false status indicates the Over Load alarm is not active.
Under Current	A true status indicates the Under Current alarm is active. A false status indicates the Under Current alarm is not active.

Software Download Menu

The Software Download Menu (see Figure 11) is used to download new code either through the Controller Unit craft port or by a TFTP download.

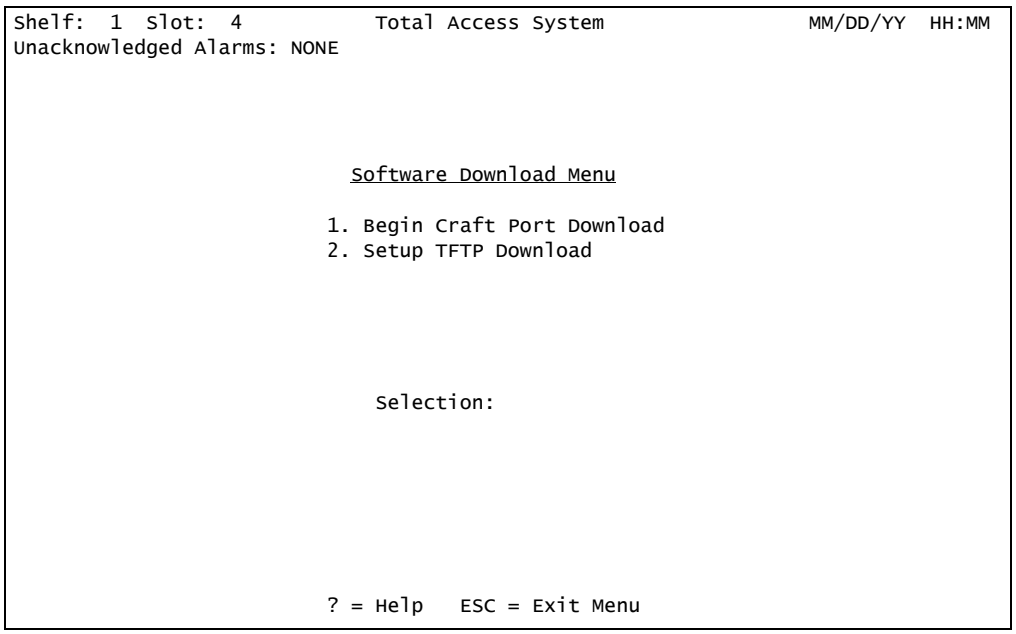

Figure 11. Software Download Menu

The Software Download Menu options are shown in Table 13.

Table 13. Software Download Menu Options

Option	Description	Function
1	Begin Craft Port Download	This option, after confirmation, causes the code to switch to the Y-Modem operating mode that begins transferring a file through the craft port on the Controller Unit. Menus are not available during download.
2	Setup TFTP Download	This option is used to display a menu that facilitates setting up a file transfer through the Controller Unit using TFTP.

MAINTENANCE

The LPU does not require routine maintenance for normal operation. Do not attempt to repair the LPU in the field. Repair services are obtained by returning the defective unit to ADTRAN. Refer to "Appendix A, Warranty" for further information.

SPECIFICATIONS

Specifications for the LPU are detailed in Table 14.

Table 14. Specifications

Specification	Description
Physical	
Dimensions:	Height: 5.5 inches Width: 1.3125 inches Depth: 10.0 inches
Weight:	11 ounces
Environmental	
Operating Temperature:	–40°C to +70°C
Storage Temperature:	–40°C to +85°C
Relative Humidity:	95 percent maximum at 50°C, non condensing
Maximum Current Draw:	2.6 amps maximum at –42 VDC
Maximum Heat Dissipation:	10 watts
Electrical	
Output Power:	100 watts maximum
Operating Voltage:	–40 VDC to –56.7 VDC
Output Voltage:	±145 VDC per T/R pair (290 VDC per T/R pair)
Maximum Output Current:	Rated: 0.345 amps Maximum: 0.4 amps (Total through all output pairs)
Part Number	
Total Access 3000/3010 4-Pair Line Power Unit:	1181500L2

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Appendix A
Warranty

WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found at www.adtran.com/warranty.

Refer to the following subsections for sales, support, Customer and Product Service (CAPS) requests, or further information.

ADTRAN Sales

Pricing/Availability:

800-827-0807

ADTRAN Technical Support

Pre-Sales Applications/Post-Sales Technical Assistance:

800-726-8663

Standard hours: Monday - Friday, 7 a.m. - 7 p.m. CST
Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS

Return for Repair/Upgrade:

(256) 963-8722

Repair and Return Address

Contact CAPS prior to returning equipment to ADTRAN.

ADTRAN, Inc.
CAPS Department
901 Explorer Boulevard
Huntsville, Alabama 35806-2807

Carrier Networks Division
901 Explorer Blvd.
Huntsville, AL 35806