TeleLite™

Single POTS Interface Cards,
(720260xxx & 720270xxx)
Description and Installation Guide

925W720105-06E

POSITRON
Positron Inc.

Contents

Acronyms

cHVI	Compact High Voltage Interface
CO	Central Office
CSA	Canadian Standards Association
DC	Direct Current
ESD	Electro-Static Discharge
FCC	Federal Communications Commission
FXO	Foreign Exchange Originating
FXS	Foreign Exchange Subscriber
GPR	Ground Potential Rise
HVI	High Voltage Interface
PBX	Private Branch Exchange
LED	Light-emitting Diode
LOS	Loss of Signal
NC	No Connection
NEBS	Network Equipment-Building System
POTS	Plain Old Telephone Service
RTN	Return
RX	Receive
TX	Transmit

Chapter 1

General Information

1.1 Publication Information

TeleLite Single POTS Interface Cards, (720260xxx & 720270xxx)
Description and Installation Guide
Part number: 925W720105-06E

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Positron Inc.
5101 Buchan Street
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H4P 2R9
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International: 1-514-345-2220

1.2 About this Guide

This guide introduces you to the TeleLite Single POTS Interface Cards, (720260xxx & 720270xxx), their features and applications, and describes how to install each in a TeleLite shelf. This guide was designed to be read from beginning to end.

1.2.1 Related Documentation

The other guides in the TeleLite set are listed below. To order any manuals, please contact your customer service representative.

- 720000 TeleLite 6-position Shelf
- 720002 720002 cHVI 2-slot Rack-Mount Shelf
- 720013 TeleLite 3-position Swing-out shelf

1.2.2 Positron Products and Services

Positron engineers and manufactures high voltage isolation products to protect personnel and telecommunications circuits in high voltage areas that are susceptible to the effects of Ground Potential Rise (GPR).

Positron is the leader in isolation technology with its Teleline wireline products and TeleLite optical fiber wireline isolation/protection product families. Positron provides total flexibility in product configuration – from standalone units protecting a single circuit to high-capacity, multi-shelf HVI preconfigured systems.

Positron also provides a wide range of consulting, analysis and training services for communications companies and electrical utilities.

Full details and contact information are available at www.PositronPower.com/en.

1.3 Compliance Information

1.3.1 FCC Part 15

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

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

1.3.2 FCC Part 68

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA (Administrative Council on Terminal Attachments). On the back of this equipment is a label that contains, among other information, a product identifier in the format US:AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

You are required to request service from the telephone company before you connect the unit to a network. When you request service, provide the telephone company with the following information:

Table 1: Request Service Information

Product Identifier:	PP-SFX-0
Facility Interface Code (FIC):	02LS2
Service Order Code (SOC):	9.0F
Universal Service Order Code (USOC) jack:	RJ-11C
Network Address Code:	E
Equipment Code:	OT
REN:	0.9B
Identification Numbers: US	CT5OT09BPP-SFX-0

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA. A compliant telephone cord and modular plug is provided with this product. It is designed to be connected to a compatible modular jack that is also compliant. For details, see installation instructions.

The Ringer Equivalent Number (REN) is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. For products approved after July 23, 2001, the REN for this product is part of the product identifier that has the format US:AAAEQ##TXXXX. The digits represented by ## are the REN without a decimal point (for example, 03 is a REN of 0.3). For earlier products, the REN is separately shown on the label.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with the TeleLite product, please contact Positron for repair or warranty information. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Positron Inc. located at 5101 Buchan street, Montreal in Canada hereby certifies that the TeleLite bearing labeling identification numbers mentioned above complies with the Federal Communications Commission's (FCC) Rules and Regulations 47 CFR Part 68, and the Administrative Council on Terminal Attachments (ACTA)-adopted technical criteria TIA-968-A-2, Telecommunications - Telephone Terminal Equipment -Technical Requirements for Connection of Terminal Equipment To the Telephone Network, January 2004.

1.3.3 Laser Safety

This laser class 1 product complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001

1.3.4 Product Safety

This equipment is compliant with CSA CAN/CSA-C22.2 No. 60950-1-03

1.3.5 NEBS Compliance

This equipment has been tested and found to comply with the following Telcordia specifications:

- GR-63-CORE
- GR-1089-CORE
- GR-487-CORE

Chapter 2

Overview

2.1 TeleLite System Introduction

TeleLite provides electrical isolation between two points on a telecom landline. Its purpose is to increase electrical isolation between the CO (Central Office) side and Station side. The increase in electrical isolation is achieved by using a fiber optic link. The Station side unit is located either inside or outside the building. The CO side must be located far enough from the Station side so that the GPR does not increase above 300 V with respect to the CO.

The TeleLite system is divided into two parts: the CO side unit and the Station side unit. Each unit is composed of one shelf. Each shelf has six slots for line cards and one slot for a power connection. The shelf backplane does not provide for any telecom connection since all connections (except local power) will be made directly to the RJ-11/RJ-45 connectors, located on the front panel of each card.

The communications link between the CO side unit and the Station side unit supports two types of fibers, single-mode or multi-mode, depending on the customer installation. For information, see section 2.1.1 on page 12.

NOTE The appropriate fiber type must be used for each line card (multi-mode or single-mode).

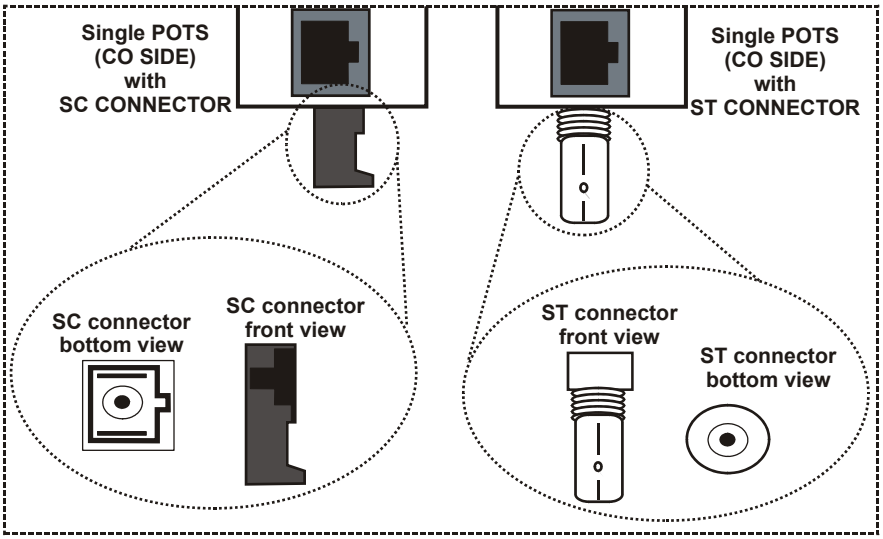
2.1.1 Fiber Connectors

The fiber interface is located on the bottom front panel of each line card. Each of these fiber interfaces will support one of two types of fiber connectors: ST or SC.

Table 2: Fiber Connectors

Fiber Connector	Description
SC	A plastic snap-on optic connector.
ST	An optical fiber connector used to join single fibers together at interconnects, or to connect them to optical cross connects.

Figure 1: SC and ST Fiber Connector Types



2.1.1.1 Multi-mode fiber type

For short distances, less than 5 km (3 miles), the fiber type will be multi-mode using an 850 ηm wavelength LED.

2.1.1.2 Single-mode fiber type

For longer distances, up to 50 km (31 miles), the fiber type will be single-mode using a 1310 ηm wavelength laser.

2.2 Card Type Model Numbers

For information contact Positron customer support.

Table 3: Card Type and Model Numbers

Card Type	Model Number
Single POTS FXS Station side Multi-mode ST connector	720260MST
Single POTS FXS Station side Single-mode SC connector	720260SSC
Single POTS FXO CO side Multi-mode ST connector	720270MST
Single POTS FXO CO side Single-mode SC connector	720270SSC

2.3 Introduction to the Single POTS Interface Card

The Single POTS interface card isolates a single loop start line using a fiber link. Two different cards are required to achieve this functionality:

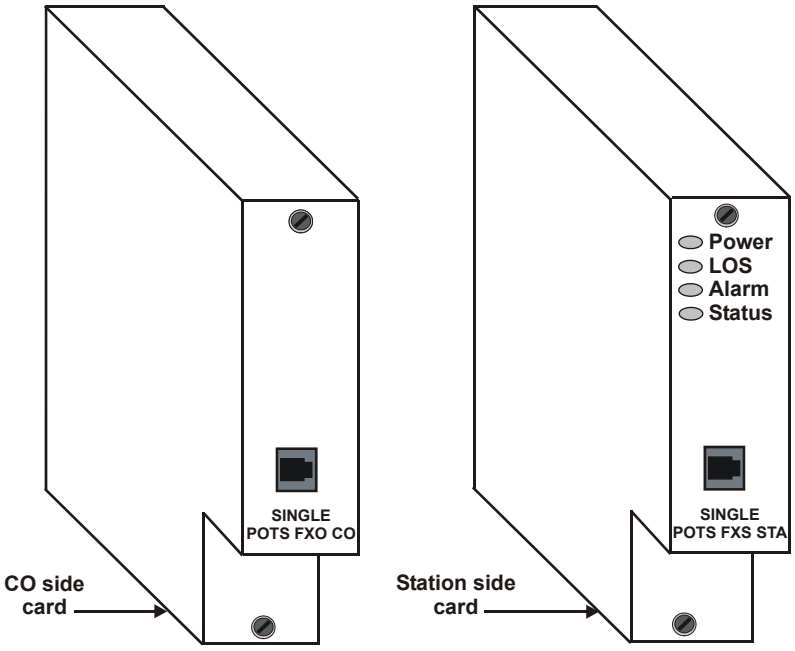
- FXO card: Foreign Exchange Originating (CO side)
- FXS card: Foreign Exchange Subscriber (Station side)

The CO side uses a POTS FXO interface. The FXO is powered from the loop current and does not require any local powering. It interfaces to the CO and provides ringing detection, battery detection and generates off-hook. This card will work with loop currents down to 18 mA.

The Station side uses a POTS FXS interface. The FXS card is powered from a shelf's backplane supply of -48 Vdc. It provides battery feed, battery disconnect, and ringing generation to the station equipment.

For an illustration of a FXO and FXS interface cards, see Figure 2 on page 14.

Figure 2: Single POTS Interface Cards (CO and Station Side)



NOTE This illustration is a general guideline only.

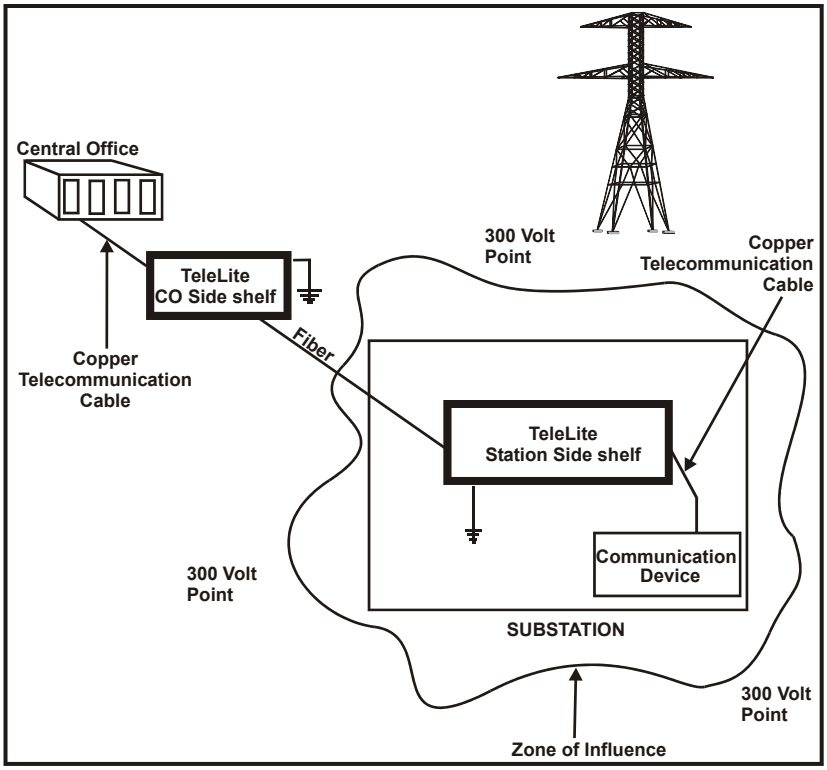
2.4 Applications

The applications include:

- A Loop Start Telephone (POTS)
- A Fax and dial-up “smart” modem
- A Loop Start PBX
- A Dial-up remote meter reading

The Single POTS card uses a type of encoding on the fiber that reduces power consumption to a minimum, while still being able to transmit over 5 km (3 miles) of multi-mode fiber and 50 km (31 miles) of single-mode fiber.

Figure 3: Single POTS Interface Card Application



2.5 Front Panel LEDs

Only the FXS card has LEDs on the front panel.

- For an illustration of the FXO front panel, see Figure 4 below.
- For a description of FXS front panel LEDs, see Figure 5 on page 17.

Figure 4: Single POTS Interface Card (CO Side)

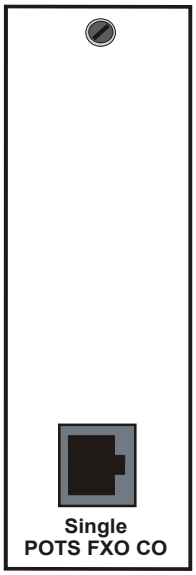
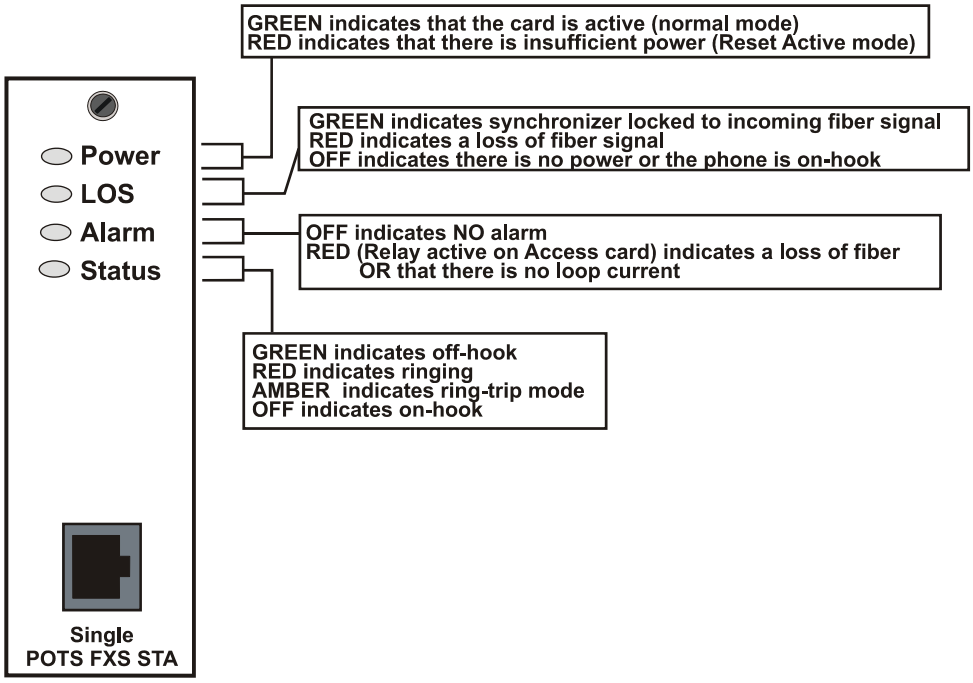
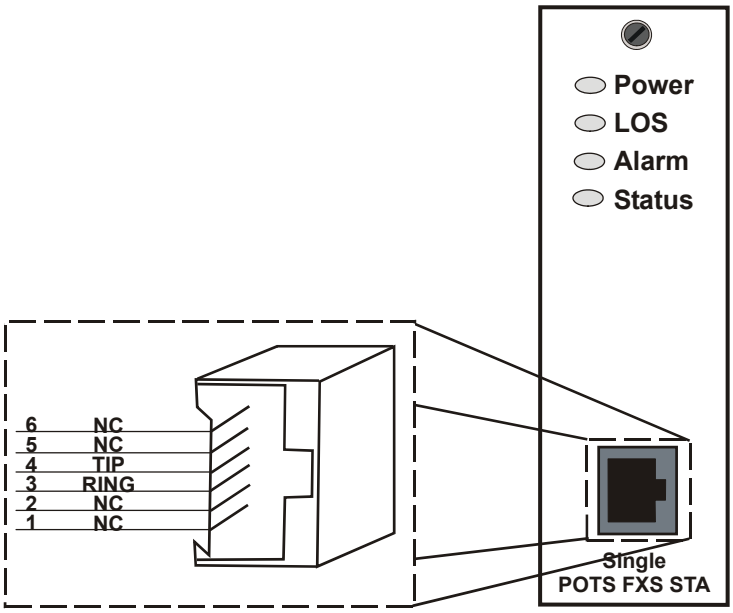


Figure 5: Single POTS Interface Card (Station Side)



2.6 RJ-11C Pinouts Descriptions

Figure 6: Single POTS Interface Card Pinout Assignments (CO and Station side)



NOTE Pinouts are the same for the CO side and Station side interface cards.

2.7 Specifications

Table 4: Electrical Specifications

Parameter	Specification
CO side power consumption	N/A
CO side power dissipation	300 mW
Station side power consumption	3.5 W
Station side power dissipation	2.5 W
FXO on-hook resistance	As per TIA-968 (> 5Mohms)
FXO loop-current	20 mA minimum with -48 Vdc on-hook voltage
FXS maximum line length	2,000 ft
FXS ringing voltage	20 Hz
Maximum ringing load	5 REN

Table 5: Optical Specifications

Parameter	Specification
Fiber optic interface	ST/SC type connector
Transmitter wavelength	Multi-mode: 850 ηm Single-mode: 1310 ηm
Transmitter power output	Multi-mode: -17dBm Single-mode: -11dBm
Receiver sensitivity	Multi-mode: -39dBm Single-mode: -39dBm
Fiber optic type	Multi-mode fiber: 62.5/125 μm Single-mode fiber: 9/125 μm
Fiber span distance	Multi-mode: 5 km (3 miles) Single-mode: 50 km (31 miles)

Table 6: Environmental Specifications

Parameter	Specification
Operating temperature	-40°C to 65°C (-40°F to 149°F)
Storage temperature	-40°C to 85°C (-40°F to 185°F)
Humidity (non-condensing)	20 to 80%
Altitude	-61 to 3048 m (-200 ft to 10,000 ft) above sea level

NOTE The operating temperature specified in Table 6 is the maximum ambient temperature with any combination of TeleLite cards in the shelf.

Chapter 3

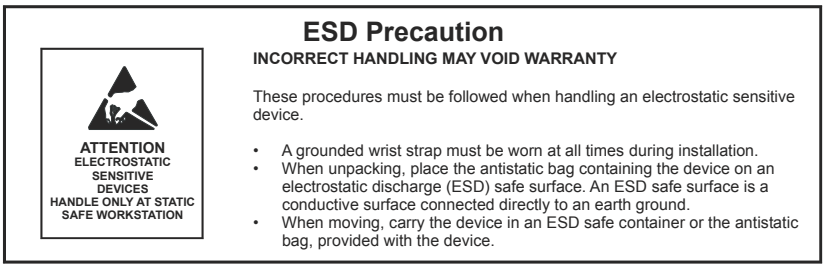
Installation

3.1 Installing a Single POTS Interface Card

After a shelf has been properly installed and all the wiring is complete, the plug-in card can be installed. For information on how to install a shelf, see the TeleLite 6-position Shelf Description and Installation Guide.

Follow the ESD precautions shown in Figure 7.

Figure 7: ESD Precautions



➤ To Install a Single POTS Interface Card in a Shelf

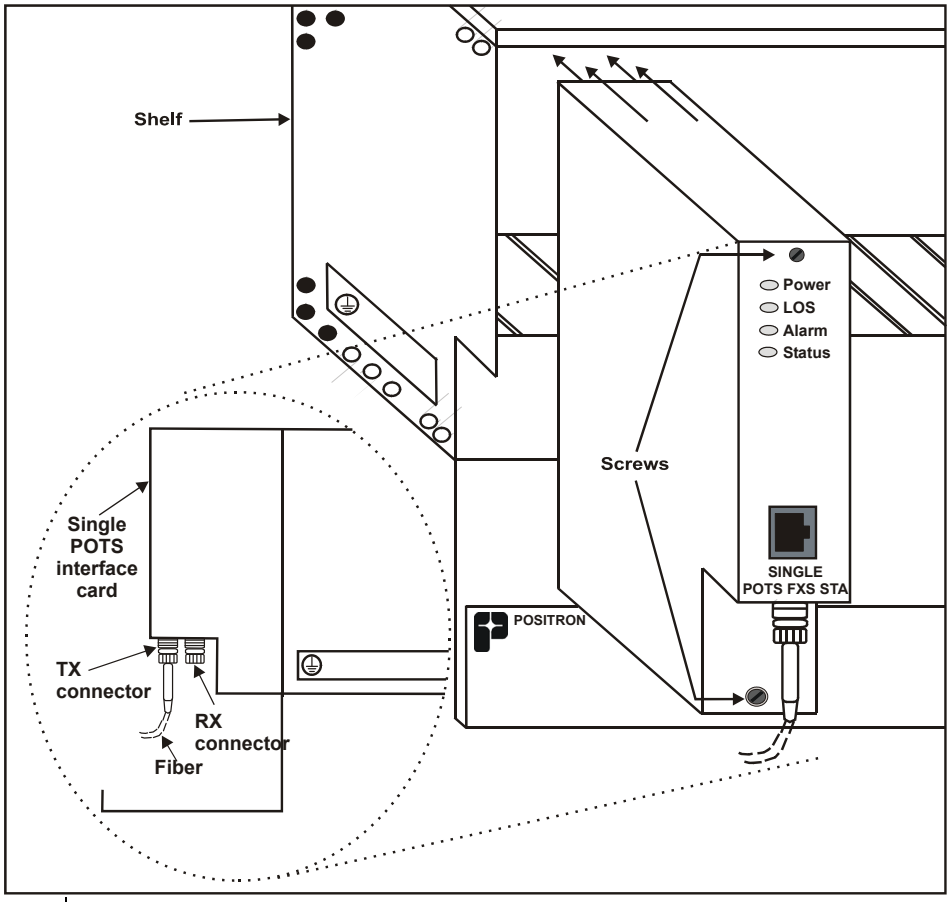
NOTE The installation procedure for the CO and Station side interface cards is the same.

1. Take the card out from its protective packaging.
2. Making sure the card is right-side up, align the card with the appropriate slot of the shelf and slide it in.
3. Hand-tighten the top and bottom screws, to secure the card in place.
4. Connect cables to and from the fiber side using the SC or ST type connectors located on the bottom front panel of each card, then connect them to the TX and RX fibers.
5. Dress the fiber cables using the fiber tray at the front of the shelf, then secure them using a cable guide.
6. Connect the phone line to the RJ-11C connector found on the front panel.

■ For an illustration of the steps that are described above, see Figure 8.

NOTE For information on the Access card (720001) or the different Power Access cards (721123, 721124, 721125), please refer to their respective Description and Installation guides. Those can be found on Positron website at www.PositronPower.com/en.

Figure 8: Installing a Single POTS card in a Shelf



NOTE This illustration is a general guideline only.

3.2 Serving Cable

CAUTION

- The serving cable to the CO unit must be routed and installed according to local regulation.
- The CO unit must be installed outside the zone of influence, beyond the 300 V point (see Figure 3 on page 15).
- Use a fiber and conduit between the CO and Station side unit that is nonconducting and follows local regulations.

3.3 Earthing (Ground) Connector

CAUTION

To ensure safety of personnel, Positron recommends following these guidelines:

- The return of the DC supply must be grounded at the source.
- This equipment must be permanently connected to earth (Refer to 720000 6-position shelf documentation).
- The field wiring should include a readily-accessible disconnect device. The disconnect device shall disconnect both poles (-48 Vdc and RTN).
- This equipment is connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode is connected.
- This equipment must be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system shall not be earthed elsewhere.
- The DC supply source must be located within the same premises as this equipment.
- There shall be no switching or disconnecting devices in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

3.4 Testing

Make sure that the FXS station LEDs and RJ-11C connectors have the following status:

- PWR: GREEN (card is active)
- LOS: OFF (on-hook)
- Alarm: OFF (no alarm)
- Status: OFF (on-hook)

3.4.1 Troubleshooting

Before calling customer service, make sure that:

- The circuit cards are properly powered; see section 3.1 on page 22.
- The line connections are correct, on both copper and fiber side.
- Voltage above 48 Vdc is measured across Tip and Ring when line is on-hook.

Appendix A

Support and Warranty

A 1 Service and Support

A 1.1 Positron Contact Information

General information:	Positron Inc. 5101 Buchan Street, Suite 220 Montreal, Quebec, Canada H4P 2R9 US and Canada: 1-888-577-5254 International: 1-514-345-2220 Fax: 514-345-2271 E-mail: info@positronpower.com Website: www.PositronPower.com
Customer Service and Repairs:	US and Canada: 1-888-577-5254 International: 1-514-345-2220 E-mail: customerservice@positronpower.com

A 1.2 Technical Customer Support

Positron is committed to providing excellent ongoing technical support to its customers. A team of specialists is always available for telephone consultations or for on-site visits to assist in the maintenance and troubleshooting of Positron equipment.
For pricing information or assistance in the planning, configuration and implementation of the installation of equipment, contact Technical Customer Service.

A 1.3 Customer Training

Full customer training courses on High Voltage Interface (HVI) are also available. For more information, contact Positron.

A 1.4 Repair Service

All warranty repairs are performed at no cost. Positron reserves the right to repair or replace any equipment that has been found to be defective.

For information about out-of-warranty repairs, contact Positron's Repair department at 1-888-577-5254 (US and Canada) or 1-514-345-2220 (International). Due to the varied nature of repairs, no specific turnaround can be guaranteed, but average turnaround time is two weeks from date of receipt. In emergency situations, special arrangements can be made. All repaired items are warranted for a period of 90 days.

Before returning any items to Positron for repair, warranty repair or replacement, call the Repair department to obtain a Return Material Authorization (RMA) number. Parts returned without RMA numbers cannot be accepted. The RMA number must always be clearly marked on all boxes, crates, and shipping documents. Bulk repairs (more than five items) will require additional processing time, so please take this into consideration when requesting an RMA number.

To accelerate the repair process, whenever possible, include a report detailing the reason for return with the unit(s). Also, please include the name and phone number of a person who can be contacted should our Repair department need further information.

When packing items being returned for repair, please ensure they are properly packed to avoid further damage. TeleLite Interface cards should never be shipped while installed in a shelf; this will cause damage that can extend the repair period.

A 2 TeleLite Warranty

Subject to the provisions of this paragraph, Positron warrants that the equipment shall perform in accordance with Positron's specifications. The warranty remains valid for one (1) year from the date of shipment. The warranty fully covers workmanship, materials and labor. Positron shall, at its sole discretion, repair or replace the problem unit.

Freight costs to ship defective equipment to Positron are borne by the Customer, with return of replaced or repaired equipment to be at Positron's expense.

A 2.1 Limitation of Liability

Subject to anything to the contrary contained herein, Positron's sole obligation and liability and the customer's sole remedy for Positron's negligence, breach of warranty, breach of contract or for any other liability in any way connected with or arising out of, the equipment or any services performed by Positron shall be as follows:

- In all situations involving performance or non-performance of the equipment or any component thereof, the customer's sole remedy shall be, at Positron's option, the repair or replacement of the equipment or said component.
- For any other claim in any other way related to the subject matter of any order under, the customer shall be entitled to recover actual and direct damages; provided that Positron's liability for damages for any cause whatsoever, and regardless of the form of the action, whether in contract or in tort (including negligence), shall be limited to the value of the order.

Positron shall not be obligated to repair or replace any item of the equipment which has been repaired by others, abused or improperly handled, improperly stored, altered or used with third party material or equipment, which material, or equipment may be defective, of poor quality or incompatible with the equipment supplied by Positron, and Positron shall not be obligated to repair or replace any component of the equipment which has not been installed according to Positron specifications.

IN NO EVENT SHALL POSITRON BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SIMILAR OR ADDITIONAL DAMAGES INCURRED OR SUFFERED INCLUDING LOSS OF PROFITS, LOSS OF REVENUES, LOSS OF DATA, LOSS OF BUSINESS INFORMATION, LOSS OF GOODWILL, LOSS OF EXPECTED SAVINGS OR BUSINESS INTERRUPTION ARISING OUT OF OR IN CONNECTION WITH THE EQUIPMENT, A PURCHASE ORDER SUPPLIES, MAINTENANCE SERVICES OR OTHER SERVICES FURNISHED HEREUNDER, EVEN IF POSITRON HAS BEEN ADVISED OR IS AWARE OF THE POSSIBILITY OF SUCH DAMAGES.

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, POSITRON DISCLAIMS ANY FURTHER CONDITIONS, REPRESENTATIONS OR WARRANTIES, WHETHER

WRITTEN OR ORAL, EXPRESSED OR IMPLIED, INCLUDING THE CONDITIONS AND WARRANTIES OF MERCHANTABILITY, MERCHANTABLE QUALITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, PERFORMANCE AND THOSE ARISING FROM STATUE, TO THE EXTENT PERMITTED BY LAW. POSITRON DOES NOT WARRANT THAT THE SYSTEM WILL OPERATE WITHOUT INTERRUPTION OR THAT IT WILL BE ERROR FREE.

A 2.2 Cancellation and Rescheduling Charges

Should the customer cancel, prior to shipment, any part of an order, the customer agrees to pay to Positron cancellation charges, not as a penalty, which shall total all expenses, including labor expenses, incurred by Positron prior to said cancellation. Equipment that has been specially developed for the customer's specific applications shall not be subject to cancellation. Cancellation or rescheduling is not permissible after shipment of the System.