Teleline™

Plug-in 56K Adtran Total Reach Card, 751333A
Description and Installation Guide

925W751023-07E

POSITRON

Positron Inc.

Contents

Chapter 1

General Information

1.1 Publication Information

Plug-in 56K Adtran Total Reach Card, 751333A
Description and Installation Guide
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1.2 About this Guide

This guide introduces you to the Teleline Plug-in 56K Adtran Total Reach Card, 751333A. This guide was designed to be read from beginning to end.

1.2.1 Related Documentation

For any other technical document relating this system installation or applications cards and shelves, please refer to the Positron Web site: www.PositronPower.com.

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

1.3 Service and Support

1.3.1 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

1.3.2 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.

1.3.3 Customer Training

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

1.3.4 Product Safety

This equipment is compliant with CSA CAN/CSA-C22.2 No. 60950-1-07.

1.3.5 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. Due to the varied nature of repairs, no specific turnaround can be guaranteed, but average turnaround time is 20 working days 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. Plug-in cards should never be shipped while installed in a shelf; this will cause damage that can extend the repair period.

1.4 Teleline 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 five (5) years 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.

1.4.1 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 STATUTE, TO THE EXTENT PERMITTED BY LAW. POSITRON DOES NOT WARRANT THAT THE SYSTEM WILL OPERATE WITHOUT INTERRUPTION OR THAT IT WILL BE ERROR FREE.

1.4.2 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.

Chapter 2

Overview

2.1 Plug-in 56K Adtran Total Reach Card

The Plug-in (ISDN) Integrated Services Digital Network plus 56K Adtran Total Reach Card provides high voltage isolation between an ISDN line and the network termination (NT) equipment at the customer's location, or a Total Reach DDS circuit.

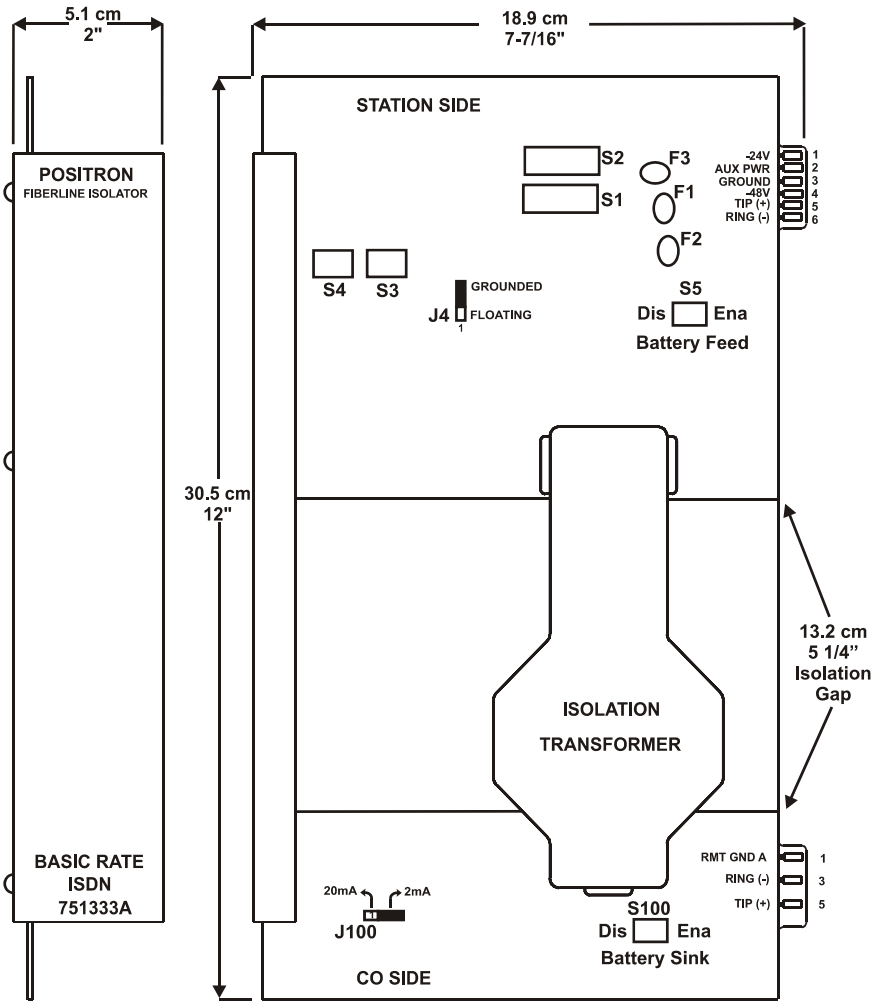
The card provides for grounded -24 Vdc, -48 Vdc or floating 129 Vdc input and is designed for use in any of the old and new generation, 3-, 5- and 8-card Teleline Shelves.

Its features include:

- The card can operate with or without battery feed by a customer selectable option.
- The current on the CO side can be set to 2 mA or 20 mA using a jumper setting.
- The battery feed on the Station side can be set to -100 Vdc (positive on Tip), -50 Vdc (positive on Tip), -130 Vdc (positive on Tip) or -65 Vdc (positive on Tip). The battery can be grounded or set to a floating condition.

For a view of the Plug-in 56K Adtran Total Reach Card, refer to Figure 1 on page 15.

Figure 1: Model 751333A Major Component Layout



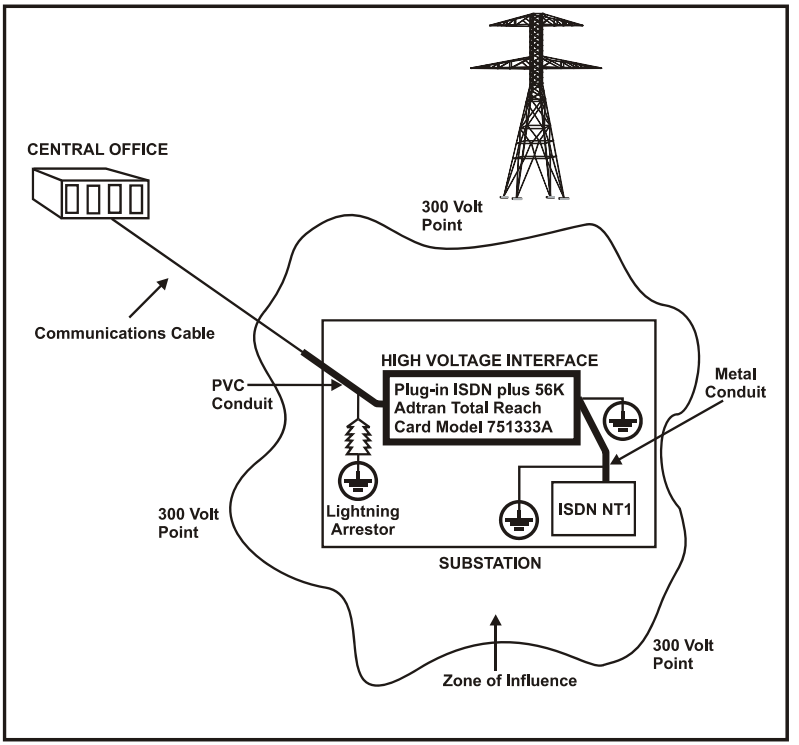
2.2 Applications

The applications of the Plug-in 56K Adtran Total Reach Card include the following:

- Regular ISDN line with or without battery feed
- Total Reach ISDN from Adtran
- Adtran Total Reach DDS circuits up to 64Kb/s
- Two-wire AC circuit with 100 to 200 Ω impedance (by setting battery feed to disable)

For an illustration of the card's application, refer to Figure 2 below.

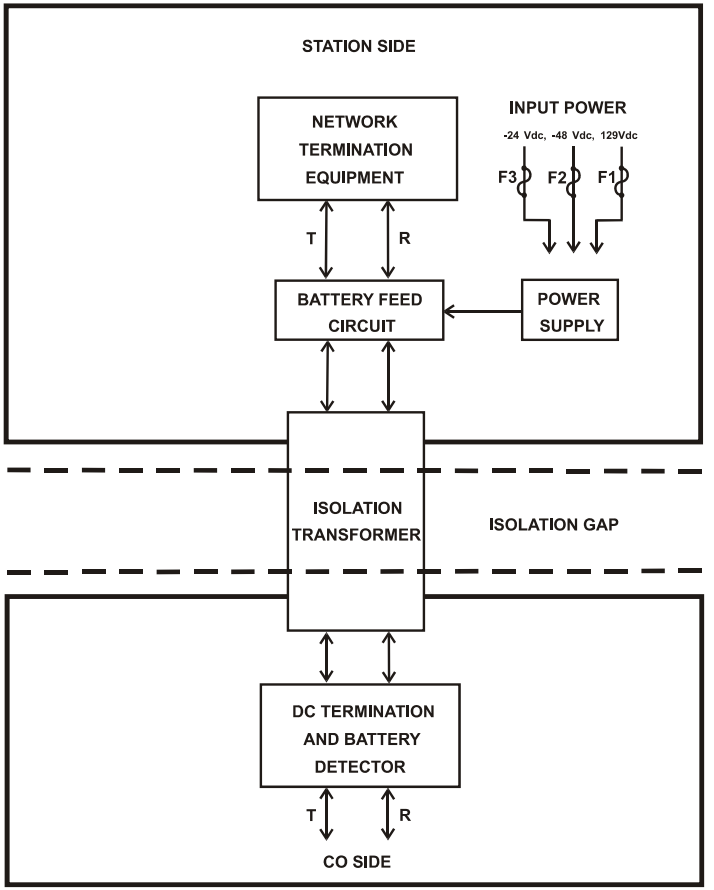
Figure 2: High Voltage Interface Application



2.3 Hardware Description

The Teleline 56K Adtran Total Reach Card is comprised of two sides. The Station side is located on the upper portion of the card and the CO side is located on the lower portion of the card. The Station side is separated from the CO side by an isolation transformer and an opto-isolator which create a 13.2 cm (5¼ inch) isolation gap. For the card's block diagram, refer to Figure 3 below.

Figure 3: Block Diagram



The following is a description of the elements of the Basic Rate ISDN Card block diagram.

2.3.1 Battery Feed Circuit

The Battery Feed Circuit supplies the line with a voltage of 0, -50, -65, -100 or -130 Vdc depending on the selected switch settings of the card. The Battery Feed Circuit will duplicate the absence or presence of a battery on the CO side at the Station side

2.3.2 Power Supply

CAUTION

- The Power Supply is switch mode configured. It receives an input of either -24 Vdc, -48 Vdc or 129 Vdc, which must be set via the card's input switches and generates the required voltages used by the card itself. In addition, the power supply generates line voltages of either 50 Vdc, 65 Vdc, 100 Vdc or 130 Vdc.

NOTE

- When switch S5 is set for "no battery", the power supply is turned off and the unit draws very little current.

2.3.3 Isolation Transformer

The Isolation Transformer is a high voltage, low-loss, full duplex component that permits the transmission of data through the isolation gap while maintaining an isolation on the CO and Station sides of the card.

2.3.4 DC Termination and Battery Detector

The DC Termination and Battery Detector circuit presents a low DC impedance to the CO and detects CO battery.

2.3.5 Fuses F1, F2 and F3

WARNING

- Fuses F1 (1 A), F2 and F3 (2-1/2 A) are fast-blow to provide over-current protection in case of card malfunction or input over-voltage.
- Fuses are not field-replaceable, if damaged, send unit for repair

NOTE

- 129 V is fed through -48 V (negative) and AUX PWR (positive).

2.4 Technical Specifications

For a listing of the card's electrical specifications, refer to Table 1 below. For a listing of the card's physical specifications, refer to see Table 2 on page 22.

Table 1: Electrical Specifications (measured at 25°C or 77°F, 50% R.H.)

Parameter	Specifications
ISOLATION DATA:	
Isolation resistance	≥100 000 MΩ
Metallic surge	3 kV_{rms}
Insulation voltage	50 kV_{rms} (70 kV peak)
NOISE	
THD (1 kHz @ -3 dBm)	Better than -68 dB
Impulse noise (both sides)	Less than 1 count in 30 minutes above 48 dBrnC
Phase jitter	< 0.5°, 300 to 3400 Hz
Noise (2 Hz to 100 Hz)	-60 dBm
Circuit noise (quiet termination, 50 kHz flat filter)	<10 dBrn
S/N ratio (50 kHz flat filter)	45 dB with 1 kHz sine @ 2.5 Vpk
Crosstalk (with adjacent card)	TBD
SIGNAL	
Return loss (@ 2.5 Vpk, either side, opposite side terminated with 135 Ω)	≥ 0 dB @1 kHz; increases 20 dB/dec, 1 kHz to 10 kHz; ≥ 20 dB, 10 kHz to 25 kHz; decreases 20 dB/dec, 25 kHz to 250 kHz; 0 dB @ 250 kHz
Insertion loss (@ 2.5 Vpk, with CO and Station side circuits ON or OFF; connected directly)	≤ 0.5 dB @ 40 kHz; ≤ 0.5 dB @ 3 kHz

Parameter	Specifications
Insertion loss (@ 2.5 Vpk, with CO and Station side circuits ON or OFF; 5 miles of 22 gauge on CO side)	≤ 2 dB @ 40 kHz; ≤ 2 dB @ 3 kHz
Longitudinal balance (CO side)	≥ 24 dB @ 5 Hz; increases 20 dB/dec to ≥ 55 dB @ 281.2; ≥ 55 dB, 281.2 Hz to 40 kHz; decreases 20 dB/dec above 40 kHz
Bandwidth (-3 dB)	200 Hz to 120 kHz
DC CHARACTERISTICS	
Maximum CO side voltage	200 V
Current limiting on CO side	2 mA ± 1 mA or 20 mA ± 4 mA
Minimum operating current on CO side	≤ 1.5 mA
Line voltage on Station side	50 Vdc, 65 Vdc, 100 Vdc, 130 Vdc
Current limit on Station side	25 mA ± 2 mA
DC voltage drop (when on)	<30 V
DC termination when dropped (off)	10 μF ± 10%; R ≥ 2 MΩ
DC resistance Tip-Ground or Ring-Ground	> 5 MΩ for V ≤ 100 Vdc
Max. input current	
-24 Vdc	≤ 620 mA
-48 Vdc	≤ 270 mA
129 Vdc	≤ 110 mA
* When S5 set without battery feed	≤ 5 mA

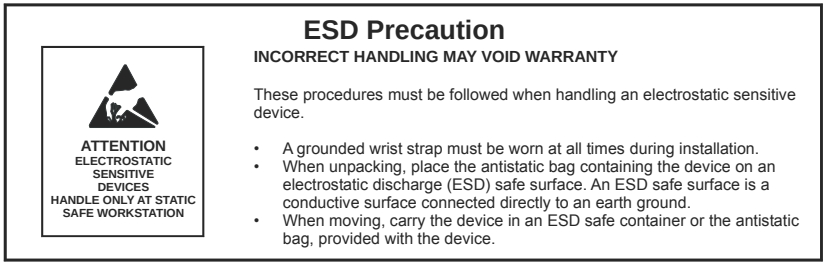
Table 2: Physical Specifications model 751333A

Parameter	Specifications
Operating temperature range	-20°C to + 65°C (-4°F to +149°F)
Height	30.5 cm (12”)
Width	5.1 cm (2”)
Depth	18.9 cm (7-7/16”)
Weight	1 kg (2.2 lbs)

Chapter 3

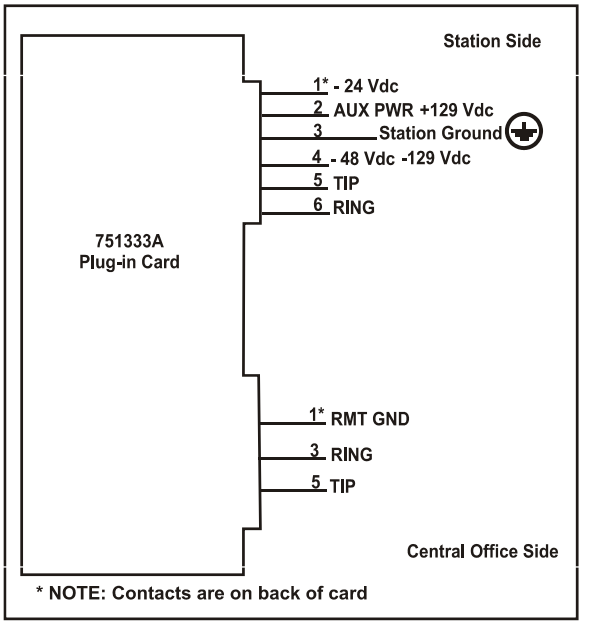
Installation

3.1 Installation



The Plug-in 56K Adtran Total Reach Card plugs into any slot of the Teleline 3-, 5- or 8-card Shelf. However, the card must be installed into the slot which has been pre-wired according to the installation diagram of the specific shelf.

Figure 4: Two-wire ISDN Circuit Using a Single 751333A Card



NOTE

- Station end ISDN equipment CAN be powered from this card, the power is regenerated on the station side of the card. Powered by the shelf power source.
- For 129 Vdc powering, AUX PWR for the + input, and -48 for the -input.

CAUTION

- Stand on a thick rubber mat and wear rubber gloves during the installation procedure. It is preferable to perform these procedures on a clear dry day when a Ground Potential Rise (GPR) or transients are less likely to occur.
- Power should only be applied after all wiring is completed. The Station and CO cables should be kept at least 15.2 cm (6”) apart upon wiring in order to prevent an electric arc between the two in the event of damaged or degraded insulation.
- Grounding of the card is done through the shelf. See the grounding section of the shelf’s installation manual for more information.

➤ **To install the Plug-in 56K Adtran Total Reach Card:**

1. Unpack the Plug-in 56K Adtran Total Reach Card from its box and the shielded anti-static bag.
2. Confirm that the unit is a Teleline 56K Adtran Total Reach Card by identifying the name and model number on the faceplate of the card.
3. Verify that the fuses F1, F2 and F3 are intact. To locate the fuses, refer to Figure 1 on page 15.

WARNING

- If one of the fuses is blown, contact Positron for a card replacement as the fuses are NOT field-replaceable.

4. The unit is factory-set for -48 Vdc input, -130 Vdc line feed on the Station side and 20 mAdc line current on the CO side.
5. Verify that the input switches, output switches and the jumpers are set properly and are compatible with the equipment to be protected.
   - For an illustration of the Station side power supply options, refer to Figure 5 on page 27.
   - For a listing of the Station side and CO side battery options, refer to Figure 7 on page 29, Table 3 on page 30 and Table 4 on page 30.

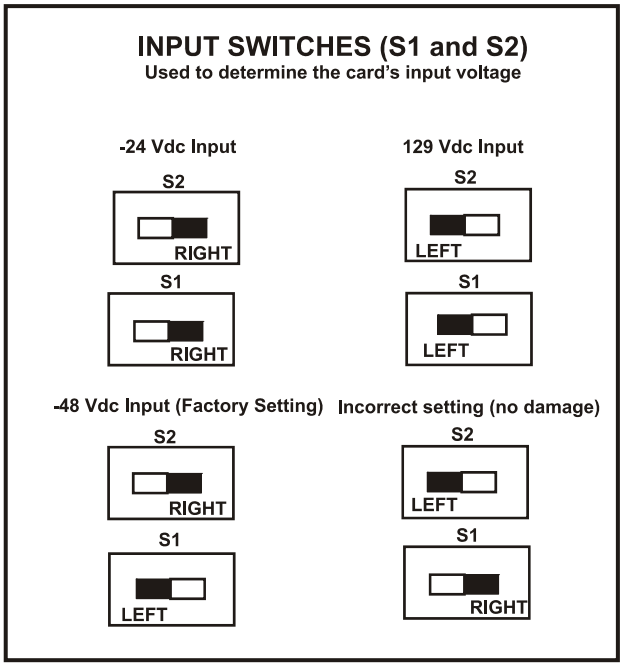
NOTE

- When set to Grounded, the Tip side of the line is grounded. If the battery is enabled, the Ring is then negative
- You cannot have 129 Vdc and -48 Vdc in the same Teleline Isolator shelf.

6. The card must be inserted rightside up and may be plugged into the shelf with the power ON or OFF.
7. Slide the card into its designated pre-wired shelf slot until the two card-edge connectors lock into the Teleline shelf and the retaining clip snaps into place.
8. Verify that the installation is correct by establishing communication on the line.

3.1.1 Power Supply Switch Settings

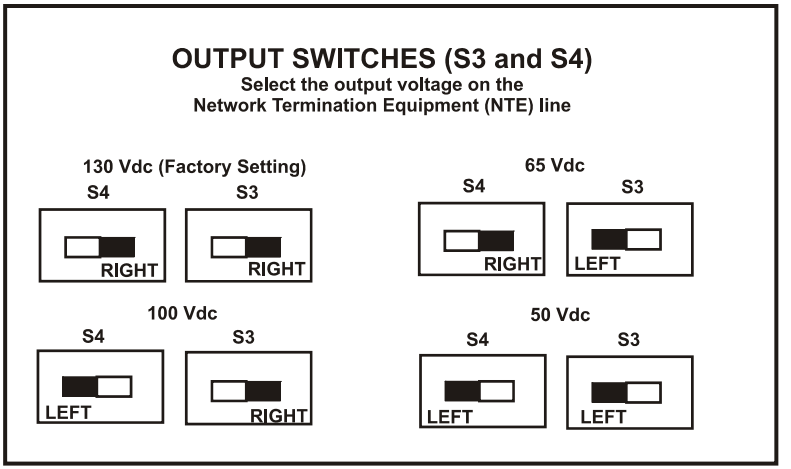
Figure 5: Station Side Power Supply Input Options



NOTE

- Incorrect output switch settings will not damage Positron equipment, but may damage equipment connected to it.

Figure 6: Station Side Power Supply Output Options



3.1.2 Strapping options

For a Two-wire ADTRAN “Total Reach” ISDN circuit using a single 751333A Card.

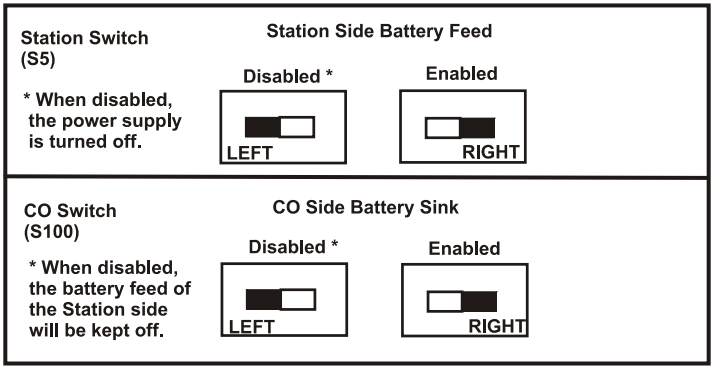
CAUTION

- Input switches S1 & S2 / Set to the correct supply voltage from the backplane of the shelf (cabinet).
- Output Switches S3 & S4 / Set to 130 V / both switches to the Right position

CAUTION

- Jumper J4 / Set to position 2-3 / Grounded.
- Jumper J100 / Set to position 1-2 / 20 mA loop current.
- Switch S5 / Must be enabled.
- Switch S100 / Must be enabled.

Figure 7: Station and CO Side Battery Switches



NOTE

- Both switches are factory-set to Enabled.
- Left and Right are with card upward and facing user.

Table 3: Jumper J100 Settings

Jumper	Description	Jumper Position
J100 (CO Side)	20 mA current sink	1 - 2*
J100 (CO Side)	2 mA current sink	2 - 3
* factory setting		

Table 4: Jumper J4 Settings

Jumper	Description	Jumper Position
J4 (Station Side)	Floating (All Voltages)	1 - 2
J4 (Station Side)	Grounded (Tip, All Voltages)	2 - 3 *
* factory setting		

3.2 Maintenance

NOTE

- Before maintenance, disconnect telecom lines on all cards being serviced in the CO splice case and on the station punch block. If not possible, stand on a thick rubber mat and wear gloves during maintenance. It is preferable to perform these procedures on a clear, dry day when a GPR (Ground Potential Rise) or transients are less likely to occur.

Appendix A

Acronyms

Acronyms

ANSI	American National Standards Institute
AWG	American Wire Gauge
CO	Central Office
CMOS	Complimentary Metal Oxide Semiconductor
DC	Direct Current
ESD	Electro-Static Discharge
FCC	Federal Communications Commission
GPR	Ground Potential Rise
ISDN	Integrated Services Digital Network
LED	Light-emitting Diode
NTE	Network Termination Equipment
PCB	Printed Circuit Board
PWR	Power
RMA	Return Material Authorization
RMT	Remote
RTN	Return