Teleline™

Plug-in 2-wire AC Data Card, 7501-72
Description and Installation Guide

925W751027-10E

POSITRON
Positron Inc.

Contents

Chapter 1

General Information

1.1 Publication Information

Teleline Plug-in 2-wire AC Data Card, 7501-72
Description and Installation Guide
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1.2 About this Guide

This guide introduces you to the Teleline Plug-in 2-wire AC Data Card, 7501-72, and describes how to install it in a Teleline shelf. 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 Compliance Information

1.4.1 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.

1.5 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.

1.5.1 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.

1.5.2 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 Introduction to the Plug-in 2-wire AC Data Card, model 7501-72

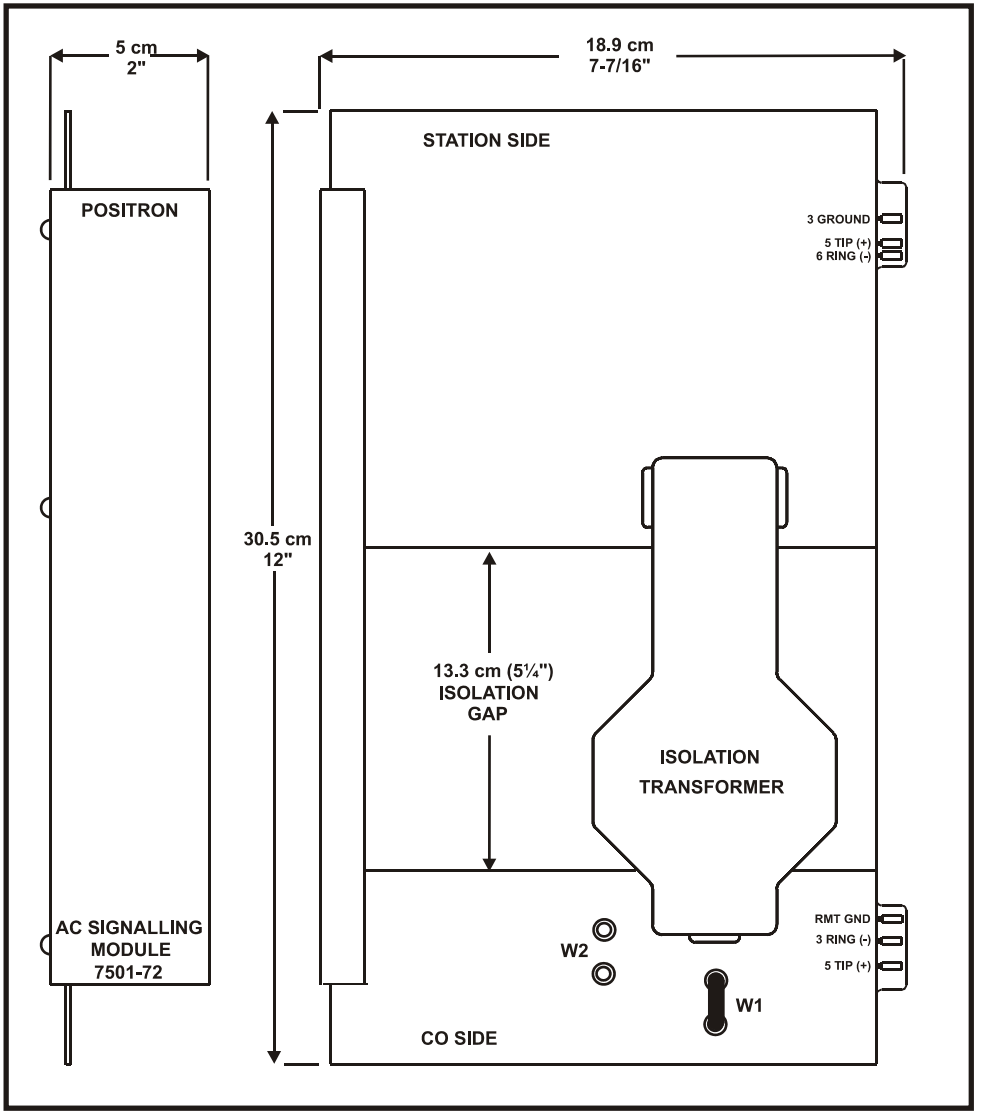
The Plug-in 2-wire AC Data Card, model 7501-72, provides high voltage isolation between an incoming dedicated 2-wire data line and a data transmitting/receiving device located in the station.

Its features include:

- The card may be used with both the old and the new generation 3-, 5- or 8-card Teleline Shelf.
- The card is suitable for transmission at frequencies of up to 100 kHz (56 kB) provided the data line is conditioned for operation at this speed.
- The card is suitable for all DDS circuit bit rates from 2.4 kb/s to 72 kb/s.
- The card does not require power input from either the Central Office (CO) or the Teleline shelf.
- With Strap W1 in place, simplex sealing current is permitted to flow between two data circuits connected to a Teleline shelf.
- With Strap W2 in place, loop sealing current is permitted to flow between Tip and Ring.
- Sealing currents are not transmitted across the isolation gap to the Station side.

For a view of the Plug-in 2-wire AC Data Card, see Figure 1 on page 15.

Figure 1: Plug-in 2-wire AC Data Card (only major components shown)

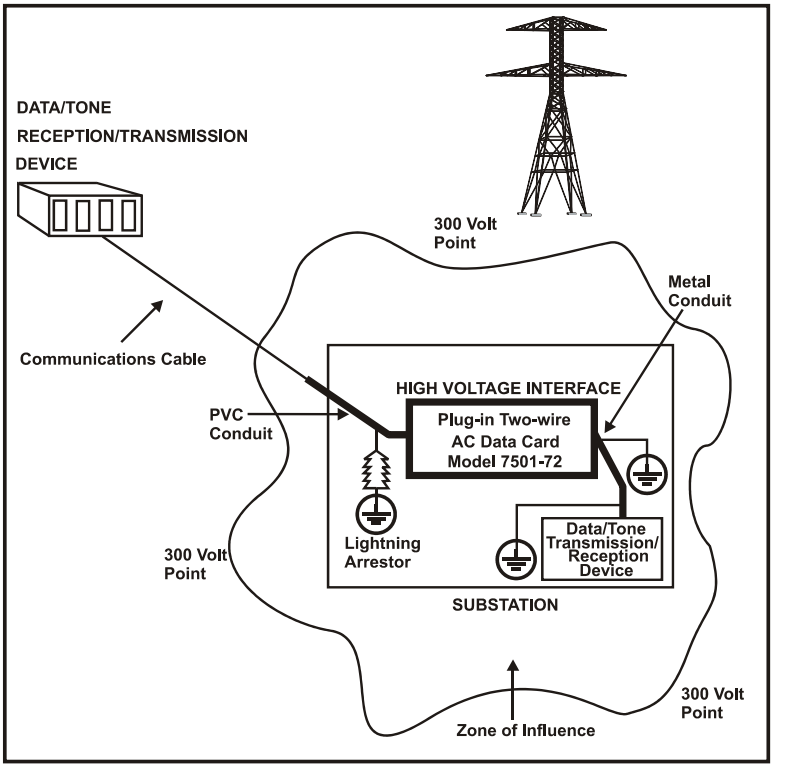


2.2 Applications

The applications of the Plug-in 2-wire AC Data Card include the following:

- Dedicated line modems
- Supervisory control and data acquisition (SCADA) systems
- Tone relay control systems
- Analog carrier systems
- Any other equipment using tone related signalling
- Digital data service

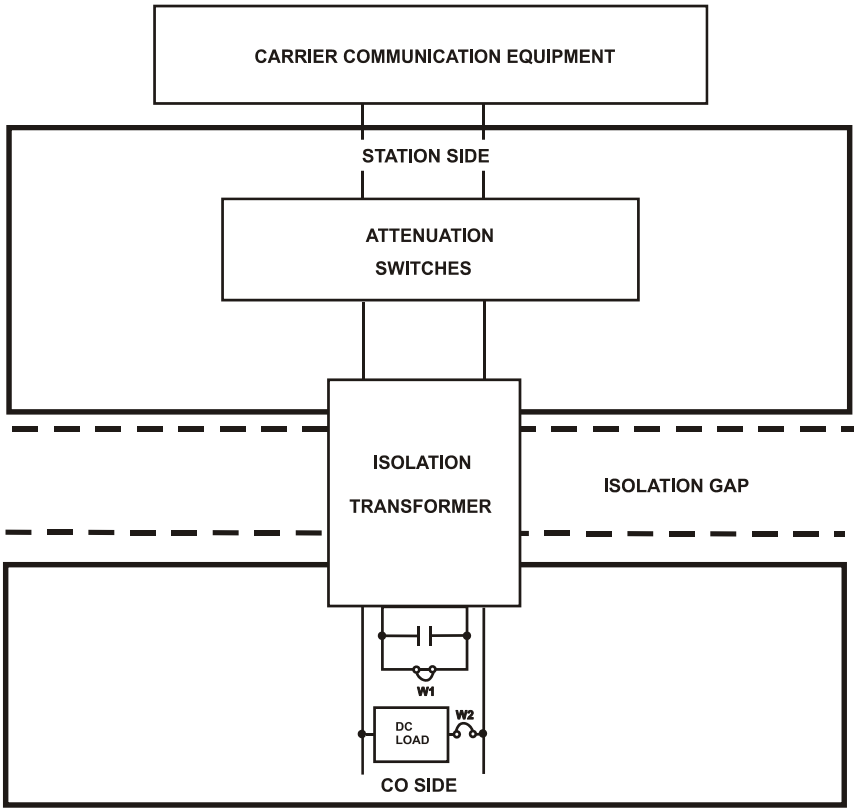
Figure 2: High Voltage Interface Application



2.3 Hardware Description

The 2-wire AC Data Card is comprised of two sides. The Station side is located on the upper portion of the card and the Central Office (CO) side is located on the lower portion of the card. The Station side is separated from the CO side by the isolation transformer which creates a 13.3 cm (5¼") isolation gap.

Figure 3: Block Diagram



The following is a description of the elements of the 2-wire AC Data Card block diagram.

2.3.0.1 Isolation Transformer

The Isolation Transformer provides the 13.3 cm (5¼") isolation gap for the card while maintaining low-loss, half duplex communication.

2.3.0.2 Straps

Strap W1 is shipped to the customer connected. When it is in place, DC simplex sealing current can flow between the following cards:

- 3-card Shelf: card slot numbers 1 and 2
- 5-card Shelf: card slot numbers 1 and 2, 3 and 4
- 8-card Shelf: card slot numbers 1 and 2, 3 and 4, 5 and 6, 7 and 8

When Strap W2 is connected and W1 is disconnected, loop sealing current can flow between Tip and Ring through a circuit that is low impedance at DC.

2.3.0.3 DC Load

The DC Load is an active inductor that presents a low impedance at DC, but a high impedance at the signal frequencies. It, therefore, does not increase the card's insertion loss.

2.4 Technical Specifications

For a listing of the card's electrical specifications, see Table 1 below.

For a listing of the card's physical specifications, see Table 2 on page 20.

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 maximum
Insulation voltage	50 kVrms (70 kV peak)
INPUT VOLTAGE REQUIREMENT	None
POWER DISSIPATION (loop sealing application)	<200mW for loop currents<50mA <5W for loop currents >50mA
POWER DISSIPATION (simplex sealing application)	None
TRANSMISSION DATA:	
Longitudinal balance (CO side)	>80 dB @ 60 Hz; >80 dB @ 300 to 3400 Hz
Echo return loss at either side with opposite side terminated at 600 or 900 Ω	Better than 15 dB
Signing return loss at either side with opposite side terminated at 600 or 900 Ω	Better than 10 dB
Crosstalk	Better than -77 dB from 300 to 3400 Hz measured at + 10 dBm
Maximum voice level	Up to + 10 dBm with less than 1% harmonic distortion
NOISE	
2 to 100 Hz	-60 dBm
Voice band (C weighted message)	< 5 dBrnC
Phase jitter	< 0.5°, 300 to 3400 Hz
Impulse noise	Less than 1 count above 48 dBrnC in 30 minutes
SIGNAL (900 Ω circuit, 0 dBm)	
Insertion loss @ 1 kHz	3 dB max
Insertion loss @ 100 kHz	1.5 dB max

Table 2: Physical Specifications

Parameter	Specifications
Operating temperature range	-20°C to +65°C (-4°F to +149°F)
Height	30.5 cm (12”)
Width	5.0 cm (2”)
Depth	18.9 cm (7-7/16”)
Weight	0.8 kg (1.8 lbs)

Chapter 3

Installation

3.1 Installation

ESD Precaution

INCORRECT HANDLING MAY VOID WARRANTY

These procedures must be followed when handling an electrostatic sensitive device.

- A grounded wrist strap must be worn at all times during installation.
- When unpacking, place the antistatic bag containing the device on an electrostatic discharge (ESD) safe surface. An ESD safe surface is a conductive surface connected directly to an earth ground.
- When moving, carry the device in an ESD safe container or the antistatic bag, provided with the device.

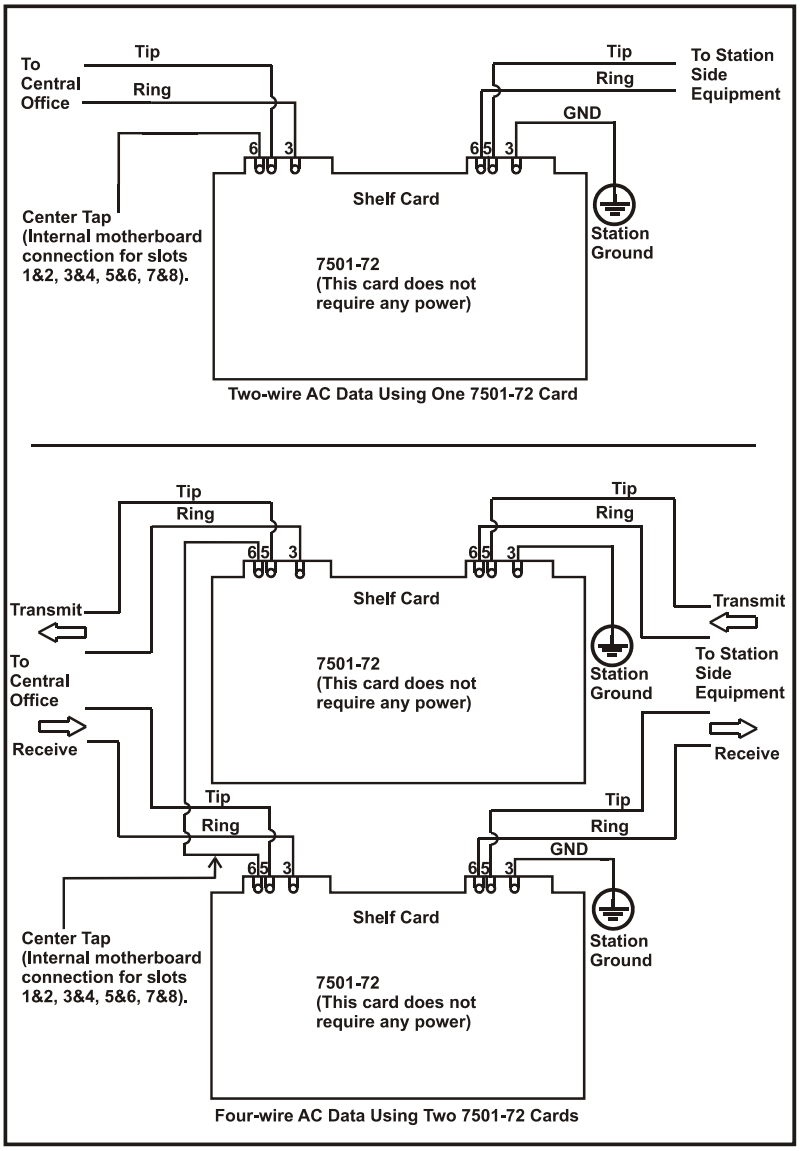
The Plug-in 2-wire AC Data Card plugs into any slot of the Teleline 3-, 5- or 8-card Shelf. However, the card must be installed into the slot which has been pre-wired according to the installation diagram of the specific shelf.

For a view of the layout for the 2-wire and 4-wire AC Data using 2-wire AC Data Card, see Figure 4 on page 23.

CAUTION

- Stand on a thick rubber mat and wear rubber gloves during the installation procedures. 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.

Figure 4: Layout for 2-wire and 4-wire AC Data Using 2-wire AC Data Card



NOTE

- Grounding of the card is done through the shelf. See the grounding section of the shelf's installation manual for more information.

The following points are for Model 7501-72 in 2-wire configuration:

- Card comes optioned from the factory with the 4-wire loop current as illustrated in the figure (simplex sealing current).
- Card can be configured for loop current.

The following points are for model 7501-72 in 4-wire configuration:

- Cards must be used in paired slots 1 & 2, 3 & 4, 5 & 6, 7 & 8 if a simplex sealing current is required.
- 'Transmit' and 'Receive' (see figure) can be interchanged.
- Card comes optioned from the factory with the 4-wire loop currents as illustrated in the figure.

➤ To install the Plug-in 2-wire AC Data Card, 7501-72

1. Unpack the Plug-in 2-wire AC Data Card, 7501-72 from its protective box and anti-static bag.
2. Confirm that the unit is a Plug-in 2-wire AC Data Card, 7501-72 by identifying the name and model number on the faceplate of the card.
3. Adjust the straps for the required application. To locate the straps, refer to Figure 1.
4. The card must be inserted right-side up and may be plugged into the shelf with the power ON or OFF.
5. 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.
6. Verify the installation by applying a data signal across the isolator and check that it has been received correctly.

NOTE

- The only PCB adjustments intended for the user are the straps W1 and W2.
- Refer all servicing to Positron personnel.

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

CO	Central Office
CSA	Canadian Standards Association
FCC	Federal Communications Commission
GND	Ground
GPR	Ground Potential Rise
HVI	High-Voltage Interface
PCB	Printed Circuit Board
RMA	Returned Material Authorization
RTU	Remote Termination Unit
UL	Underwriter's Laboratories