# Teleline™

## Standalone Enhanced T1 model 751228R2
## Description and Installation Guide

**925W751003-13E**


POSITRON
Positron Inc.

# Contents

# Chapter 1

## General Information

# 1.1 Publication Information



**Teleline Standalone Enhanced T1 model 751228R2**
**Description and Installation Guide**
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Positron Inc.
5101 Buchan Street, Suite 220
Montreal, Quebec, Canada
H4P 2R9
US and Canada: 1-888-577-5254
International: 1-514-345-2220

## 1.2 About this Guide

This guide introduces you to the Teleline Standalone Enhanced T1 unit, model 751228R2, its features and applications. 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.<br>5101 Buchan Street, Suite 220<br>Montreal, Quebec, Canada<br>H4P 2R9<br>US and Canada: 1-888-577-5254<br>International: 1-514-345-2220<br>Fax: 514-345-2271<br>E-mail: info@positronpower.com<br>Website: www.positronpower.com |
| **Customer Service and Repairs:** | US and Canada: 1-888-577-5254<br>International: 1-514-345-2220<br>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 (TCS) at 1-888-577-5254 (US and Canada) or at 1-514-345-2220 (International).

## 1.3.3 Customer Training

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

### 1.3.4 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. 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 Introduction

The Teleline Standalone Enhanced T1 model 751228R2 provides high voltage isolation between an incoming 4-wire T1 carrier line and a data transmitting and receiving device located in the substation.

Model **751228R2** is an enhanced T1 unit. The key enhancement consists of more effective use of Surface Mount Technology (SMT) for increased reliability and greater Mean Time Between Failures (MTBF).

**NOTE**

- Model **751228** has been manufacture discontinued and is replaced by the new enhanced T1 unit.
- This unit isolates a legacy T1 circuit. It is NOT compatible with T1 over HDSL circuits. To isolate T1 over HDSL, the Teleline Standalone 4-wire HDSL model 751239R2 is required.

A standalone unit consists of an isolation card mounted inside a compact enclosure. The enclosure is molded from fiberglass, making it a lightweight and flame-retardant container of high-dielectric strength. The fiberglass body limits the possibility of many kinds of infiltration while providing reliable isolation from external ground potentials.

The standalone unit is shipped with an installation kit that includes a 12-conductor (6-pair) cable for connection to the Central Office (CO) incoming cable, and mounting hardware.

## 2.1.1 Features

Features for model 751228R2 include the following:

- The unit is suitable for transmission at frequencies up to 5 MHz provided the data line is conditioned for operation.
- Isolation of 50 $kV_{rms}$ (70 kV peak) while maintaining full communication between terminals.
- Communication maintained across the gap by isolation transformers that provide low-loss low-distortion transmission.
- The unit is passive and does not require power to operate, except when using the span power option.

- Simplex current termination is provided on the CO side. The current will not be transferred to the Station side.
- The enclosure resists the infiltration of dust, mist and water from sprinklers.

**Figure 1: Standalone Enhanced T1 model 751228R2**

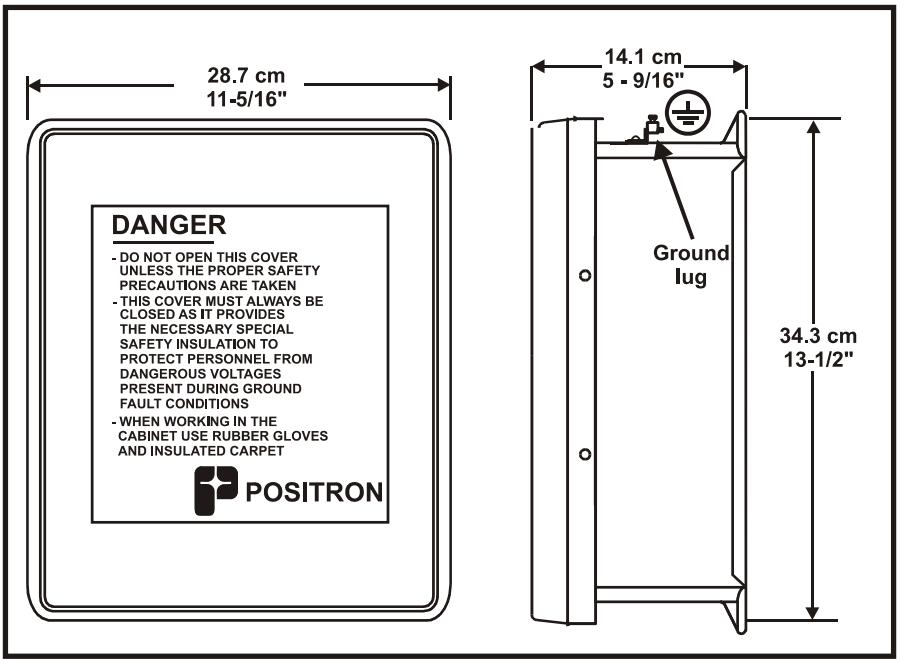
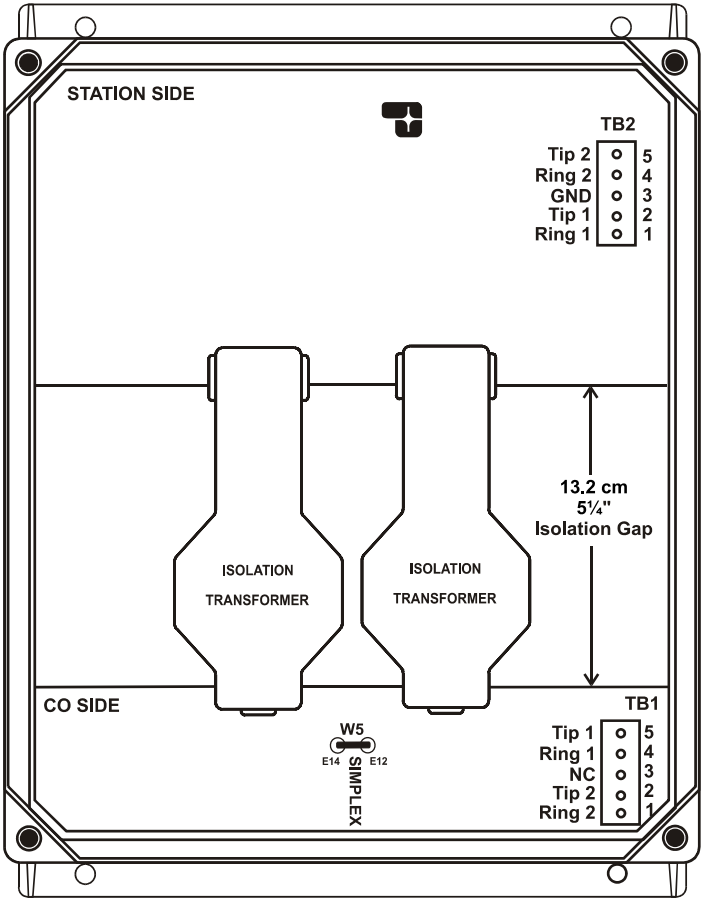


**Figure 2: Model 751228R2 Component Layout**
(only major components shown)



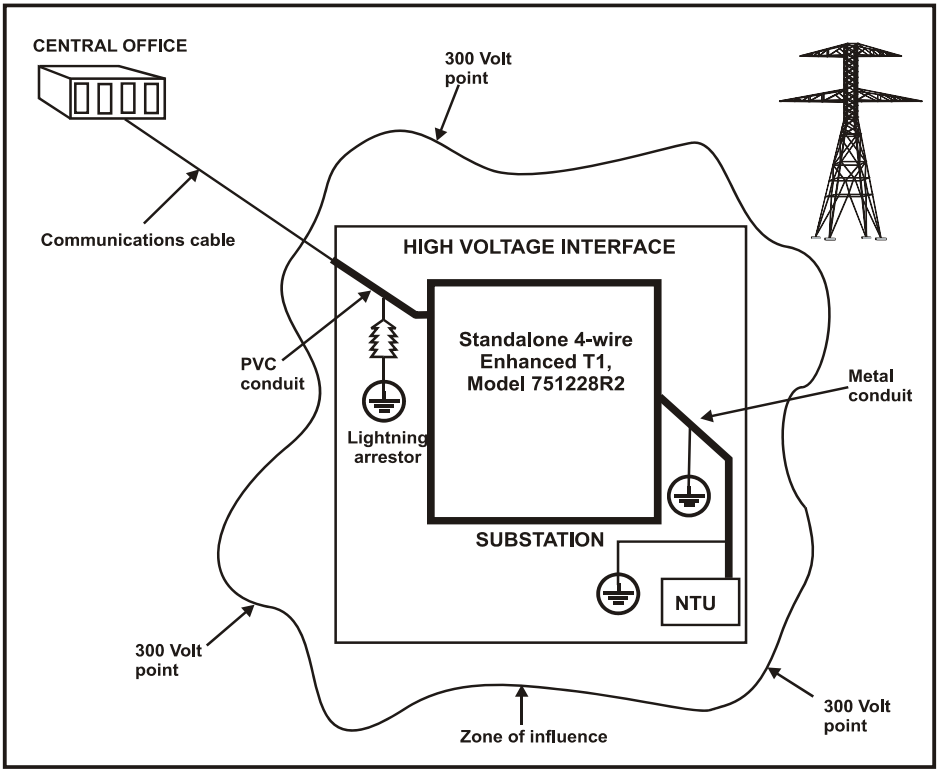

**NOTE** The layout shown above illustrates the default jumper settings for model 751228R2.

## 2.2 Applications

The applications of the Standalone Enhanced T1 model 751228R2 unit include the following:

- T1 Carrier (1.544 Mb/s)
- E1 Carrier (2.048 Mb/s)
- Compatible with pure ADSL, ADSL2, ADSL2+ when NO telephone circuit is present

**Figure 3: High Voltage Interface**




**NOTE**

- When model 751228R2 is used, the NTU must be locally powered.

## 2.3 Hardware Description

The model 751228R2 unit has two sides:

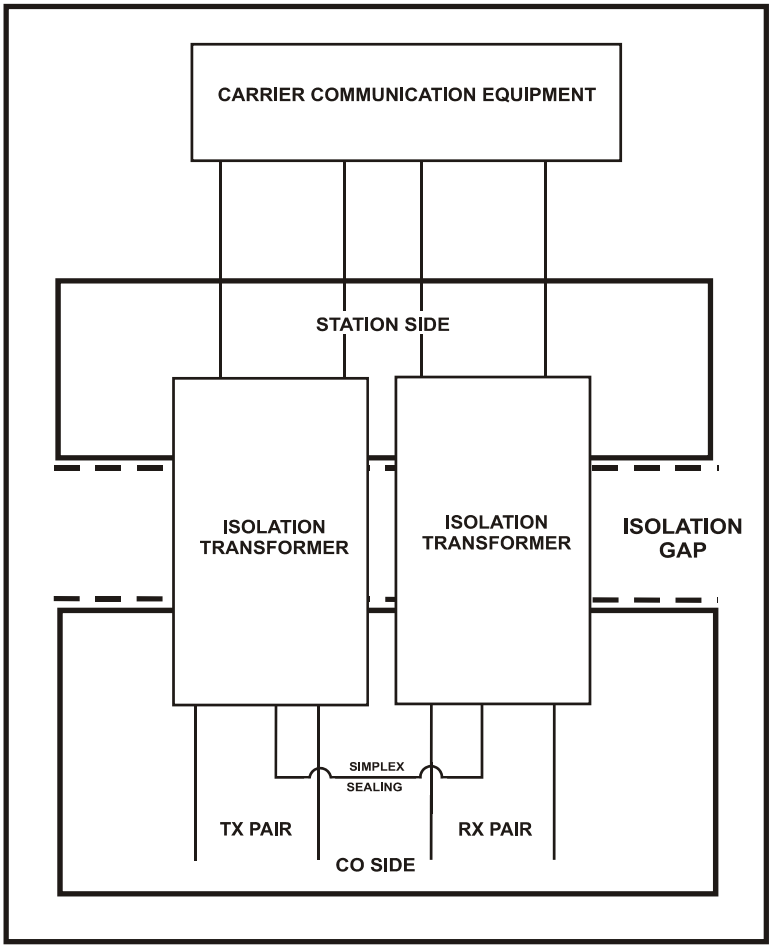
- The **Station side** is located on the upper portion of the unit.
- The **CO side** is located on the lower portion of the unit.

The isolation transformers separate the Station side from the CO side, creating a 14 cm (5¼“) isolation gap.

For the 751228R2 station side, both transformer center taps are grounded,

On the CO side, the TX and RX pair center taps are connected with an effective 200 ohm impedance to allow simplex current to flow across the pairs.

**Figure 4: Block Diagram**



# 2.4 Technical Specifications

### Table 1: Electrical Specifications for 751228R2

(measured at 25°C or 77°F, 55% R.H.)

| | Parameter | Specification |
|---|---|---|
| **Isolation Data:** | Isolation Resistance | 100,000 MΩ |
| | Metallic Surge | 1.5 kV maximum |
| | Insulation Voltage | 50 $kV_{rms}$ |
| **Input Voltage Requirement:** | | None |
| **Transmission Data:** | Longitudinal Balance (CO side) | > 80 dB at 60 Hz |
| | Return Loss | > 25 dB, at 350 kHz |
| | Insertion Loss | < 1.0 dB at 350 kHz |
| **Signal:** | Frequency Response in 120 Ohms | -3 dB, 2.5 kHz to 5 MHz |
| | Total Harmonic Distortion at 22 dBm, 10 kHz | < 40 dB |
| **Power:** | Power Consumption | None |
| | Power Dissipation | 0.75 W |

### Table 2: Physical Specifications for 751228R2

| Parameter | Specification |
|---|---|
| Operating Temperature Range | -20°C to 65°C (-4°F to 149°F) |
| Height | 34.3 cm (13-1/2”) |
| Width | 28.7 cm (11-5/16”) |
| Depth | 14.1 cm (5-9/16”) |
| Weight | 4.1 kg (9.0 lbs) |

# Chapter 3

# Installation

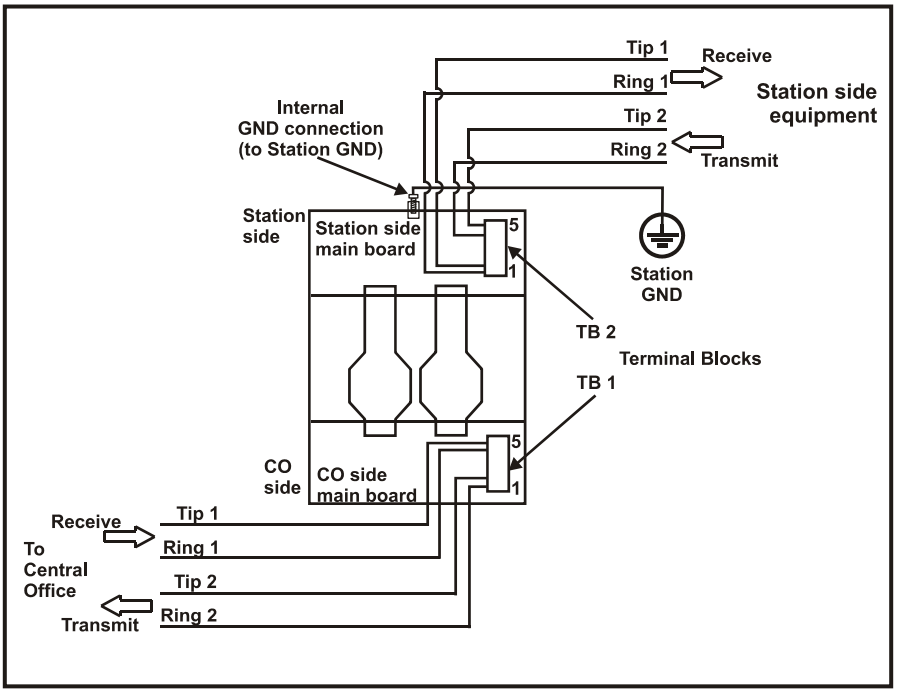
# 3.1 Installation

**CAUTION**

- Stand on a thick rubber mat and wear rubber gloves during the installation procedure. Perform these procedures on a clear dry day when a Ground Potential Rise (GPR) or Transients are less likely to occur.
- When wiring a unit, keep the Station and CO cables at least 15.2 cm (6”) apart to prevent an electric arc between the two, in the event of damage to or degradation of their insulation.

The Standalone 4-wire Enhanced T1 unit is used when the number of lines to be isolated does not justify the installation of a shelf. They will isolate one 4-wire T1 circuit (RX and TX).

**Figure 5: Layout for model 751228R2**




**CAUTION**

- Unit must be connected to the station ground by the ground lug connection using a #6AWG wire - green with yellow stripes.

**NOTE**

- Model 751228R2 does not require power.
- Station side cable pairs are connected to the Station side terminal block.
- CO side cable pairs are connected to the CO side terminal block.
- The unit is usually mounted with the Station side up, but may be mounted in any position.

### ➤ To Install a Standalone Unit

1. Verify that you have the following customer-provided tools and hardware which are required to install the unit:
   - Station cable
   - Center punch
   - Electric drill with a 5/32” diameter bit
   - 7/16” hex wrench
   - 1/8” and 1/4” common blade screw drivers
   - Phillips screwdriver
   - 2.5 cm (1” thick) plywood backboard with appropriate mounting hardware
   - Cable clamps and mounting hardware for routing cables exterior to the shelf (quantity determined by the cable lengths involved)
2. Unpack the Standalone 4-wire T1 unit and its installation hardware from its protective box.
3. Check the contents of your Standalone 4-wire T1 unit kit. For kit content, see Table 3 below.

**Table 3: Model 751228R2 Installation Kit Contents**

| Items Included | Part Numbers |
|---|---|
| 10’ insulated cable (12-conductor) | 207-990000-138 |
| Connector cord grip (1/2” hub) | 230-990400-027 |
| Connector cord grip (1/2” hub) | 230-990400-038 |
| Instruction sheet, strain relief | 241-010006-001 |
| Hex nut 1/2-14NPT | 714-990000-005 |
| Hex screw with washer (#14A) | 724-990000-011 |

4. Confirm that the isolation unit is a Standalone 4-wire T1 unit by identifying the name located inside the cover and the model number on a metallic label on the top of the right-hand portion of the unit.

5. Fasten the plywood backboard to the wall, and mount the enclosure on it using the four screws supplied.

**NOTE** The Station side of the enclosure is the side connected to the external ground lug. It is recommended to mount the unit with the air vent facing the bottom.

### 3.1.1 Ground Connections

**CAUTION**

- The equipment ground must be connected before any other connection is made to the unit.
- Installations must conform to local electrical code.
- The unit must be permanently connected to earth.
- There shall be no switching or disconnecting devices in the earthed circuit conductor between the unit and the earthing electrode conductor.

6. Jumper setting changes are not required. For the default position of jumpers refer to 3.2, “Settings”.
7. The strain reliefs supplied each have a cable entry diameter appropriate to one of the two cables employed in this installation. The CO cable strain relief is the largest, accommodating a cable diameter from 1 cm to 1.4 cm (0.375” to 0.570”). The Station side cable strain relief accepts cable diameters from 0.3 cm to 0.7 cm (0.125” to 0.275”) (all measurements are the outside cable diameters).

**NOTE** Refer to the strain relief instruction sheet provided in the installation kit.

8. Slide the strain reliefs supplied onto the CO and Station side cables and affix them to the unit.
9. Route the two telephone cables, allowing a length of 12 cm (5”) per cable for the internal connections to the terminal blocks.
10. Cut the excess wire once the exact internal length is established, and tighten the strain reliefs.
11. Strip back the outer jacket of each cable 2.5 cm (1”). Strip the inner insulating jacket of each conductor 0.5 cm (1/8”).

12. Connect these stripped conductors to the designated terminal locations:
    - To locate the connectors for 751228R2, see Figure 2 on page 16.
    - For a listing of the terminal block connections, see Table 4 on page 26.

## 3.1.2 Connections

**Table 4: Model 751228R2 Terminal Block Connections**

| Cable | Signal | Color Coding | Connector Position |
|---|---|---|---|
| **Station** | Tip 1 | Customer Determined | TB2-2 |
| | Ring1 | Customer Determined | TB2-1 |
| | Tip 2 | Customer Determined | TB2-5 |
| | Ring 2 | Customer Determined | TB2-4 |
| | Station Gnd | Customer Determined | TB2-3 |
| **CO** | Tip 1 | Any of the 12 conductors | TB1-5 |
| | Ring1 | | TB1-4 |
| | Tip 2 | | TB1-2 |
| | Ring 2 | | TB1-1 |
| | Not Connected | | TB1-3 |

13. Bundle the cable conductors using the cable guide provided.

**CAUTION**

- Connect the ground lug to station ground, using a #6 AWG stranded wire.
- Ground wire should be Green with a Yellow stripe.

14. Ensure that there are no excess wires dangling into the isolation gap between the Station and CO side circuits. Then close and secure the shelf cover with the captive screws.

➤ **To verify the installation of a standalone unit:**

1. On the CO side, loopback the TX pair into the RX pair at the demarcation block.
2. On the Station side, using the Bit Error Rate Test unit, verify data transmission between the TX pair and RX pair at the punch block.

## 3.2 Settings

The CO side jumper position for the 751228R2 is:

- W5 pins (E12-E14)

## 3.3 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

| | |
|---|---|
| **AWG** | American Wire Gauge |
| **CO** | Central Office |
| **CSA** | Canadian Standards Association |
| **CT** | Center Tap |
| **DTU** | Data Terminal Unit |
| **FCC** | Federal Communications Commission |
| **GND** | Ground |
| **GPR** | Ground Potential Rise |
| **MTBF** | Mean Time Between Failures |
| **NIU** | Network Interface Unit |
| **NTE** | Network Terminating Equipment |
| **NTU** | Network Terminating Unit |
| **RMA** | Return Material Authorization |
| **RMT** | Remote |
| **RX** | Receive |
| **SMT** | Surface Mount Technology |
| **TX** | Transmit |
| **UL** | Underwriters Laboratory |