Standalone Four-wire T1 Carrier Unit

751228 & 751228A

Description and Installation

POSITRON

Positron Inc.

DOCUMENT CONTROL INFORMATION

Document Part Number:	924-010132-001, Rev 8
Document Issue Number:	8
Publication Date:	May 12, 2003
Document ID:	o03e8000.fm

CONFIDENTIALITY NOTICE

DISCLAIMER NOTICE

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TECHNICAL CUSTOMER SUPPORT

Should a problem arise, contact your customer support department. If the problem cannot be resolved by your support department or if you have any questions, contact Positron's Technical Customer Support department at 1-888-577-5254.

1. The Standalone Four-Wire T1 Carrier Unit

The Standalone Four-Wire T1 Carrier Units, models 751228 & 751228A, provide high voltage isolation between an exterior dedicated four-wire T1 Carrier line, and T1 Carrier transmitting/receiving equipment located inside the substation.

The installation kit consists of an isolator card mounted inside a compact enclosure, a cable, and mounting hardware. The enclosure is molded from fiberglass, making it a lightweight, flame retardant container of high dielectric strength. Its fiberglass body limits the possibility of many kinds of infiltration while providing reliable isolation from external ground potentials.

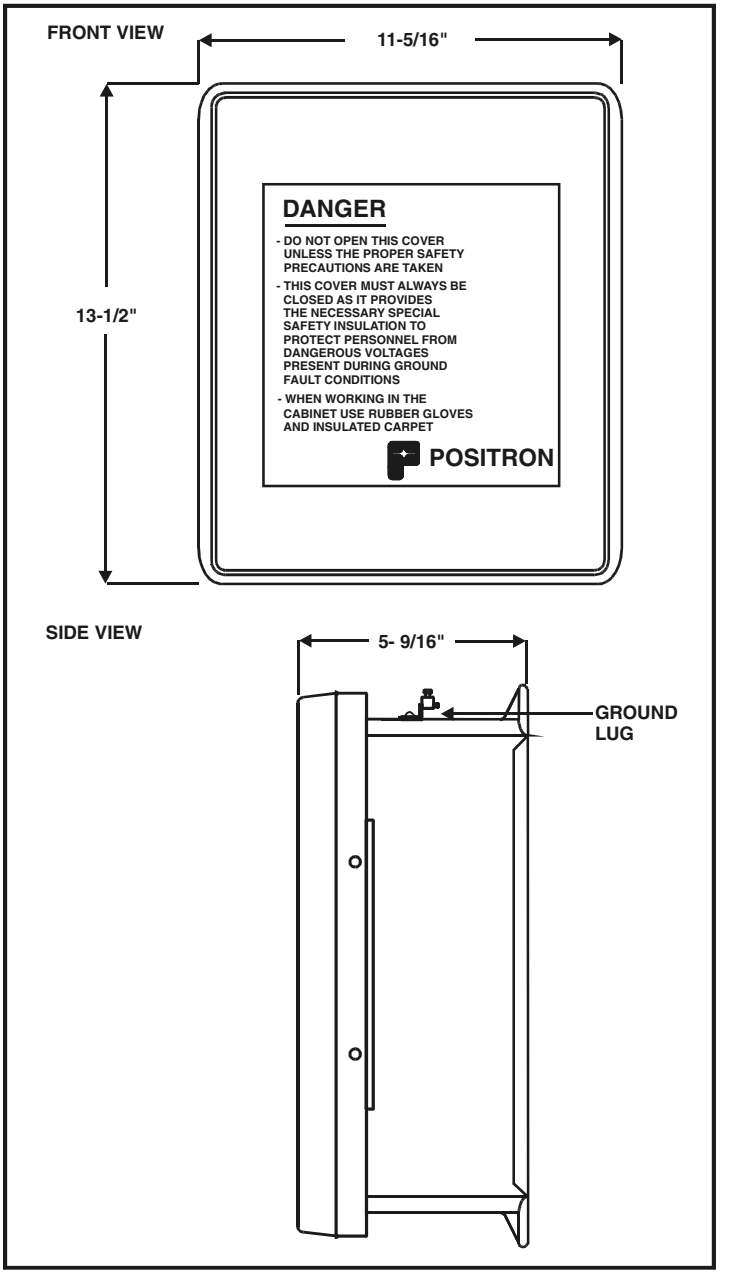
The shelf is shipped with a 12-conductor cable for connection to the Central Office (CO) incoming cable and mounting hardware.

Its features include the following:

- These units are suitable for transmission at frequencies up to 5 MHz or below provided the data line is conditioned for operation at this speed.
- These units do not require power input from either the CO or an external supply to operate.
- These units permit the flow of CO simplex sealing current from one pair to another. Simplex sealing current is not transmitted across the isolation gap to the Station side.
- The enclosures resist the infiltration of dust, mist, and water from sprinklers.

For a view of the Standalone Four-Wire T1 Carrier Unit enclosure, refer to Figure 1.

Figure 1 Model 751228 & 751228A



Two versions of the Standalone Four-wire T1 Carrier unit are available:

- The 751228 Standalone Four-wire T1 Carrier unit features two 50/60 Hz filters. In cases of line imbalance, common mode 60 Hz (or 50 Hz) can become metallic and disturb the isolation transformer. The filters will permit normal functionality with up to 30 V of 60 Hz induction.
- The 751228A Standalone Four-wire T1 Carrier unit has been modified. The 60 Hz filters have been removed to create a more cost efficient standalone unit for applications where 60/50 Hz induction is not a problem (dedicated lines).

For a view of the 751228 Standalone Four-wire T1 Carrier Unit, cover open, refer to Figure 2.

For a view of the 751228A Standalone Four-wire T1 Carrier Unit, cover open, refer to Figure 3.

Figure 2 Model 751228 Standalone Four-wire T1 Carrier Unit, Cover Open (Only Major Components Shown)

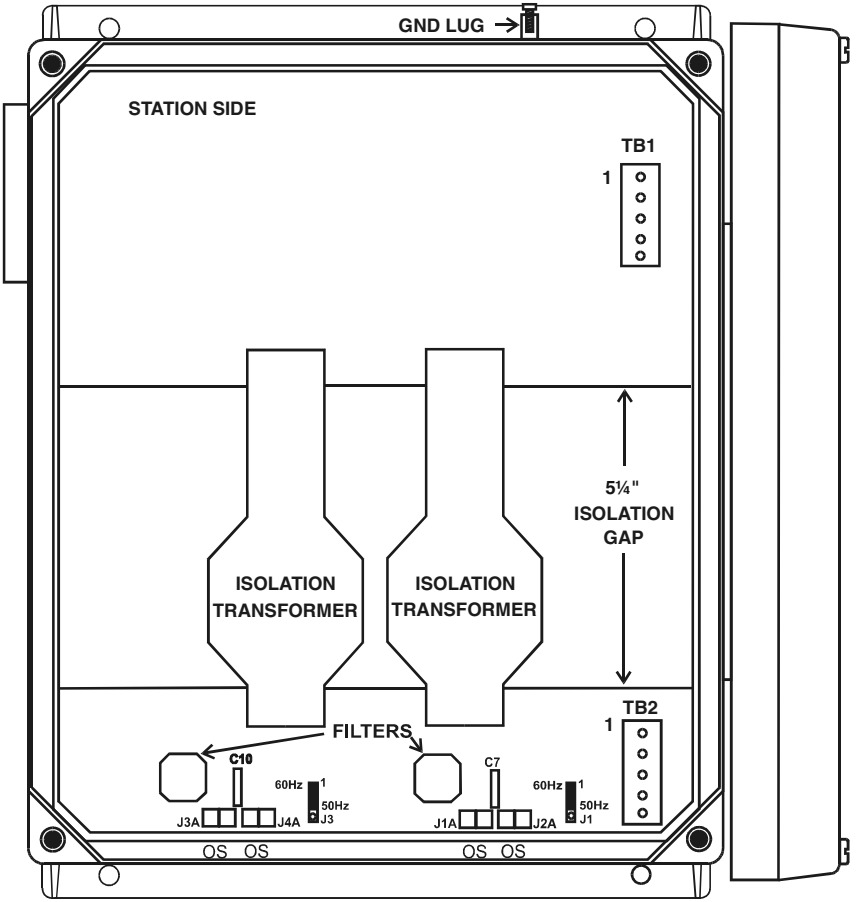
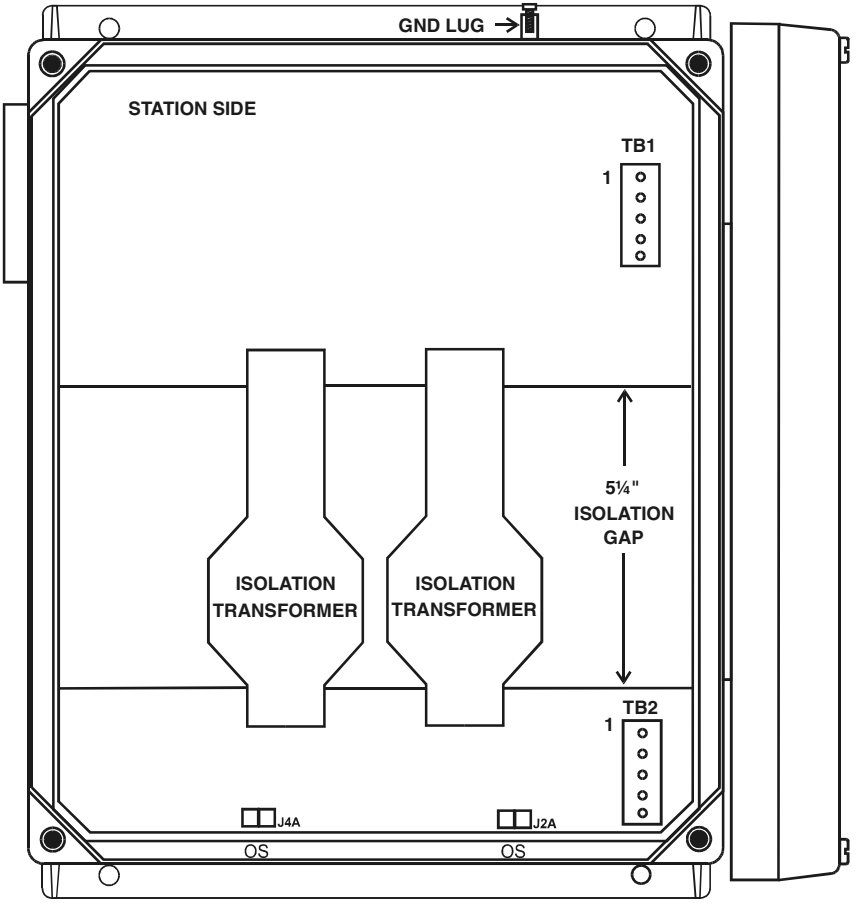


Figure 3 **Model 751228A Standalone Four-wire T1 Carrier Unit No-Filter, Cover Open (Only Major Components Shown)**



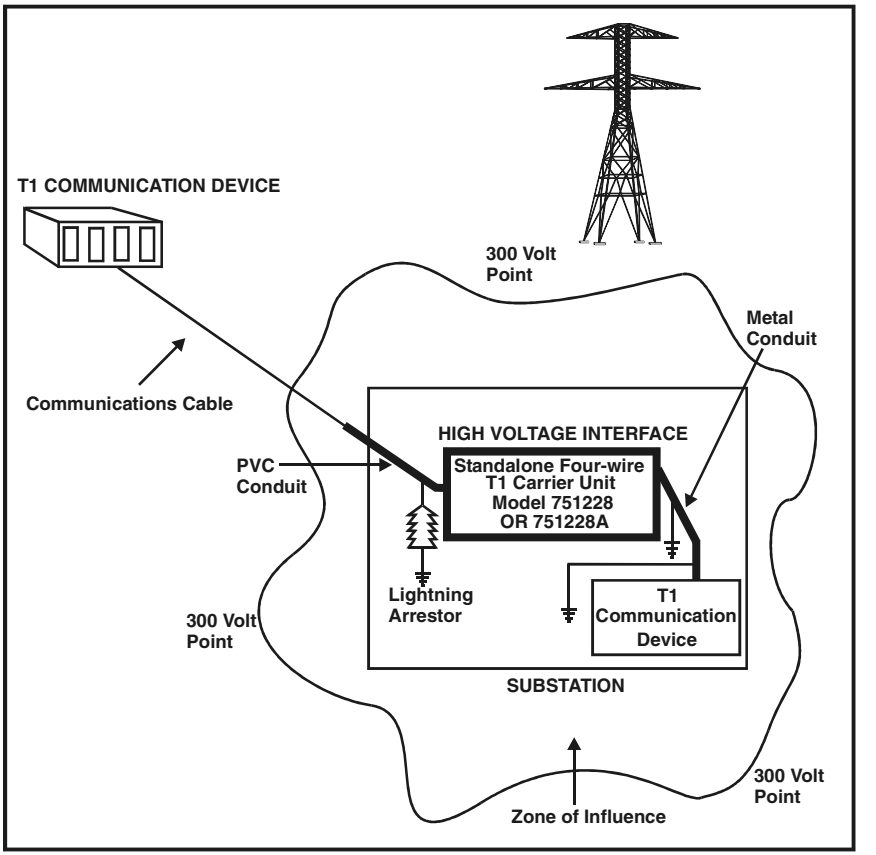
2. Applications

The applications of Standalone Four-Wire T1 Carrier Unit include the following:

- T1 Carrier (1.544 Mb/s)
- E1 Carrier (2.048 Mb/s)
- Analog carrier systems
- Digital data service
- Digital Signal (DS) 1

For an illustration of the unit's application, refer to Figure 4.

Figure 4 High Voltage Interface Application

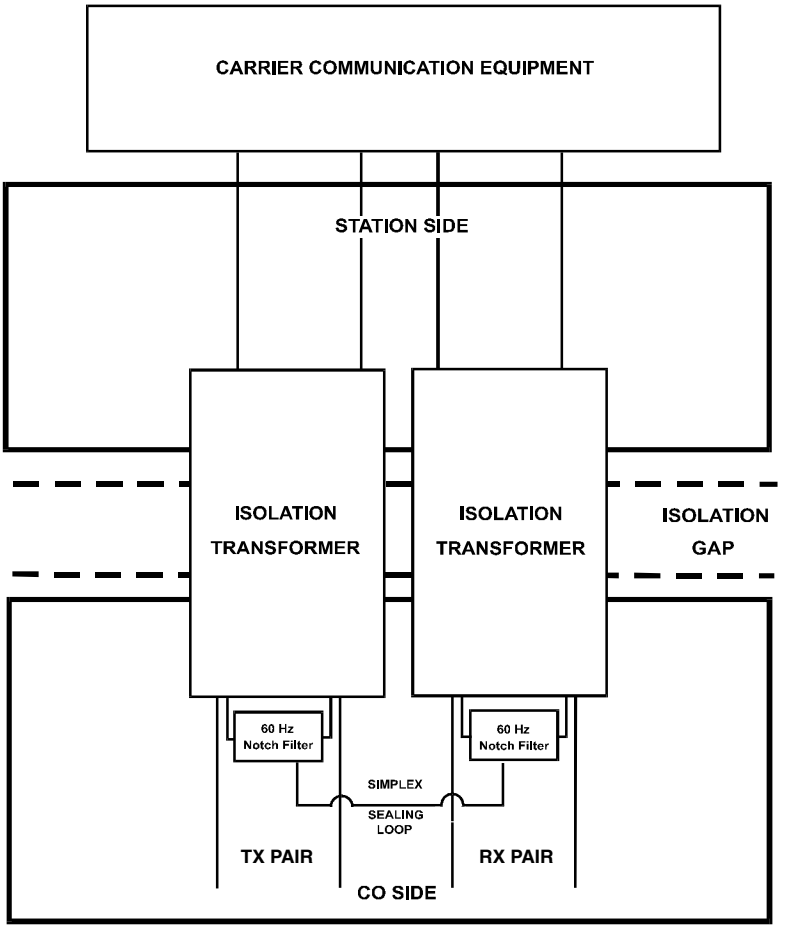


3. Hardware Description For 751228

The Standalone Four-Wire T1 Carrier Unit contains the Plug-in Four-Wire T1 Carrier card. This 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 isolation transformers which create a 5¼ inch isolation gap.

For the unit's block diagram, refer to Figure 5.

Figure 5 Block Diagram for the 751228 Standalone Four-wire T1 Carrier Unit (featuring 50/60 Hz Filter)



The following is a description of the elements of the Standalone Four-Wire T1 Carrier Unit, model 751228, block diagram.

Isolation Transformers

The Isolation Transformers provide the 5¼ inch isolation gap for the card.

Simplex Sealing Loop

The center taps of the two transformers are shorted together on the PCB to allow the Simplex Sealing current to flow across the pairs.

Filters

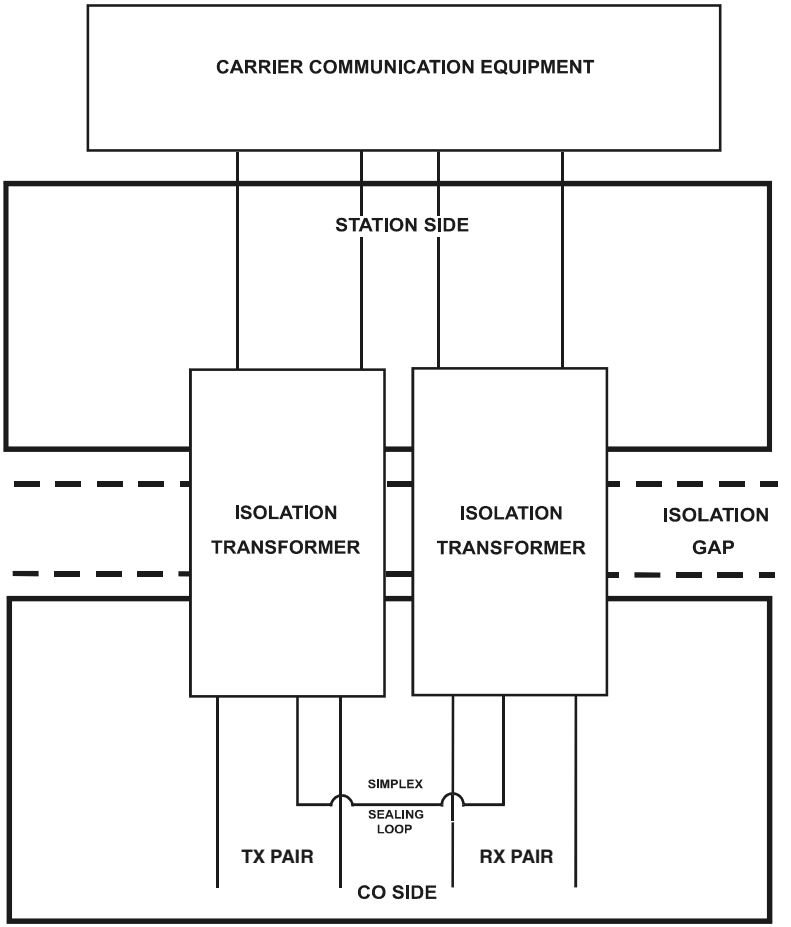
The 751228 (only) features two 50/60 Hz filters. In case of line imbalance, common mode 60 Hz (or 50 Hz) can become metallic and disturb the isolation transformer. The filters protect the transformer by eliminating the metallic 60 Hz (or 50 Hz).

4. Hardware Description For 751228A

The Standalone Four-Wire T1 Carrier Unit contains the Plug-in Four-Wire T1 Carrier card. This 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 isolation transformers which create a 5¼ inch isolation gap.

For the unit's block diagram, refer to Figure 6.

Figure 6 Block Diagram for the 751228A Standalone Four-wire T1 Carrier Unit (No Filters)



The following is a description of the elements of the Standalone Four-Wire T1 Carrier Unit, model 751228A, block diagram.

Isolation Transformers

The Isolation Transformers provide the 5¼ inch isolation gap for the card.

Simplex Sealing Loop

The center taps of the two transformers are shorted together on the PCB to allow the Simplex Sealing current to flow across the pairs.

5. Technical Specifications

For a listing of the unit's electrical specifications, refer to Table 1. For a listing of the unit's physical specifications, refer to Table 2.

Table 1 Electrical Specifications (measured at 77°F or 25°C, 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	None
TRANSMISSION DATA:	
Crosstalk (between TX and RX pairs @ 750 kHz)	Better than -35 dB measured at + 10 dBm
Maximum signal level	Up to + 10 dBm with less than 2% 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	
Insertion loss (@ 100 kHz, 0 dBm)	< 1 dB
Insertion loss (@ 1.544 MHz, 0 dBm	< 1 dB
Bandwidth (-3 dB)	2 kHz to 5 MHz

Parameter	Specifications
MAXIMUM OPERATING VOLTAGE	
Across Tip and Ring	± 11.2 Vpk, 7.9 Vrms
Tip to GND or Ring to GND	± 5.6 Vpk, 3.9 Vrms

Table 2 Physical Specifications

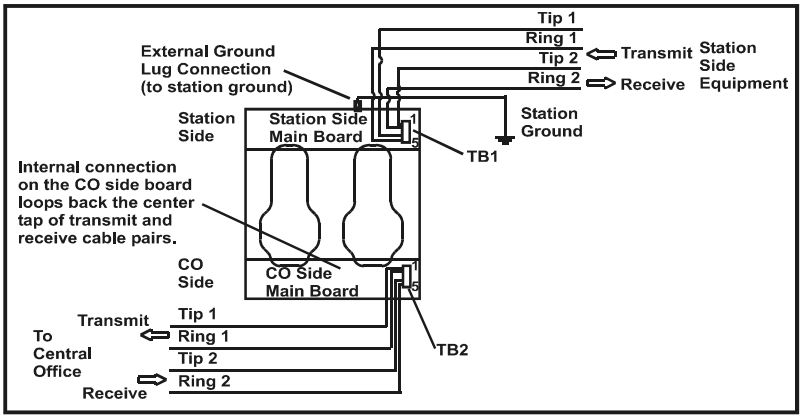
Paremeter	Specifications
Operating temperature range	-4°F to +149°F (-20°C to +65°C)
Height	13.5” (34.29 cm)
Width	11-5/16” (28.734 cm)
Depth	5-9/16” (14.129 cm)
Weight	9.0 lbs (4.1 kg)

6. Installation

The Standalone Four-Wire T1 Carrier Unit is used when the number of lines to be isolated does not justify the installation of a shelf. It will isolate one four-wire T1 circuit (RX and TX).

For a view of the devices' wiring connection, refer to Figure 7.

Figure 7 Layout for Standalone Four-wire T1 Carrier Unit



Note

1. These units are passive devices and do not require any power.
2. Station side AC data equipment and T1 carrier terminal equipment cannot be powered from the CO line side cable pairs using this type of unit (see note 7).
3. These units must be connected to the station ground by the ground lug connection.
4. An additional ground connection is provided at TB1.
5. The Station side cable pairs are connected to TB1.
6. The CO side cable pairs are connected to TB2.
7. The simplex sealing current is looped back on the CO side CT of the TRANSMIT and RECEIVE (see figure) cable pairs.
8. TRANSMIT and RECEIVE can be interchanged.
9. The unit is usually mounted with the Station side up, but may be mounted in any position.

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.
- The station and CO cables should be kept at least six inches apart upon wiring in order to prevent an electric arc between the two in the event of damage to, or degradation of their insulation.

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
- 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 Four-Wire T1 Carrier Unit and its installation hardware from its protective box.

3. Check the contents of your Standalone Four-Wire T1 Carrier Unit kit. For a listing of the items included in the kit, refer to Table 3.

Table 3 Models 751228 and 751228A Kit Contents

Items Included	Qty	Part Numbers
Standalone Four-wire T1 Carrier Unit	1	244-751228-401
Description and Installation document	1	924-010132-001
One-card Shelf, four-wire, accessory kit	1	241-751202-401
10’ insulated cable (12-conductor)	1	207-990000-138
Connector cord grip (1/2” hub)	1	230-990400-027
Connector cord grip (1/2” hub)	1	230-990400-038
Instruction sheet, strain relief	1	241-010006-001
Label, white	1	612-990000-034
Terminal block (0.2”)	2	666-990000-059
Hex nut 1/2-14NPT	2	714-990000-005
Hex screw with washer (#14A)	4	724-990000-011

4. Confirm that the isolation unit is a Standalone Four-Wire T1 Carrier 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 1” thick plywood backboard to the wall, and mount the enclosure on it using the four screws supplied.

Note

The Station (subscriber) side of the enclosure is the side connected to the external ground lug. The orientation of the unit does not matter.

6. Jumper the filter according to local power frequency. There is no power required. This is to limit local power influence on the communication link. The unit is shipped with the factory setting of 60 Hz and J1A to J4A set at “0” position to activate the filters. **(For the 751228 only)**.

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 0.375” to 0.570”. The station cable strain relief accepts a cable diameter from 0.125” to 0.275” (All measurements are the outside cable diameters).

   - Slide the strain reliefs supplied onto the CO and station cables and affix them to the unit.
   - Route the two telephone cables, allowing a length of five inches per cable for the internal connections to the terminal blocks. Cut the excess wire once the exact internal length is established, and tighten the strain reliefs.
   - Strip back the outer jacket of each cable one inch. Strip the inner insulating jacket of each conductor 1/8”. Connect these stripped conductors to the designated terminal locations. To locate the connectors, refer to Figure 2. For a listing of the terminal block connections, refer to Table 4.

Table 4 Terminal Block Connections

Cable	Signal	Color Coding	Connector Position
Station	Tip 1 Ring 1 Tip 2 Ring 2 Station Ground	Customer determined Customer determined Customer determined Customer determined Customer determined	TB1-4 TB1-5 TB1-1 TB1-2 TB1-3
CO	Tip 1 Ring 1 Tip 2 Ring 2 Sheath	Any of the available 12 conductors	TB2-1 TB2-2 TB2-4 TB2-5 No connection

   - Bundle the cable conductors using the tie wraps supplied.
   - Connect the ground lug to station ground, using a #6 AWG stranded wire.

8. 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.

9. Verify the installation by applying a data signal across the isolator and check that it has been received.

7. Service and Support

Technical Customer Support

Positron is committed to providing excellent ongoing technical support to its customers. A team of specialists is always available at our Technical Support Center in Montreal for either telephone consultations or on-site visits, to assist Field Technical personnel in the maintenance and troubleshooting of Positron equipment. During normal business hours, (8:30 a.m to 5:00 p.m. EST), any one of our Technical Customer Support (TCS) staff may be reached by dialing 1-888-577-5254 from anywhere in the continental United States or from Canada. Customers outside North America should dial 1-514-345-2200. Staff may also be contacted via fax at 514-345-2271 or e-mail at powerdivision@positron.qc.ca.

Positron TCS staff are available to provide technical assistance and/or to supervise the installation of Positron equipment. Assistance in the planning, configuration, and implementation of the installation will be provided as requested. Arrangements and pricing information regarding field assistance may be obtained by contacting the Technical Customer Support department. Please contact Positron for scheduling at least four weeks prior to the actual requested visit date.

Customer Training

Positron offers full customer training courses, as requested. Seminars are also available on High Voltage Interface (HVI). For more information, contact a customer representative by dialing 1-888-577-5254 or use our e-mail address, powerdivision@positron.qc.ca.

Warranty

Positron warrants that all equipment shall perform in accordance with Positron's specifications. The warranty remains valid for five (5) years from the date of shipment. The warranty will be honored provided that the equipment has not been abused and provided that the equipment has been installed and used in accordance with Positron's installation instructions and specifications. The warranty fully covers workmanship, materials and labor.

This warranty is in lieu of all other warranties, whether expressed or implied, including warranties of merchantability and fitness for a particular purpose. Positron guarantees that all equipment shall perform in accordance with Positron's specifications. Positron disclaims any warranty that Positron

equipment will meet customer requirements beyond the product specification. Positron disclaims any warranty that operations will be uninterrupted or error free.

Repair Service

Positron Inc. offers repair services by which customers can count on timely and quality repairs, regardless of customer location.

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

For information about out-of-warranty repairs, contact Positron's Repair department at 1-800-661-4911 (from anywhere in the continental United States or from Canada) or dial 514-345-2228. Due to the varied nature of repairs, no one time frame for turnaround can be guaranteed. However, average turnaround time is two weeks from date of receipt. In emergency situations, special arrangements can be made by contacting our Repair department. All repaired items are warranted for a period of 90 days. Bulk repairs (more than five items) will require additional processing time, therefore, please take this into consideration when requesting a Return Material Authorization (RMA) number.

Before returning any items to Positron for repair, warranty repair or replacement, call the Repair department to obtain an RMA number. Parts returned without RMA numbers cannot be accepted. The RMA number must always be clearly marked on all boxes and crates and on all shipping documents.

Items under warranty are to be shipped prepaid to Positron and will be returned prepaid to the customer. Items that are not under warranty are to be shipped prepaid to Positron and will be returned prepaid with freight charges included on the invoice. Positron cannot accept items shipped collect. A purchase order number is required for all repairs.

To accelerate the repair process, whenever possible, customers should include a report detailing the reason for return with the unit(s) being returned. 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 that the item(s) is properly packed to avoid further damage. Teleline Isolator cards should never be shipped while installed in a shelf; this will cause damage and will almost invariably extend the repair period.

Ordering Information

Positron's Teleline equipment can be ordered by telephone, facsimile, or by mail. All orders should be directed to the Positron Inside Sales department. Ordering by telephone, or facsimile will eliminate any delays arising from postal services. However, a hard copy purchase order is required as a confirmation. In addition to the model numbers of the items being ordered, the following information is required:

- Company name, contact name and telephone number
- Purchase order number
- "Ship To" address
- "Bill To" address
- Date required on site

All orders must be followed by a confirming order. Equipment will not be shipped until such confirmation is received.

For a list of our contact information, refer to Table 5.

Table 5 Positron Contact Information

Address	Positron Inc.
	5101 Buchan St.
	Montreal, Quebec, Canada
	H4P 2R9
Main telephone number	514-345-2200
Customer Service department telephone number	514-345-2200, 1-888-577-5254
General e-mail address	powerdivision@positron.qc.ca
Customer Service department fax number	514-345-2271
TCS department toll-free number	1-888-577-5254
TCS department fax number	514-345-2271
TCS department e-mail address	scarbonaro@positron.qc.ca
Repair department telephone numbers	514-345-2228 or 1-800-661-4911
Customer representative e-mail address	customerservicepower@positron.qc.ca