Standalone Telephone Unit, 751221

Description and Installation

POSITRON
Positron Inc.

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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 Telephone Unit

The Standalone Telephone Unit, model 751221, provides high voltage isolation between a telephone line and the drop side of one loop start telephone circuit (telephone, dial-up modem, or loop start private branch exchange (PBX)).

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

Its features include the following:

- The unit can operate from either 120 V ac or -24 to 130 V dc. It is not polarity sensitive, although the live wire should be connected to the fused terminal.
- The unit's power supply provides a -24 V dc feed to the telephone on the subscriber side of the card. In the event of a power outage, communications are maintained by the onboard battery.
- The Central Office (CO) side circuit components are powered from the battery feed.
- The unit's sinusoidal ringing generator can ring up to five standard 500 type sets and track the CO side frequency, which enables selective ringing.
- The unit withstands 600V power cross (as per UL1950) with automatic restoration of service after a fault.
- The enclosure resists the infiltration of dust, mist, and water from sprinklers and operates from 0°C to 50°C.
- The unit's operating temperature range may be extended to -20°C to +65°C by removing the battery completely. (Since this would result in no internal backup power, an external 48 V or 130 V dc supply with battery backup would be the preferred power source in such a case.)

For a view of the Standalone Telephone Unit enclosure, refer to Figure 1.

For a view of the Standalone Telephone Unit, cover open, refer to Figure 2.

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Figure 1 Model 751221 Cover Closed

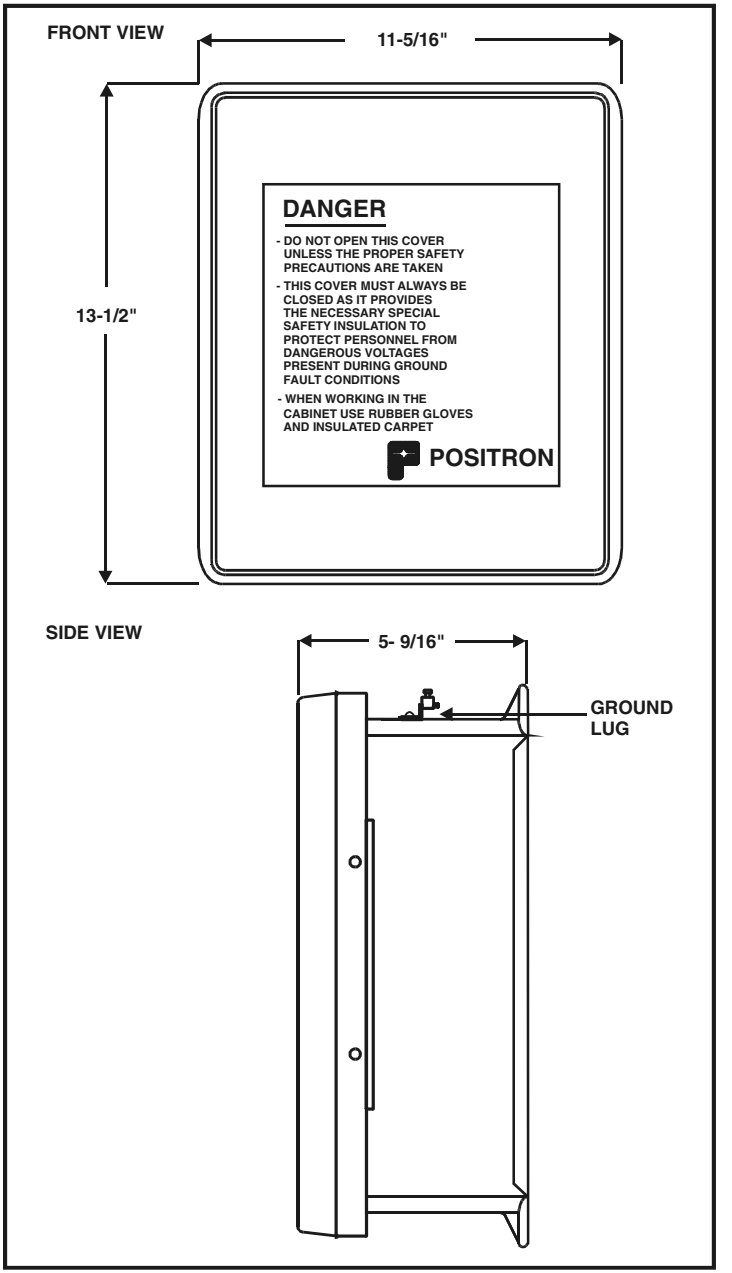
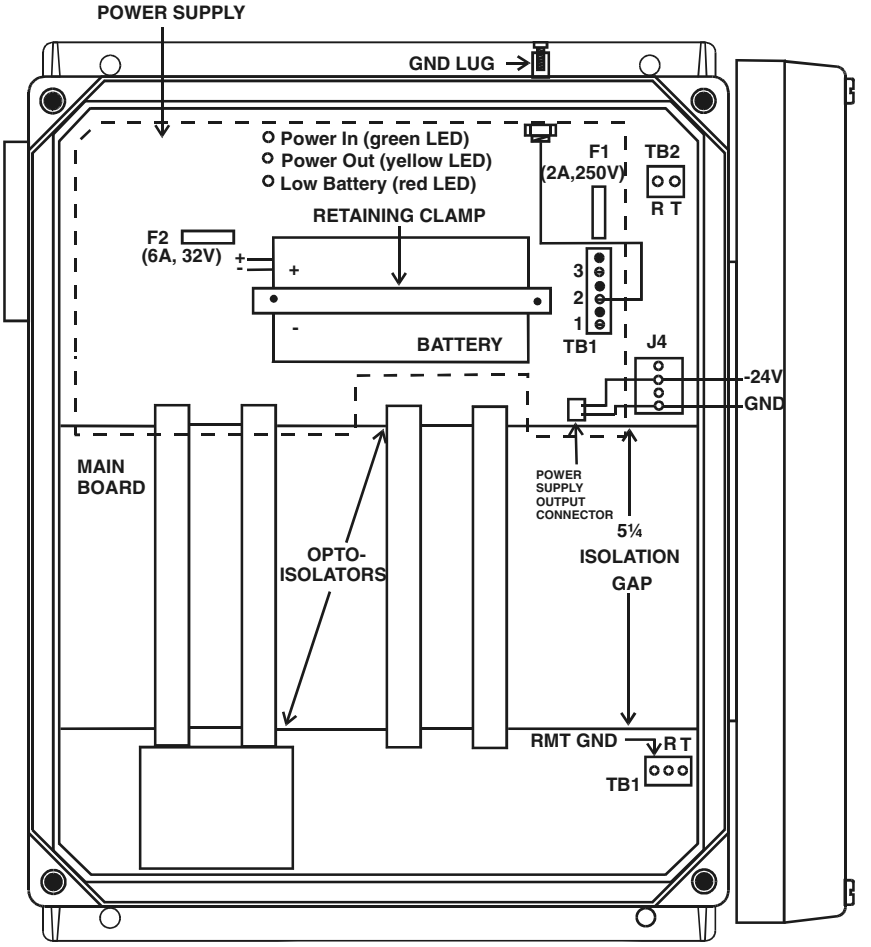


Figure 2 Model 751221 Cover Open (Only Major Components Shown)



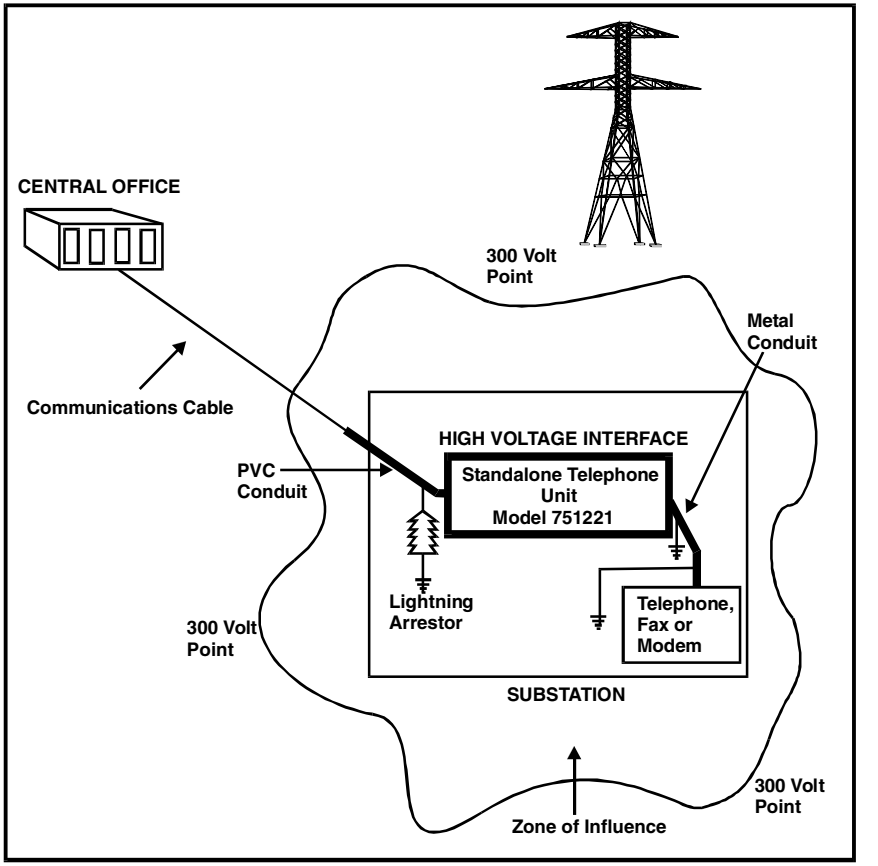
2. Applications

The applications of the Standalone Telephone Unit include the following:

- Loop start plain old telephone service (POTS)
- Dial-up “smart” modems (up to 19200 baud)
- Fax lines (up to19200 baud)
- Loop start PBX
- Dial-up remote meter reading

For an illustration of the unit’s applications, refer to Figure 3.

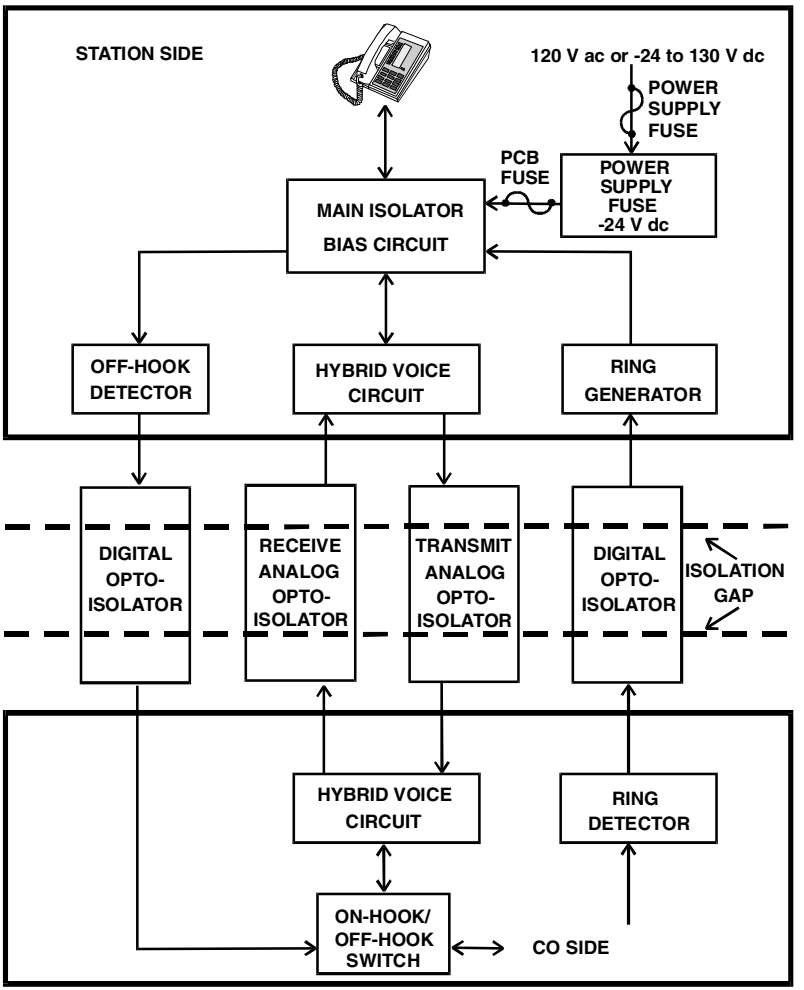
Figure 3 High Voltage Interface Applications



3. Hardware Description

The Standalone Telephone Unit contains the Fiberline Telephone 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 the opto-isolators, which create a 5¼ inch isolation gap. For the Fiberline Telephone card block diagram, refer to Figure 4.

Figure 4 Block Diagram



Hybrid Voice Circuits

The Hybrid Voice Circuits located on both the Station and CO sides of the card form a two-wire to four-wire to two-wire configuration that permits the separation of Transmit (TX) and Receive (RX) signals. These circuits also perform an impedance matching function such that the Station side impedance is reflected to the CO side. This renders the card effectively transparent for communication purposes.

Ring Detector

The Ring Detector is a bandpass filter centered about 20 Hz. It detects ringing signals and sends 40 Hz pulses to the ring generator on the Station side, via a digital opto-coupler.

Digital Opto-Isolators

Each Digital Opto-Isolator consists of a light emitting diode (LED) and a phototransistor pair, connected with a plastic fiber optic cable for isolation. They provide digital signal transmission across the isolation gap.

Transmit and Receive Analog Opto-Isolators

The Transmit and Receive Analog Opto-Isolator employs feedback circuitry to "linearize" the behavior of its LED/photodiode pairs, thus providing for undistorted lightwave analog signal transmission across the air gap. Feedback also makes it possible to compensate for the aging of the LEDs, ensuring that the performance of the unit does not degrade over time.

Ring Generator

The Ring Generator receives 40 Hz pulses from the CO side and regenerates a ringing signal at the same frequency and synchronism as the CO side.

On-hook/Off-hook Switch

The On-hook/off-hook Switch is a metal oxide semiconductor field effect transistor (MOSFET) current limiting circuit that is turned on by the off-hook signal. When switched on, it permits modulation of the hybrid voice circuits.

Off-hook Detector

The Off-hook Detector transmits a signal to the CO side to go off-hook when the telephone is lifted.

Main Isolator Bias Circuit

The Main Isolator Bias Circuit generates the off-hook and ring trip signals, and feeds a -24 V dc (on-hook potential) bias to the Station side telephones.

Power Supply PCB

The Power Supply PCB accepts either 120 V ac or -24 to 130V dc, and provides -24 V dc to the Station side circuitry. It also keeps the onboard battery backup charged.

Fuse F1 and F2

Fuse F1 limits the power supply's input current in case of input power overvoltage or power supply circuit failure. Fuse F2 protects the power supply circuitry if the battery is reversed when connected. For the location of F2, refer to Figure 2.

4. 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)
ON-HOOK	
Ringing generator voltage	> to 84 Vrms with 5 ringers (type 500) at 20 Hz
CO side input ringing detection	50 V to 105 Vrms, 17 to 30 Hz
Terminal resistance (CO side)	>5 MΩ at ± 100 V dc
Metallic impedance (CO side)	>17 kΩ at 20 Hz; >82 kΩ from 200 Hz to 3.2 kHz
OFF-HOOK (40 mA dc)	
Minimum loop current (CO)	20 mAdc
Maximum loop current (CO)	Current limiting at 110 mAdc
Minimum loop current (station)	Will detect off-hook down to 20 mA
Maximum loop current (station)	Current limiting at 60 mAdc
Maximum loop resistance (station, 20 mA dc)	850 Ω maximum, including telephone
Longitudinal balance (CO side)	>80 dB @ 60 Hz; >56 dB @ 4 kHz
Dial pulse distortion	<1%, measured at 14 mA threshold (output duty cycle w.r.t. input duty cycle)

Parameter	Specifications
NOISE (Off-hook, 40 mA dc)	
Impulse noise (both sides)	Less than 1 count in 30 minutes above 48 dBrnCz
Phase jitter	< 0.5°, 300 to 3400 Hz
Common mode rejection ratio (from CO to Station side, terminated in 600 or 900Ω)	>80 dB, 300 to 3400 Hz
Noise (2 Hz to 100 Hz)	-60 dBm
Message circuit noise (quiet termination)	<5 dBrnC
S/N ratio (C message filter)	50 dB at 0 dBm
SIGNAL	
Echo return loss (either side, opposite side terminated in 600 or 900Ω)	Better than 21 dB
Singing return loss (either side, opposite side terminated in 600 or 900Ω)	Better than 13 dB
Insertion loss (at 0 dBm)	< 0.35 dB @ 1000 Hz
Frequency response (300 to 3400 Hz)	± 0.2 dB relative to 1000 Hz
Flatness	1.0 dB max from 100 to 10 kHz
Rolloff	12 dB / octave from 30 kHz
POWER SUPPLY	
Input voltage	120 V ac or -24 to 130 V dc (not polarity sensitive)
Input current with maximum Load at: -24 V dc 48 V dc 130 V dc 120 V ac	 600 mA 300 mA 125 mA 150 mA rms

Parameter	Specifications
BATTERY TIME AVAILABLE (with new, fully charged battery)	
On-hook (idle) or: ringing (1 ringer) or: off-hook	17 hours minimum 5.5 hours minimum 5.5 hours minimum
Composite specification	10 hrs idle + 2 hrs off-hook + 20 minute ringings
BATTERY SERVICE LIFE	4 years (minimum)
BATTERY REPLACEMENT	Sonnenschein 12V/1.2 Ah A212/1.2S

Table 2 Physical Specifications

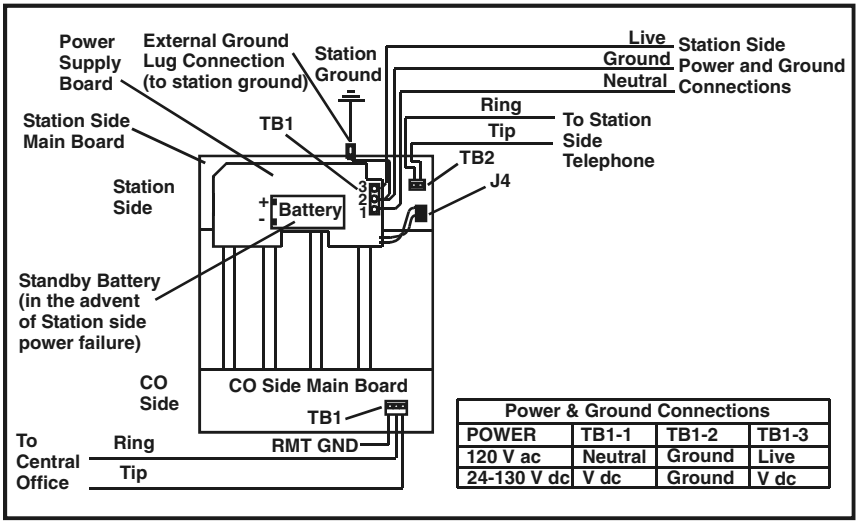
Parameter	Specifications
Operating temperature range with battery	+32°F to +122°F (0°C to + 50°C)
Operating temperature range without battery	-4°F to +131°F (-20°C to + 55°C)
Height	13-1/2” (34.29 cm)
Width	11-5/16” (28.734 cm)
Depth	5-9/16” (14.129 cm)
Weight	8.648 lbs (3.922 kg)

5. Installation

The Standalone Telephone Unit is used when the number of lines to be isolated does not justify the installation of a shelf. It will isolate one telephone circuit and is powered from an AC or DC source.

To view the Standalone Two-wire Telephone Units' wiring connections, refer to Figure 5.

Figure 5 Standalone Two-wire Telephone Unit



Power & Ground Connections			
POWER	TB1-1	TB1-2	TB1-3
120 V ac	Neutral	Ground	Live
24-130 V dc	V dc	Ground	V dc

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Note

1. This unit can be powered by 120 V ac or a DC voltage source of 24 V dc to 130 V dc (maximum of 150 V dc).
2. The input power is not polarity sensitive.
3. The power connections are made at TB1 on the power supply board (see Power & Ground Connections in the figure).
4. J4 connects the -24 V dc output of the power supply to the Station side main board.
5. This unit contains an internal standby battery, which may be removed if this internal backup power supply is not required.
6. The station ground must be connected to the unit by either TB1 terminal 2 of the power supply board or the external ground lug connection. It must not be connected to both to avoid inductive loop.
7. Both TB1 terminal 2 and the external ground lug connection may be used to provide a common ground, as long as ground loop limitations are recognized. (GND LUG is the preferred way of grounding).
8. The Tip and Ring of the Station side are connected to TB2.
9. The loop voltage supplied to the Station side telephone is 24 V dc.
10. The Tip and Ring of the CO side are connected to TB1 of the CO side main board.
11. The RMT GND on the CO side is shown as a reference only and is not normally connected.
12. Do not connect the incoming cable shield to the RMT GND.
13. 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.
- This card utilizes CMOS circuitry that can be damaged by static electricity. Observe normal CMOS handling procedures to avoid static discharge. Manipulate the card exclusively by the faceplate to prevent any damage to the card and to limit the possibility of electric shock. When moving the card, carry it in an ESD safe container or the antistatic bag, provided with the card. Failure to follow ESD precautions may void the warranty. For further information concerning ESD precautions, contact Positron's Customer Support department.
- Power should only be applied after all wiring is completed. 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
- 1" thick plywood backboard with appropriate mounting hardware
- Digital voltmeter
- Cable clamps and mounting hardware for routing cables exterior to the unit (quantity determined by the cable lengths involved).

2. Unpack the Standalone Telephone Unit and its installation hardware from its protective box.

3. Check the contents of your Standalone Telephone Unit kit. For a listing of the items included in the kit, refer to Table 3.

Table 3 Model 751221 Kit Contents

Items Included	Qty	Part Numbers
Standalone Telephone Unit	1	244-751221-401
Description and Installation document	1	7501-24-52
One-card Shelf accessory kit	1	7501-22-02
6’ power cable (3-conductor)	1	207-990000-020
10’ insulated cable (12-conductor)	1	207-990000-138
Connector cord grip (1/2” hub)	1	230-990400-036
Connector cord grip (1/2” hub)	1	230-990400-037
Connector cord grip (1/2” hub)	1	230-990400-038
Instruction sheet, strain relief	1	241-010016-001
Fuse (2 A, 250 V)	1	248-990000-008
Terminal block (0.2”)	1	666-990000-071
Terminal block (0.2”)	1	666-990000-086
Nylon cable fastener (3/4” diameter)	5	706-990000-010
Hex nut 1/2-14NPT	3	714-990000-005
Screw, pan (6-32 X 3/8)	2	724-020001-015
Hex screw with washer (#14A)	4	724-990000-011
Screw, pan (6-32 X 3/8)	2	724-990000-073
Washer (#6)	2	738-990010-003
Instruction sheet, One-card Shelf	1	7501-18-113

4. Remove the cover of the unit by unfastening the four screws located at each corner.

5. Confirm that the unit is a Standalone Telephone 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.

6. The power supply board is not fastened to the main isolation card prior to shipment and, therefore, requires installation first. Unfasten the cover of the unit and proceed as follows:
   - ► Remove the screws from the tops of the spacers mounted on the Station side circuit board.
   - ► Position the power supply board onto the spacers and align the board holes with the spacers.
   - ► Secure using the four screws with the nylon screw going on the spacer in the isolation gap.
7. Fasten the 1” thick plywood backboard to the wall.
   - ► Mount the enclosure onto it using the four screws supplied.

Note

The Station (subscriber) side of the enclosure may be identified by two access holes, one for the telephone cable and the other for the power cable. The CO (remote) side has only one hole for the telephone cable entry. The orientation of the unit does not matter.

8. Plug the power supply’s output connector into receptacle J4 of the main isolation card.

   To locate J4 and the output of the power supply, refer to Figure 2.

9. The strain reliefs supplied each have a cable entry diameter appropriate to one of the three cables employed in this installation. The CO cable strain relief is the largest, accommodating a cable diameter from 0.375” to 0.570”. The power cable strain relief accommodates a cable diameter from 0.250” to 0.570”, and 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, station, and power cables and affix them to the unit.
   - ► Route the power cable and 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. 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 Ring	Customer determined Customer determined	TB2-T TB2-R
CO	Tip Ring Remote Ground	Any of the available 12 conductors	TB1-T (CO side) TB1-R (CO side) TB1-RMTGND (CO side)
Power	Live Neutral Ground1	Black White Green	TB1-3 (Station side) TB1-1 (Station side) TB1-2 (Station side)
1 The ground lug is the preferred way of grounding the unit. Use ground of power cable only if no local ground is available. If ground lug is used, cut the green wire of the power cable.			

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

10. The unit is shipped with both leads of the battery disconnected to prevent discharge.

- Reconnect these leads to their respective battery terminals: red to "+",black to "-".

  To locate F2, refer to Figure 2.

11. Fuse F2 protects the power supply card against improper connection of the battery leads.

- Should the fuse blow, correct the wiring error and replace the fuse.

12. Apply power to the unit, and use a digital voltmeter to measure the voltage across the terminals of TB1 on the power supply card. The voltage should correspond to the source voltage to within 1%.

13. Measure the voltage across the terminals of J4 on the main PCB of the unit. The voltmeter should register 23 to 25V dc with the subscriber telephone on-hook.
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.
15. Verify that the unit is functioning as it should by checking that an applied signal is correctly received.

Note

Not all applications of the Standalone Telephone Unit, model 751221, require a remote ground connection.

6. Battery Replacement Procedure

Replacement of the battery will be necessary after its rated service life has expired. Its rated service life is at least four years. It is to be replaced by a Sonnenschein 12V/1.2 Ah A212/1.2S unit or equivalent.

1. Remove the retaining clamp holding the battery in place.

   For the location of the retaining clamp, refer to Figure 2.

2. Disconnect the battery and dispose of it in a government approved waste site.

Caution

The batteries contain toxic lead and corrosive acid, and as they are user-replaceable, should only be disposed of in government approved waste sites.

3. Position a new battery in place and refasten the retaining clamp. Reconnect the leads (red to “+”, black to “-”).
4. Close and secure the cover.

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