



**6- Slot Card Shelf  
Description & Installation  
P30112**

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## 1.0 PRODUCT SCOPE

This document describes the technical specifications, technical requirements and installation instructions for the P30112 SNC Lyte Lynx® 6-Slot Card Shelf. It provides an understanding of the basic functions and features available with this product.

## 2.0 PRODUCT OVERVIEW

### 2.1 Intended Uses

The 6-slot Card Shelf provides an isolated interface for voice (POTS), analog data and digital circuits, depending on the isolation cards that are inserted into the Card Shelf. The primary function of the Card Shelf is to provide a convenient connection location or housing in which isolation cards can be inserted “transparently” into the circuit. This product presents a very small footprint, making it ideal for installations where space is at a premium and only four or six circuits are required.

Lyte Lynx® systems are intended for use at power substations and similar locations where high voltage isolation is required on the incoming copper telephone pairs to protect the telco network from harm and to provide a personnel safety barrier against voltages. This specifically includes protection from longitudinal voltage surges and Ground Potential Rise (GPR) that may occur during power system faults.

### 2.2 System Requirements

Printed circuit boards designed for installation in the SNC Lyte Lynx® 12-Slot, 6-slot and 3-Slot Card Shelves or Teleline Isolator\* 8-Slot Card Shelf may be used. A 24VDC, 48VDC, 130VDC or 120VAC power source from the substation is required whenever fiber optic or other active electronic PC isolation cards are to be used.

### 2.3 Parts List

<u>QTY</u>	<u>Description</u>
2	5/16" X 1 1/2" Lag Bolts
3	18 pin terminal blocks marked RM1, RM2, RM3
1	¾" inch male adapter for (CO) remote side
3	18 pin terminal blocks marked ST1, ST2, ST3
1	1/2" inch male strain relief for station side
1	6 Foot A/C Power Cord
1	Description/Installation Instruction Manual T0395

### 2.4 Physical Characteristics

#### 2.4.1 Mechanical Configuration

The P30112 Card Shelf is constructed of a high dielectric material that meets Underwriters Laboratories Standard 94V-0 flammability test.

#### 2.4.2 Environmental Requirements

The Lyte Lynx® system is designed for an indoor environment and is operable in temperatures ranging from -40°C to 100°C (-40°F to 212°F) under humidity conditions from 0-99 percent. (Requirements for individual cards may vary.)

\* Teleline Isolator is a trademark of Positron Industries, Inc.

### 2.4.3 Physical Dimensions

**Table 1**

<b>P30112</b>	<b>Height</b>	<b>Width</b>	<b>Depth</b>
<b>CARD SHELF WITH COVER</b>	<b>13.13"</b> <b>(33 cm)</b>	<b>17.13"</b> <b>(43.5 cm)</b>	<b>9.75"</b> <b>(25 cm)</b>

## 3.0 PRODUCT FEATURES

### 3.1 Isolation Card Slots

The P30112 Card Shelf contains six (6) isolation card slots. Slots 1 through 6 are used for any combination of Lyte Lynx® isolation cards and can terminate a total of 12 telephone pairs (two pairs per slot). Any combination of two-wire or four-wire service can be configured. Card slot no. 1 (J1) has pairs one and two of remote entrance cable and the station entrance cable terminated as "odd" or "even." Slot 2 (J2) has pairs three and four, etc. The pair color order for the remote cable is that of standard 25 pair exchange cable (i.e., pair one=blue/white, pair two=orange/white, etc.). The pair color order for the station cable is that of standard 25 pair "inside wiring" cable (i.e., pair one = White/Blue and Blue/White; pair two = White/Orange and Orange/White, etc. See Table 2 and 4.

### 3.2 Powering

The substation side of most SNC Lyte Lynx® and Teleline Isolator\* fiber optic isolation cards requires a supply of -24VDC or -48VDC power to operate. Floated 48VDC or 130VDC battery and 120VAC power is commonly available at most power substations. Various Lyte Lynx® internal power supply cards are available (See Table 3) to convert the chosen power source to -24VDC or -48VDC to power up the electronic circuitries on active isolation cards. The -24VDC or -48VDC is made available to each isolation card slot by means of the upper, station side backplane plug-in connectors.

The power supply and some isolation cards may be powered by floated 48VDC, 130VDC or 120VAC power. It will accept any two of these power sources at one time (one as primary power and another as secondary active backup power) to provide continuous operation in the event of a power supply card failure or power outage. If only one power source is used, a 24VDC battery backup module may be used.

## 4.0 Installation



**CAUTION:** The incoming telephone pair should be contained in insulated conduit (PVC, etc.), or the pair should be jacketed with sufficient insulation to withstand a voltage rise from ground fault potential and from fault induction voltage.

\* Teleline Isolator is a trademark of Positron Industries, Inc.



**CAUTION:** Any metallic shielding on the incoming CO/Remote pair must be isolated from substation grounds all the way from the network low voltage interface (300 volt peak GPR point per IEEE Standard 487) to the entry into the Card Shelf. The conductors must also be isolated.



**CAUTION:** The Lyte Lynx® Remote/CO terminals and electronics are isolated from substation ground. To provide personnel isolation from local ground, stand on a thick rubber mat and use other adequate insulation devices (rubber gloves) when working on the Card Shelf.

Tools required for P30112 Card Shelf installation include:

- Tape Measure
- Screwdriver, 1/8" Blade
- 7/16" Wrench or Socket
- Center Punch
- 1/8" Drill Bit · Drill
- Hammer

#### 4.1 Card Shelf Mounting

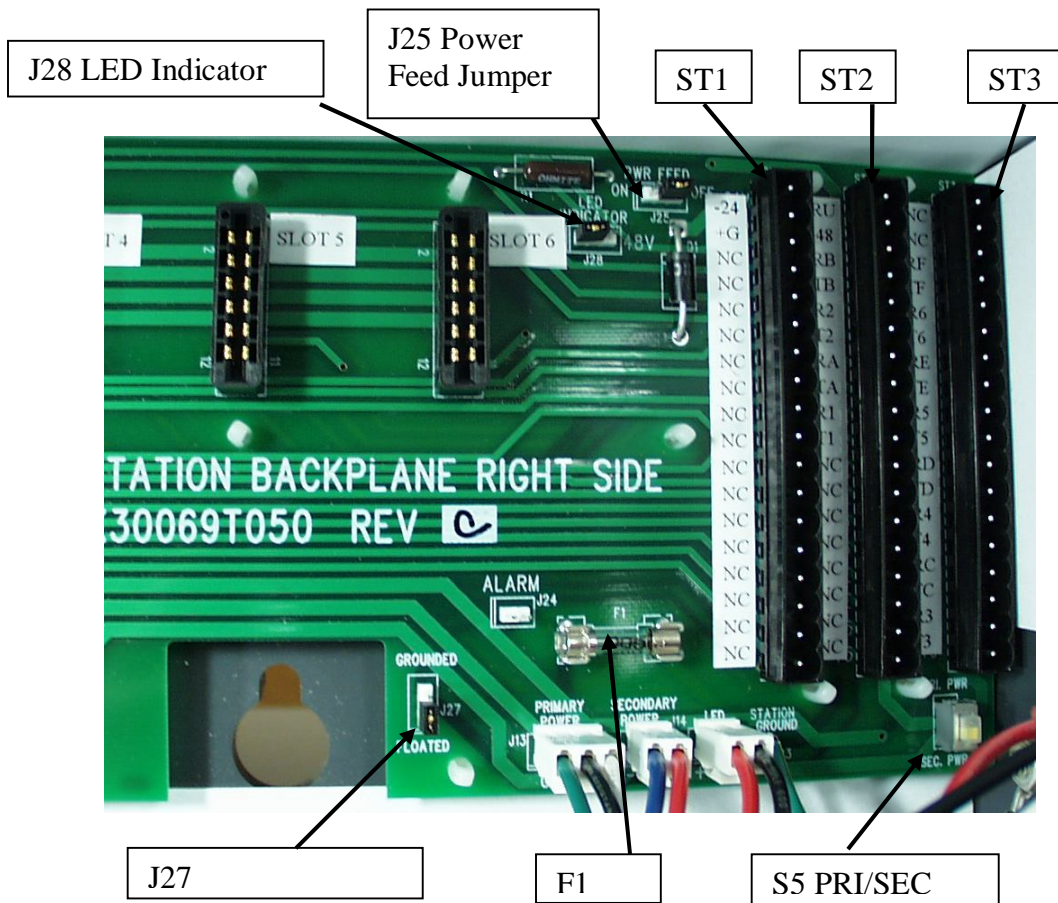
- (a) Determine the location for the Card Shelf, leaving room to the left or below the shelf for a lightning arrester, if required. The shelf should be mounted to a 3/4" thick plywood wall (or equivalent).
- (b) Mark the location for the lag bolts. Two keyhole cutouts distanced on 8" centers are provided in the back wall of the Card Shelf.
- (c) Center punch location and drill 1/8" pilot holes in wall at center punch marks.
- (d) Mount the Card Shelf to the wall using the 5/16" lag bolts (included).

### 5.0 INSTALLATION - STATION SIDE CONNECTIONS

#### 5.1 Station Cable Pair Entrance

- (a) The upper right side of the card shelf has a 1/2 inch-14 NPT threaded hole for the strain relief. It is shown in the Figure 2 below as the station cable entrance.
- (b) Run customer side cable into stations side entrance of card shelf.
- (c) Strip 1/4 inch from the end of each wire.
- (c) Secure the wire pairs to the appropriate 18-pin terminal blocks marked ST1, ST2, and ST3 by tightening the screws with a small 1/8 inch blade screwdriver. See Table 2 and Figure 1 for appropriate cable pair termination.
- (e) Plug the three terminal blocks into the three, 18 position, push-on connector blocks (ST1, ST2, ST3) located in the upper right hand corner of the card shelf.
  - (i) Plug ST1 into ST1 on station side backplane.
  - (ii) Plug ST2 into ST2 on station side backplane.
  - (iii) Plug ST3 into ST3 on station side backplane.

(See Figure 1)



**Figure 1:** Station Side (Upper) Backplane

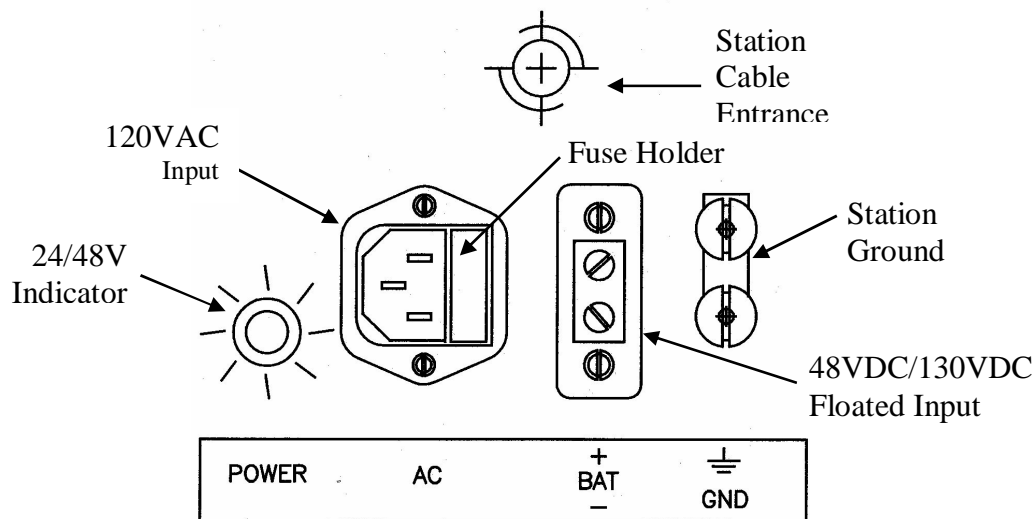
## 5.2 Station Side Pair Designations

Each of the six (6) slots will support two (2) pairs. The first pair is connected to the left side of the backplane jacks and assigned a numeric designation (i.e. T1, R1, etc.). The second pair is connected to the right side of the backplane jacks and is assigned an alpha designation (i.e. TA, RA, etc.). (See Table 2 and Figure 4)

**Table 2: Station Side Pin Configurations**

Station Side					
SLOT #	CONNECTOR	COLOR - TIP	PAIR	COLOR - RING	CONNECTOR
1	ST2-28	WHT/BLU - T1	1	BLU/WHT - R1	ST2-27
1	ST2-26	WHT/ORN - TA	2	ORN/WHT - RA	ST2-25
2	ST2-24	WHT/GRN - T2	3	GRN/WHT - R2	ST2-23
2	ST2-22	WHT/BRN - TB	4	BRN/WHT - RB	ST2-21
3	ST3-54	WHT/SLT - T3	5	SLT/WHT - R3	ST3-53
3	ST3-52	RED/BLU - TC	6	BLU/RED - RC	ST3-51
4	ST3-50	RED/ORN - T4	7	ORN/RED - R4	ST3-49
4	ST3-48	RED/GRN - TD	8	GRN/RED - RD	ST3-47
5	ST3-46	RED/BRN - T5	9	BRN/RED - R5	ST3-45
5	ST3-44	RED/SLT - TE	10	SLT/RED - RE	ST3-43
6	ST3-42	BLK/BLU - T6	11	BLU/BLK - R6	ST3-41
6	ST3-40	BLK/ORN - TF	12	ORN/BLK - RF	ST3-39
	ST1-2	STA. GND.		-24VD/C	ST1-1
	ST2-20	(-) 48/130VDC		(+) 48/130VDC	ST2-19

5.3 Station Power/Ground Connections



**Figure 2: Station Connectors**

## External Connections

Just below the station cable entrance is a cluster of four items. See Figure 2.

- 1) LED - The first of these items (furthest to the left) is an LED that when lit indicates 24VDC or 48 VDC GROUNDED power is available at each slot in the card shelf. If the LED is not lit, see Internal Connection Section for proper jumper setting. If the alternate powering of 48VDC FLOATING is chosen, the LED will NOT light. If the LED is blinking, see Trouble Shooting section.
- 2) 120VAC Input - Next to the LED is a male 120VAC receptacle that will accept the female end of a standard IEC (instrument/computer-type) power cord (provided). This AC receptacle features a built-in 250V, 2 amp fuse. A spare fuse is accessible by pulling out the small drawer in right side of the receptacle. Another 250V, 4 amp fuse in series with this fuse is located on the PCB backplane. These fuses may be swapped before installation if the card shelf is used in an application where it is difficult or impossible to get access to the fuse compartment on the side. **The card shelf is shipped from the factory with this input terminal wired as primary power.**
3. BAT Input- The third item from the left is a screw terminal block ("BAT") for connecting DC Input (**Floating Battery 130VDC or 48VDC Only**). Connect positive (+) battery to the top screw and negative (-) battery to the bottom screw. **The card shelf is shipped from the factory with this "BAT" terminal wired as secondary power, though S5 must be set to "Sec. Pwr" if this terminal is used.**
4. Station Ground - The item furthest to the right is a ground lug for connecting a #6 AWG wire that can be used to bring station ground into the card shelf.



**CAUTION:** All station terminal apparatus should be on the same ground grid as the Card Shelf when the station ground is connected in the Lyte Lynx® Card Shelf.

## Internal Connections

### Note:

- ❖ **IF INTERNAL POWER SUPPLY IS USED, NO INTERNAL CONNECTION IS NECESSARY.**

### LED Indicator Jumper J28

This jumper must be set to appropriate position for the LED to be lit. If a 24V power supply is used, the jumper must be set to 24V (default setting); if a 48V power supply is used, the jumper must be set to 48V position.

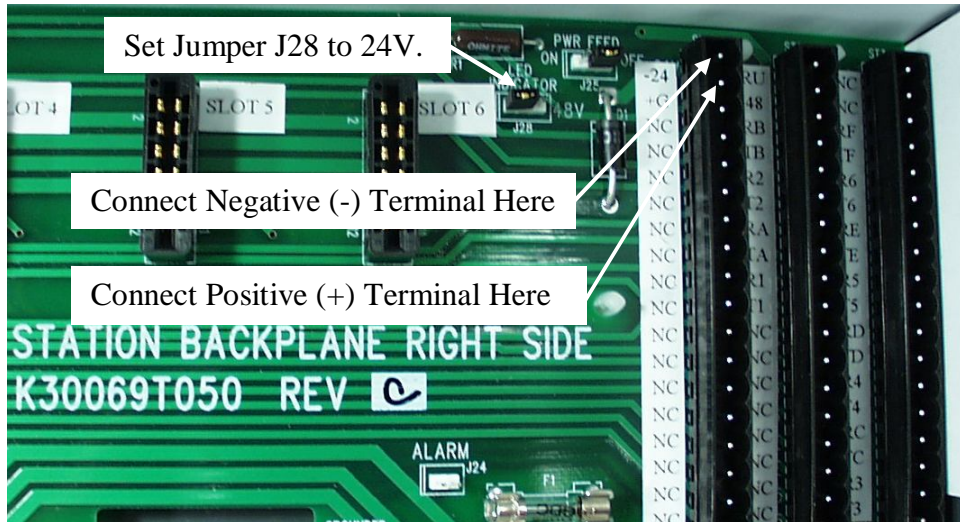
### J27 Ground/Float Setting

This jumper provides optional setting for grounding the card shelf through the AC power cord. **Note:** The jumper is set to FLOATED by factory.



**To bring external 24VDC into the card shelf:**

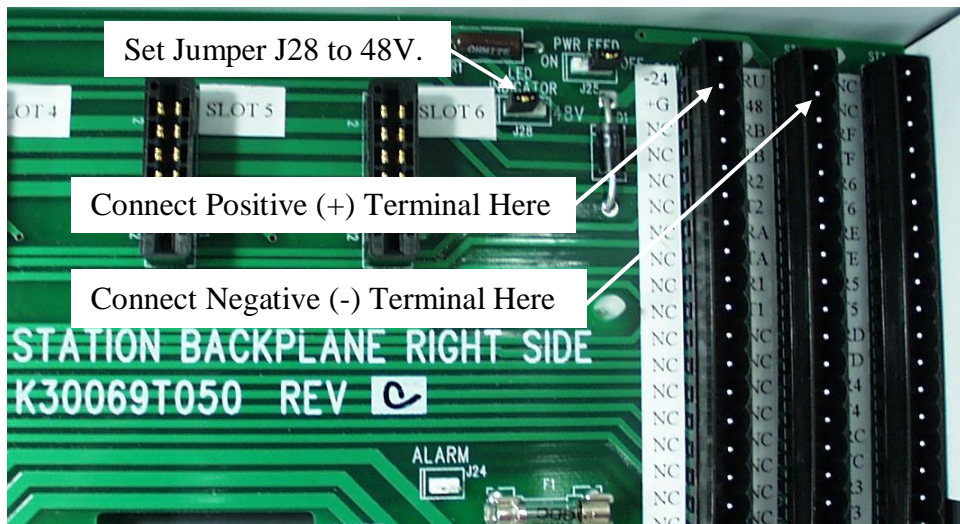
A separate wire can be brought into the card shelf and connected directly to the ST1-2 (GND) and ST1-1 (-24V) terminal block positions. The LED indicator jumper J28 should be set to "24V".



**Figure 3:** Connecting 24V External Power Supply

**To Bring external 48VDC into the card shelf as GROUNDED 48VDC:**

A separate wire can be brought into the card shelf and connected directly to the ST1-2 (GND) and ST2-20 (-48V) terminal block positions. The LED indicator jumper J28 must be set to "48V".



**Figure 4:** Connecting 48V External Power Supply

**Powering Cards Requiring Other Than 24/48VDC GROUNDED**

Some isolation cards have special powering requirements, i.e. 48VDC FLOATED, 130VDC FLOATED, or 120VAC.

- o 48VDC/130VDC FLOATING - With the battery terminals connected properly as described at the above section (5.3), then set switch **S5** to **Sec. Pwr** position (See Figure 1-A for location of switch).
- o 120VAC - Simply plug the power cord into the AC receptacle on the card shelf, then set switch **S5** to **Pri. Pwr** position (See Figure 1).

**NOTE:** Cards that require 120VAC/130VDC Floating cannot be used in the same card shelf as cards that require 48VDC Floating (RUGEN) because they utilize the same ST2-19 (RUGEN) terminal position.

**Internal Power Supply**

In P30112, only one of the two different power sources may be used. Normally 120VAC is the primary power source. Simply plug the power cord into the AC receptacle on the card shelf and set Switch S5 on the upper right hand backplane to "Pri Pwr". If a second power source (130VDC or 48VDC) is desired, simply connect it to the (+) and (-) screw terminals on the "BAT" connector block and set Switch S5 to "Sec Pwr". Be sure to use the power supply card that matches the power source. See Table 3 for power configurations.

**Table 3**

Primary Input Voltage	Secondary Input Voltage	Output Voltage	Power Supply (Set S5 to Pri. Pwr)	Power Supply (Set S5 to Sec. Pwr)
120 VAC	130 VDC	24 VDC	P30114	P30114
	48 VDC	24 VDC		P30079
	130 VDC	24 VDC		P30078
	130 VDC	48 VDC		P30111

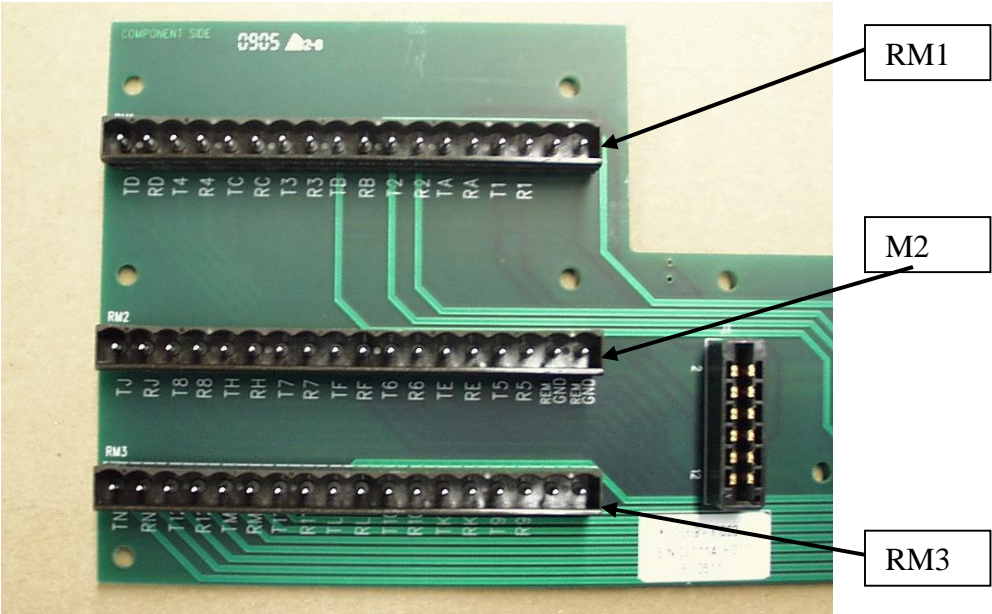
**6.0 INSTALLATION - CO/REMOTE SIDE CONNECTIONS**

**6.1 Remote Side Cable Pair Entrance**

- (a) Left side of card shelf bottom has a 3/4 inch NPT threaded hole. If standard PVC pipe is used, install a 3/4 inch-14 NPT male PVC fitting (PN 21300T9 - provided) in the threaded hole and run solid or flexible PVC conduit to the shelf.
- (b) A strain relief to accommodate a 0.45" thru 0.709" 12 to 25 pair high dielectric CO/Remote cable is also available (PN 23158T9). It will also screw into the threaded hole in the bottom of the card shelf.
- (c) Insert cable into remote side cable entrance.
- (d) Strip 1/4 inch from end of each wire and secure to appropriate connector block terminal by tightening screws with a small 1/8 inch standard blade screwdriver.
- (e) Three (3) 18-position, push-on connector blocks (RM1, RM2, RM3) located in the lower left corner of the card shelf are used to terminate the CO/Remote cable pairs. See Figure 3 and Table 4 for proper cable pair terminations.
  - (i) Plug RM1 into RM1 on remote side back plane.
  - (ii) Plug RM2 into RM2 on remote side back plane.
  - (iii) Plug RM3 into RM3 on remote side back plane.

(See Figure 3)

**Figure 5**  
Remote  
Side  
Terminal  
Blocks



6.2 Remote Side Pair Designations  
Each of the twelve (12) slots will support two (2) pairs. The first pair is connected to the left side of the backplane jacks and assigned a numeric designation (i.e. T1, R1, etc.). The second pair is connected to the right side of the backplane jacks and is assigned an alpha designation (i.e. TA, RA, etc.). See Table 4 and Figure 4

**Table 4: Remote Side Pin Configurations**

Remote Side					
SLOT	CONNECTOR	COLOR - TIP	PAIR	COLOR - RING	CONNECTOR
J1	RM1-15	WHITE - T1	1	BLUE - R1	RM1-16
J1	RM1-13	WHITE - TA	2	ORANGE - RA	RM1-14
J2	RM1-11	WHITE - T2	3	GREEN - R2	RM1-12
J2	RM1-9	WHITE - TB	4	BROWN - RB	RM1-10
J3	RM1-7	WHITE - T3	5	SLATE - R3	RM1-8
J3	RM1-5	RED - TC	6	BLUE - RC	RM1-6
J4	RM1-3	RED - T4	7	ORANGE - R4	RM1-4
J4	RM1-1	RED - TD	8	GREEN - RD	RM1-2
J5	RM2-33	RED - T5	9	BROWN - R5	RM2-34
J5	RM2-31	RED - TE	10	SLATE - RE	RM2-32
J6	RM2-29	BLACK - T6	11	BLUE - R6	RM2-30
J6	RM2-27	BLACK - TF	12	ORANGE - RF	RM2-28
	RM2-35	REM. GND.		REM. GND.	RM2-36
	RM3-53	REM (-V)		REM (-V)	RM3-54

### 6.3 Remote Ground

**When Surge/Lightning Arrester is NOT Used:** If user has concluded that a surge arrester is not needed for the installation, then the dedicated cable pairs are normally connected in an insulated splice case or terminal box to the card shelf cable stub. Pair 25 (violet/slate) should be connected to terminals 35 and 36 of terminal block RM2 to provide a means to access central office ground if required for certain circuit applications.

**When Surge/Lightning Arrester is Used:** Following the recommended protection practice of IEEE Standard 487-1992, remote ground outside the GPR zone of influence (300 volt GPR location) is accessible via a 5 kV spark gap located in the lightning surge arrester housing external to the card shelf.

One of the 5 kV spark gap terminals is physically connected to the remote ground end (line terminal end of the power type surge arrester as opposed to its ground terminal end) of the surge arrester used for the 65 kV rated BIL system. The other spark gap terminal connects to the card shelf "remote ground" designated on card shelf backplane terminations via the stub cable shield (equipped with a "bullit bond" or bonding clamps). The card shelf termination for the stub cable shield is the RM2-35 and RM2-36 terminal positions on the middle (RM2) connector block.

The above installation scheme provides for coordinated 65 kV BIL protection of both the isolation equipment (shelf and cards) and the dedicated entrance cable. The 5 kV gap coordinates drainage of surge voltage difference between the dedicated cable pairs and the shield should the power type surge arrester operate and equalize ground potential difference between station ground and remote ground via the cable shield.

The isolation system is designed around the protection practice of IEEE Standard 487-1992, and it is recommended that this configuration be used in any application environment where surges are possible. The 65 kV BIL of the isolation system is assured and the dedicated cable receives similar BIL protection and insulation protection coordination between shield and cable conductors.

**Note:** In some applications "remote ground" is directly needed for a circuit function such as for PBX ground start trunks (a less desirable trunk seizure configuration that is more prone to possible transient voltage and circuit noise problems than a loop start trunk). When a direct "remote ground" connection is required, a protection system application utilizing the 5 kV spark gap must have the gap bypassed by the Violet/Slate 25th pair to get central office ground directly accessible to the PBX card. This effectively disables the 5kV gap.

### 6.4 Circuits Requiring 2 or 3 Isolation Cards CENTER TAP (CTE) CONNECTIONS

To permit DC simplex sealing loop current to flow between two 2-wire isolation cards, all odd numbered slots have CTE connections through the remote backplane. J1 is connected to J3, J5 to J7, and J9 to J11. Use these combinations when using 2-wire isolation cards.

**NOTE:** The SW1 backplane switches must be in the down or "Standard" position to connect the CTE of slots J1 to J3 and J9 to J11.

#### SW1 SWITCH ON REMOTE BACKPLANE

Between slots J4 and J5 is an up/down switch marked "Special Setup" (up) and "Standard" (down). The "standard" position is the default position in which the card shelf is shipped. It is rarely necessary to change this setting!

#### **"Standard" Position**

SW1 switch connects CTE of 2-wire isolation cards residing in slots J1 and J3.

#### **"Special Setup" Position**

**WARNING:** This "Special Setup" position is rarely needed. Use "Special Setup" only for 4-wire DX Signaling Applications requiring a combination of three (3) isolation cards (Pilot Wire Relaying, OPX, AC). The SW1 switch connects the CTE of slot J1 to Ring (R5) of J5; and the CTE of J3 to Tip (T5) of J5. Put the 2-wire AC isolation (56 kbs) cards in slots J1 and J3. The special circuit card goes in slot J5.

## 7.0 TROUBLE SHOOTING

A test card P31102 is recommended for checking correct wiring and correct powering voltages.

### 7.1 LED Not Lit

- ◆ No supply voltage. Check with P31102 test card.
- ◆ Fuse on AC line receptacle or on upper back plane may have burned out.
- ◆ J28 on upper back plane was not set correctly (see page 7 & 8).

### 7.2 LED Blinking

- ◆ Possible line and neutral of the AC line are reversed.
- ◆ S5 on upper back plane may be set to Primary while J28 is set to 48V.
- ◆ J28 on upper right backplane is set to 48V while 120VAC is used.
- ◆ Input to one of the isolation cards may be shorted.
- ◆ Output of power supply may be shorted.

### 7.3 Fuse keeps burning

- ◆ Possible line and neutral of the AC line are reversed while J28 is set to 48V.
- ◆ The cards being used may be shorted.

### 7.4 Data Card Failure

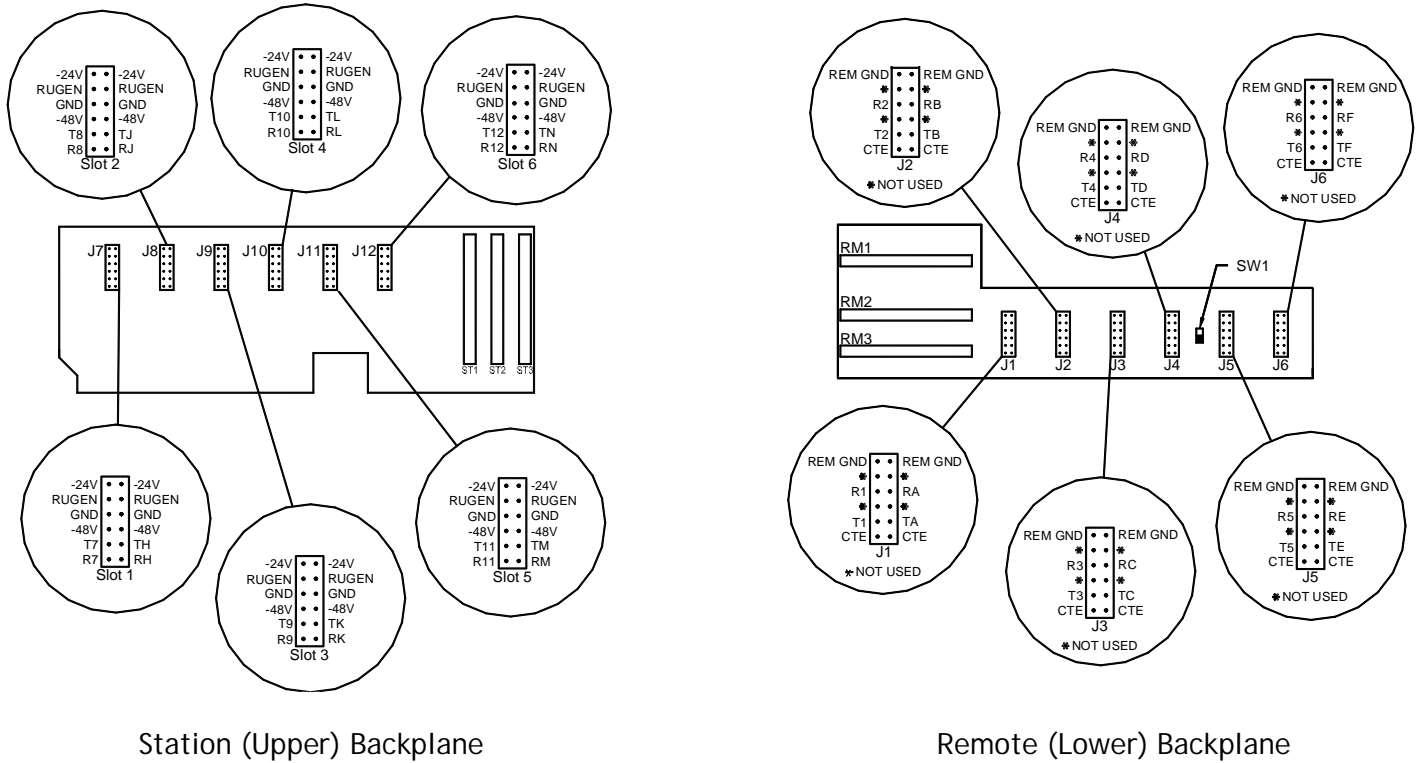
- ◆ Check for correct wiring. (Use P31102 and make jumpers from Station to Remote)
- ◆ Incorrect data card is used.

### 7.5 POTS Card Failure

- ◆ Check for correct wiring. (Use P31102 and make jumpers from Station to Remote)
- ◆ Check S1 on POTS card for correct setting.
- ◆ Check for correct powering voltage (Grounded 24V/48V) using P31102 test card.

## 8.0 PIN OUT DIAGRAMS

**Figure 6:** P30112, 6-Slot Station (Upper) and Remote (Lower) Backplane



For further information or for technical support - call 800-558-3325  
or visit [www.sncmfg.com](http://www.sncmfg.com)



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