FOXCOM

Complete RF-2-Fiber Solutions


# 7225H Interfacility Link
# Installation and User's Guide

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# Important Information



## Warranty and Repair Policy

Foxcom performs testing and inspection to verify the quality and reliability of our products. Foxcom uses every reasonable precaution to ensure that each unit meets specifications before shipment. Customers are asked to advise their incoming inspection, assembly, and test personnel as to the precautions required in handling and testing our products. Many of these precautions are to be found in this manual.

The products are covered by the following warranties:

### General Warranty

Foxcom warrants to the original purchaser all standard products sold by Foxcom to be free of defects in material and workmanship for 24 months from date of shipment from Foxcom. During the warranty period, Foxcom will repair or replace any product that Foxcom proves to be defective. This warranty does not apply to any product which has been subject to alteration, abuse, improper installation or application, accident, electrical or environmental over-stress, negligence in use, storage, transportation or handling.

### Specific Product Warranty Instructions

All Foxcom products are warranted against defects in workmanship, materials and construction, and to no further extent. Any claim for repair or replacement of units found to be defective on incoming inspection by a customer must be made within 30 days of receipt of shipment, or within 30 days of discovery of a defect within the warranty period.

This warranty is the only warranty made by Foxcom and is in lieu of all other warranties, expressed or implied. Foxcom sales agents or representatives are not authorized to make commitments on warranty returns.

### Returns

In the event that it is necessary to return any product against above warranty, the following procedure shall be followed:

1. Return authorization is to be received from Foxcom prior to returning any unit. Advise Foxcom of the model, serial number, and discrepancy. The unit may then be forwarded to Foxcom, transportation prepaid. Devices returned collect or without authorization may not be accepted.
2. Prior to repair, Foxcom will advise the customer of our test results and any charges for repairing customer-caused problems or out-of-warranty conditions etc.
3. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.

### Limitations of Liabilities

Foxcom's liability on any claim, of any kind, including negligence for any loss or damage arising from, connected with, or resulting from the purchase order, contract, quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contact, shall in no case exceed the purchase price of the device which gives rise to the claim.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, FOXCOM MAKES NO WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY GOODS, PARTS AND SERVICES PROVIDED IN CONNECTION WITH THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. FOXCOM SHALL NOT BE LIABLE FOR ANY OTHER DAMAGE INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH FURNISHING OF GOODS, PARTS AND SERVICE HEREUNDER, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE THE GOODS, PARTS AND SERVICE.

The Company's exclusive warranty and the remedy provided for breach thereof shall not apply to:

1. Any Product used or operated other than pursuant to the Company's written instructions,
2. Damage or deficiencies resulting from accident, alteration, modification, misuse, tampering, negligence, improper maintenance, installation or abuse,
3. Use of any Product other than at the Installation Site,
4. Use of any Product that is defective or damaged due to misuse, accident, or neglect, or due to external electrical stress, lightning or other acts of nature,
5. Use of any Product by a person who is not any authorized employee of the Customer, or
6. Used other than as explicitly authorized in writing by the Company.

## Reporting Defects

The units were inspected before shipment and found to be free of mechanical and electrical defects.

Examine the units for any damage which may have been caused in transit. If damage is discovered, file a claim with the freight carrier immediately. Notify Foxcom as soon as possible.

**Note** Keep all packing material until you have completed the inspection.

## Precautions

### Personal Safety

OPTICAL RADIATION

Applying power to the transmitter unit will create a laser energy source operating in Class I as defined by IEC 825-1. Use either an infrared viewer, optical power meter or fluorescent screen for optical output verification.

AC POWER HAZARD

The rackmount power supply line is EMI filtered. The chassis is connected to earth ground in compliance with safety requirements. Always use the 3-prong AC plug with earth ground to avoid possibility of electrical shock hazard to personnel.

### Equipment Safety

To avoid damaging your product, please observe the following:

1. The output of the receiver is AC coupled and can withstand the bias from a satellite receiver. **Do not exceed 25V DC bias.**
2. The input of the transmitter has an optional built-in bias for inserting DC power up the coax to the LNB. Make certain that any equipment or test equipment connected to the transmitter input can withstand this bias.
3. Do not allow any dirt or foreign material to get into the optical connector bulkheads. This may cause damage to the polished optical connector end faces.
4. The optical fiber jumper cable bend radius is 3 cm. Smaller radii can cause excessive optical loss and/or fiber breakage.
5. If multiple transmitters are installed in the chassis allow sufficient room for adequate ventilation; otherwise the units may overheat causing possible safety hazard or equipment damage.
6. Fuses: The 7180M chassis does not have fuses. If the unit fails, pull the power supply out from the chassis and then push it back in.
7. When several units are installed on one 7180M chassis, ensure that the total units' current consumption (including any LNB bias) does not exceed 6A.

# 1 Introduction to the *7225H Interfacility Link*



The Sat-Light™ 7225H IFL transmits an L-Band RF signal over single-mode fiber from a satellite antenna LNB to control room equipment up to 5 kilometers away. The 7225H IFL is a DFB high dynamic range link for applications that require either a higher quality link or transmission over long distances. The 7225H IFL consists of an optical transmitter (7225HT) which receives the L-Band signal from the LNB and an optical receiver (7225HR) which connects to a satellite receiver.

The 7225HT and 7225HR modules plug into the 7180M, a 3U chassis/power supply, which enables expansion of the system to accommodate any eight Sat-Light modules. Accessories include the Model 7001P Power Supply, the Model 2040 1:1 Redundant Switch, the Model 2100 Amplifier, the 2380 Relay Adaptor, and the Model 7050 Serial Optical Multiplexer, an asynchronous data link.

The 7225H IFL transmits all satellite modulation schemes - digital or analog. Any FM modulated RF signal is transmitted accurately. The RF signal is directly modulated and adds virtually no phase noise to the original signal. The direct modulation, along with extremely flat amplitude and group delay, guarantees low bit error rate (BER) and high signal quality, independent of distance. Featuring a Multi-Quantum Well (MQW) laser diode, the 7225H IFL operates over a wide temperature range, without needing to be cooled. Slow start optical power control protects the laser from DC transients upon turn-on.

Gain Control provides for optimization of the RF signal. LEDs, and back panel monitors and alarms allow for complete system status monitoring and for interfacing with monitor and control (M&C) systems.

## 1.1 Options

The *7225H Interfacility Link* comes with a variety of options:

1. 155nm laser; a 1310 nm laser is standard.
2. LNB powering; the transmitter unit can provide 14 or 18 VDC for optional LNB powering, depending on the Power Supply in the chassis[1].
3. 50 Ω or 75 Ω Input/Output Impedance/BNC female connector. Standard impedance is 50 Ω/F type, female connectors.
4. Standalone unit; the *7225H Interfacility Link* can be installed as a standalone unit. If the **7225H** is used as a standalone, a separate power supply must be used.
5. On the side of the **7225H**T and the **7225H**R units is a label which lists options 1 to 3. Under each option is a square[2]. If the unit includes a particular option the square under the option should be marked.

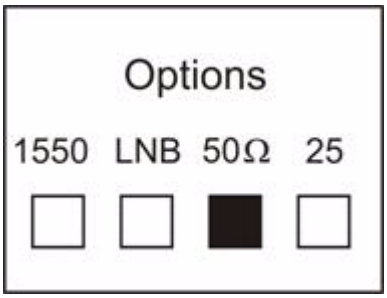



**Figure 1 Option Label**

1. At least one power supply, either a 14 VDC or an 18 VDC, depending on customer specifications, must be installed in the 7180M chassis. Up to two rackmounted power supplies may be installed on the chassis. The two power supplies must have the **same** voltage, either two 14VDC or two 18 VDC.
   **External Power Supply**: An external power supply may be used.The external power supply is connected via connector J11. If an external power supply is used this must be specified when ordering the**7225H** and the chassis. The voltage level provided by the external power supply is customer-defined any may be different from the internal voltage power supply.
2. The label includes options which are not relevant to the *7225H Interfacility Link*.

## 1.2 Product Drawings

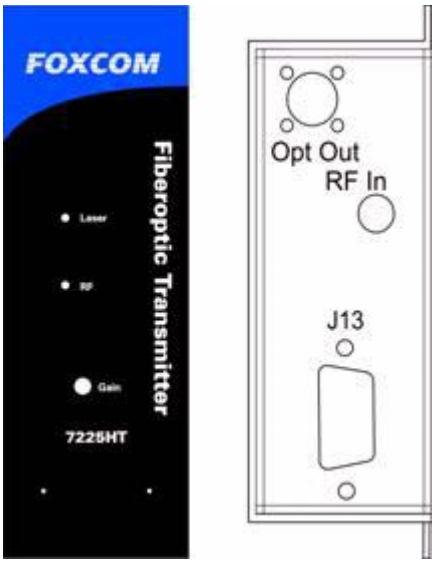



**Figure 2 7225HT Transmitter Front and Rear Panel**


**Figure 3 7225HR Receiver Front and Rear Panel**

## 1.3 Panel Descriptions

On the Front Panel of the 7225H IFL units are two LEDs. Both LEDs should be on when the unit is in use. The following tables describe the LEDs.

The LEDs on the Front Panel of the **7225H** Transmitter and Receiver are:

| LED Name | LED Function |
|---|---|
| **Laser** | Indicates if the laser is functioning |
| **RF** | Indicates if the RF signal is within the operating limits [-25 to -5 dBm] |

**Table 1 7225HT Transmitter LEDs**

| LED Name | LED Function |
|---|---|
| **Opt.** | Indicates if the optical input power is above the minimal level [–3 dBm] |
| **RF** | Indicates if the RF signal is within the operating limits [-25 to -5 dBm] |

**Table 2 7225HT Receiver LEDs**

## 1.4 Block Diagrams

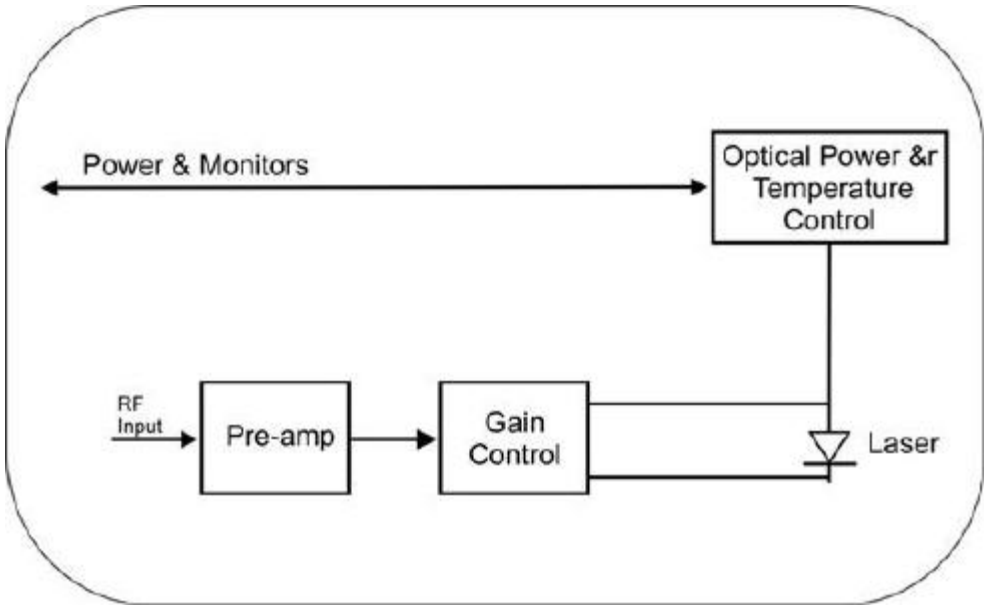



**Figure 4 Transmitter Block Diagram**

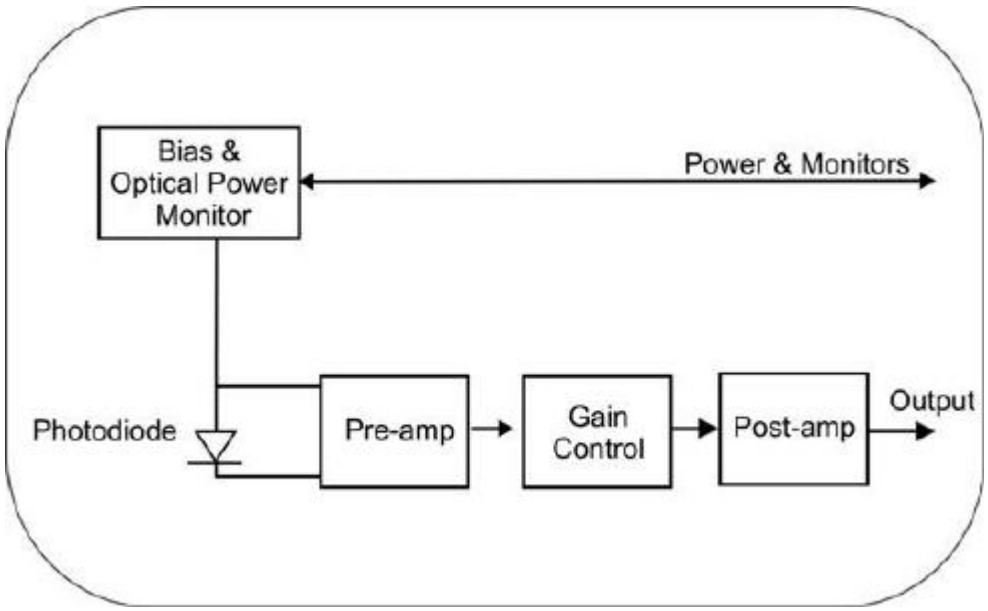



**Figure 5 Receiver Block Diagram**

# 2 Installation

The following section details how to install the *7225H Interfacility Link* units[3]. Setting up the 7225H Transmitter/Receiver consists:



Observe all warnings and cautions mentioned at the beginning of this manual (See **Important Information** on page iii).

If after set-up you experience problems, see **Chapter 5: Troubleshooting**, on page 29.

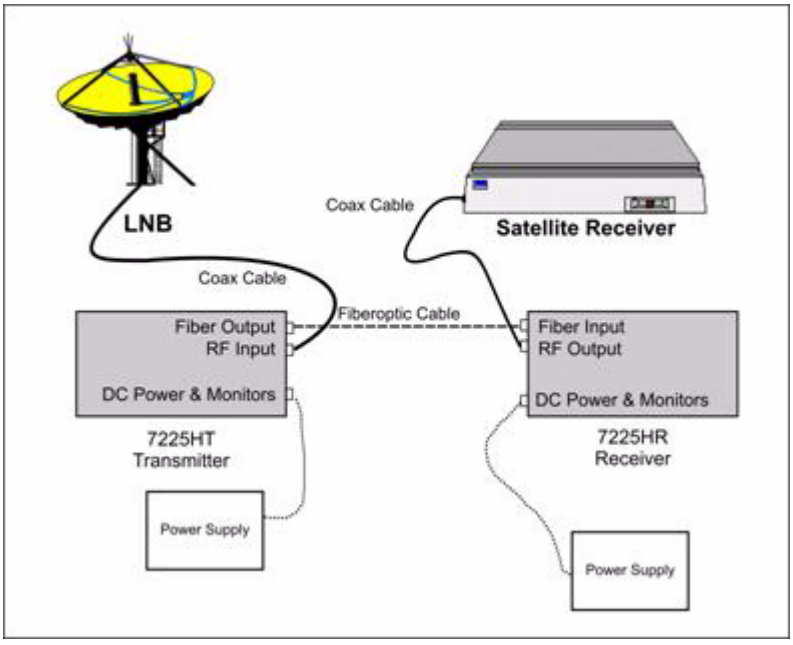



**Figure 6 Typical Application of a *7225H Interfacility Link***

3. This section gives instructions on installing the transmitter an ad receiver in a chassis rackmount. For instructions on installing standalone units see **Appendix 2 Installing a Standalone Unit** on page 35.

## 2.1 Setting up the Transmitter

1. Place the 7225HT in the 7180M Chassis.
2. Apply AC power to the chassis. The Power Supply and Laser LEDs should be lit.
3. Using an optical power meter, measure the optical power. Insert the meter's cable into the Transmitter's optical connector. Power levels should be between 2 - 5 mW (+3 to +7 dBm).

   Alternatively, use a DVM to measure the voltage at:
   - pins J13-P17 through J13-P24 for the slot being measured (See **Table 4 7225HT Transmitter Pinout** on page 20 for details regarding J13 pinouts) (7180M Rackmount)
   - at pin #6 of the 9 pin connector (standalone)

   The signal level should be -4.2 to -4.8VDC.
4. On the rear panel, connect the coax cable to the RF Input Connector. The RF LED should be lit.
5. On the rear panel, connect the fiber optic cable to the Optical Connector.
6. Adjust the Gain Control Potentiometer to give the desired output power. Using a small screw driver, turn the potentiometer (located on the front panel) to increase or decrease the gain.
   - To **increase** the gain, turn the gain control clockwise.
   - To **decrease** the gain, turn the gain control counterclockwise.

   For more information, see **2.7 Aligning the Fiber Optic Link** on page15.

**Note** If either LED is not lit, see **Chapter 5: Troubleshooting**, on page 29.

**Caution** *When monitoring the voltage outputs use only a high resistance DVM.*

## 2.2 Connecting the Fiber Optic Cable

**Before connecting the cable:**

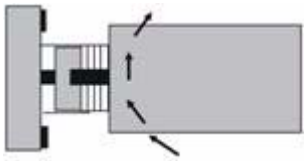
1. The fiber optic cable **must** be either fusion spliced or connected via FC/APC connectors.
2. Wipe the connector with a lint-free cotton cloth.
3. Note the polarity key of the optical connector before inserting.

**To connect the cable:**

1. Line Up the Polarity Key.


2. Insert the connector

3. Tighten the connector



**Caution** *Do not apply any glue, silicon adhesive, or any other material to the fiber optic connector!*

## 2.3 Setting Up the Receiver

1. Place the 7225HR Receiver in any of the 7180M Chassis, unless a 2040 RF Switch is installed. (See **Figure 8 7180M Chassis Rear View** on page 12.).

**Note** If a 2040 RF Switch(s) is being installed, then slots 2 and/or 5 of the 7180M are reserved for the switch(es).

2. Apply AC power to the chassis. The Power Supply's LED should be lit.
3. On the rear panel connect the fiber optic cable from the De-Mux to the Optical Connector. The Opt. LED should be lit (if the Transmitter is operating correctly).
4. Using an optical power meter, measure the optical power coming to the Receiver from the fiber optic cable. The power levels of the Receiver should be the power level measured at the Transmitter minus the fiber loss[4].

   Alternatively, use a DVM to measure the voltage at:
   - pins J13-P7 through J10-P12 for the slot being measured (See **Table 5 7225HR Receiver Pinout** on page 21 for details regarding J13 pinouts) (7180M Rackmount). The voltage level should be 1 V for each 1 mW measured at the Receiver input.
   - at pin #5 of the 9 pin connector (standalone)
5. On the rear panel, connect the coax cable to the RF Output Connector.
6. Adjust the Gain Control Potentiometer to give the desired output power. Using a small screw driver, turn the potentiometer (located on the front panel) to increase or decrease the gain.

**Notes**

1. The potentiometer is 10 turn potentiometer.
   - To **increase** the gain, turn the gain control clockwise.
   - To **decrease** the gain, turn the gain control counterclockwise.

   For more information see **2.7 Aligning the Fiber Optic Link** on page15.
2. If the LED is not lit, see **Chapter 5: Troubleshooting**, on page 29.

4. Fiber loss is defined as:
(attenuation/km x length (km) of the fiber optic cable) + (1.0 dB x number of connectors).
*For example if a signal with an optical wavelength of 1310 nm is transmitted over a link 10 kilometers long which had two connectors the loss would be:*
*(0.4 dB/km x 10 km) + (0.5 dB x 2) = 5.0 dB*

### 2.3.1 Measuring the RF Signal Strength

The RF signal strength can be monitored during operation via a DC RF signal-strength monitor. Maintenance personnel can perform a simple verification process.

**To measure the RF signal strength:**

- **Rackmount Connector:** Using a Digital Volt Meter, measure the voltage at J13-P1 through J13-P8.
- **2380 Relay Adapter:** Using a Digital Volt Meter, measure the voltage at J4-P1 through J4-P8.
- **Standalone:** Using a Digital Volt Meter, measure the voltage at the connector pin #4.

  The nominal level is 3 to 4 VDC.

## 2.4 Powering the IFL

- Transmitter power requirement: 14 or 18 VDC [5]@ 270 mA (excluding LNB Drive option).
- Receiver power requirement: 14 or 18 VDC [5.] @ 360mA.
- The Standalone Transmitter/Receiver is powered by a Foxcom supplied external DC power supply.
- The Rackmount Transmitters/Receivers are plugged into the rackmount chassis. The chassis can accept and power up to eight units.

**Note** At temperatures below -10°C, the Transmitter's internal heater will require an additional 120 mA. The Transmitter's total power requirement will then be 390 mA.

**Caution** *Ensure that there is a good airflow around the chassis rackmount.*

5. At least one power supply, either a 14 VDC or an 18 VDC, depending on customer specifications, must be installed in the 7180M chassis. Up to two rackmounted power supplies may be installed on the chassis. The two power supplies must have the **same** voltage, either two 14VDC or two 18 VDC.
   **External Power Supply**: An external power supply may be used.The external power supply is connected via connector J11. If an external power supply is used this must be specified when ordering the *7225H Interfacility Link* and the chassis. The voltage level provided by the external power supply is customer-defined any may be different from the internal voltage power supply.

### 2.4.1 7180M Chassis

The 7180M Chassis provides power to the plug in units. The power supply is a switching type. Each plug-in regulates its own voltage. The power supply provides:

- 15 or 18 VDC stable
- AC input; 100 - 240 VAC
- Units can be plugged in “hot standby”

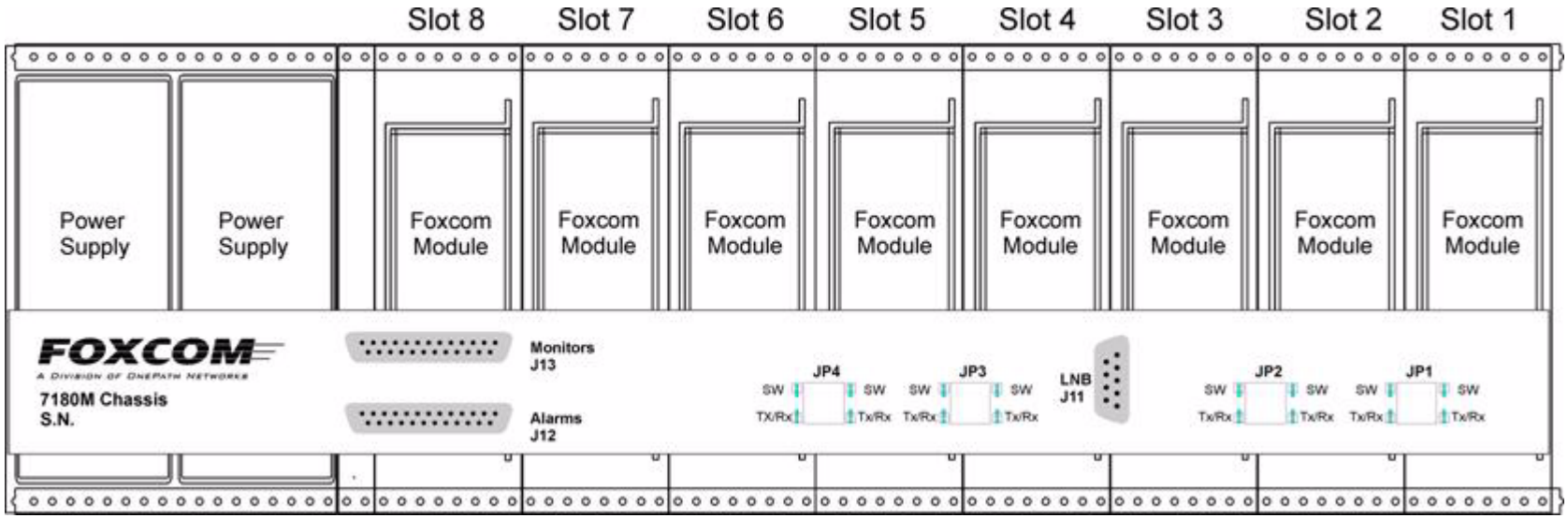



**Figure 7 7180M Chassis Rear View**

## 2.5 Connecting the Back Panel Jumpers

On the rear panel of the 7180M Back Panel are product selectors (JP1 to JP4). The 3 pin selectors (male) are the connecting point between the slots and the back panel. One pin is for the transmitter/receiver (Tx/Rx), one is for the optional 2040 1:1 Redundant Switch, and one is for the 7180M. A 2 pin jumper (female) is placed on the relevant pins to complete the connection between the 7180M and the units. For example, if a 2040 Switch is being used, the jumper is placed on the Switch-7180M pins.

**To connect the jumpers:**

1. Each jumper has two sets of pins, upper and lower. The upper pins are labeled SW (Switch) and the lower pins Tx/Rx.
2. If the 7180M has Tx or Rx units only, place all jumpers on the lower two pins.

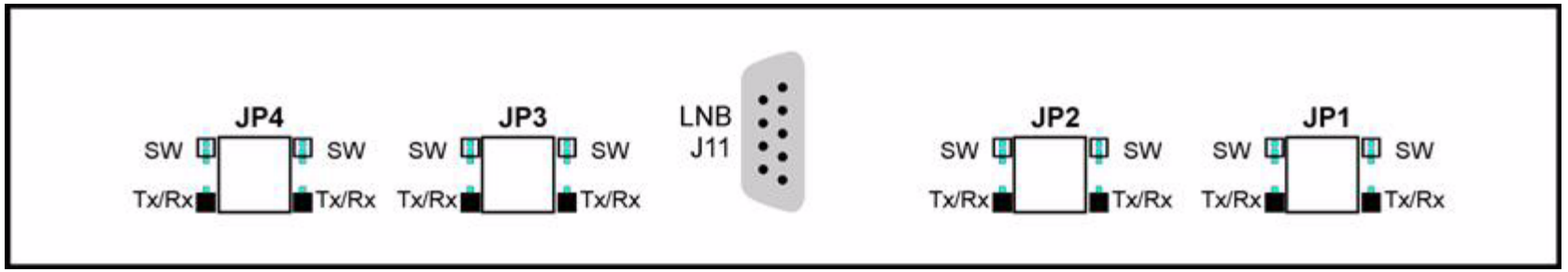



**Figure 8 Jumper Installation: Tx and Rx only**

3. If the 2040 Switch is installed in Slot 2, place the JP1 and JP2 jumpers on the higher two pins and the JP3 and JP4 jumpers on the lower two pins.

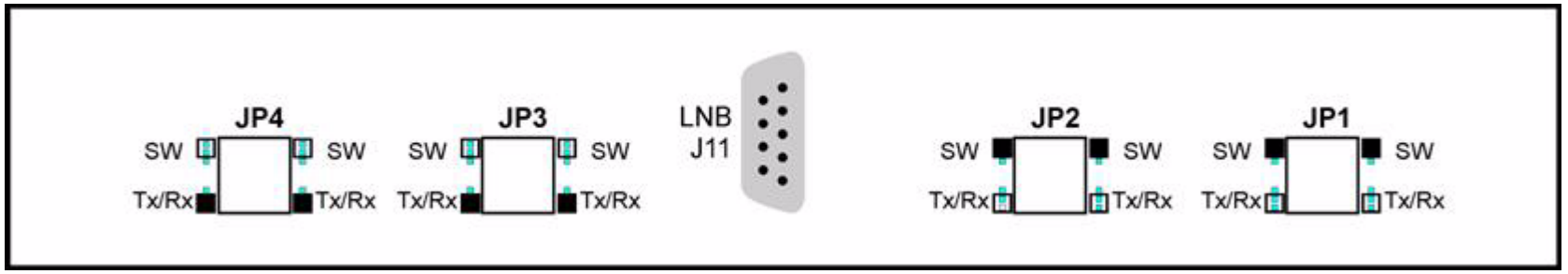



**Figure 9 Jumper Installation: 2040 Switch in slot 2**

4. If the 2040 Switch is installed in Slot 5, place the JP1 and JP2 jumpers on the lower two pins and the JP3 and JP4 jumpers on the higher two pins.

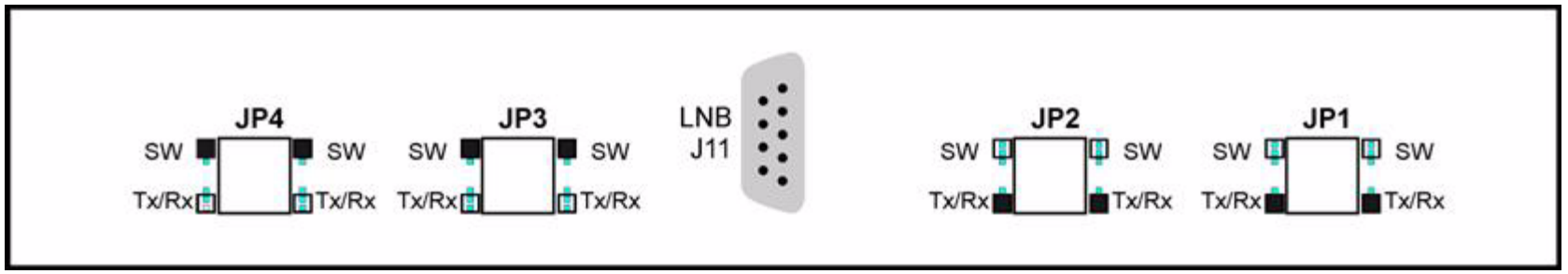



**Figure 10 Jumper Installation: 2040 Switch in slot 5**

5. If the 2040 Switch is installed in Slots 2 and 5, place the JP1, JP2, JP3, and JP4 jumpers on the higher two pins.

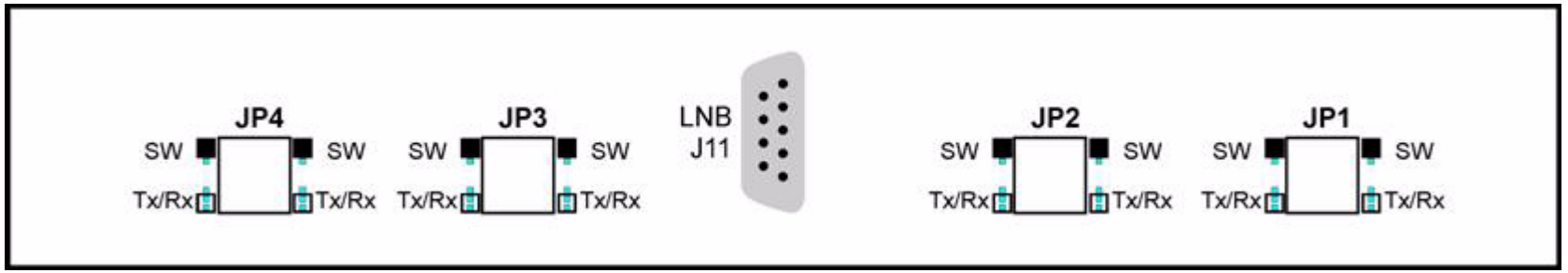



**Figure 11 Jumper Installation: 2040 Switch in slots 2 and 5**

## 2.6 Measuring the RF Signal Strength

The Receiver's RF signal Strength can be monitored during operation via a DC RF signal-strength monitor. Maintenance personnel can perform a simple verification process.

**To measure the RF signal strength:**

Using a Digital Volt meter, measure the voltage at the connector pin#4 (both Rackmount and Standalone).

## 2.7 Aligning the Fiber Optic Link

The final step in installing the *7225H Interfacility Link* is re-adjusting the Receiver Gain Control for unity gain.

**To set the unity gain (standard version)**[6]

1. Connect the combiner to the input of the transmitter.
2. Set the Signal Generator 1 to -8 dBm on the Spectrum Analyzer at 1500 MHz.
3. Repeat for the Signal Generator 2 at 1510 MHz.
4. Set up the system as shown in **Figure 12 Fiber Optic Alignment Setup**
5. Set the Transmitter Gain Control for 3rd order intermodulation level of -50 dBc at the Receiver output.
6. Adjust the Receiver Gain Control for unity gain.

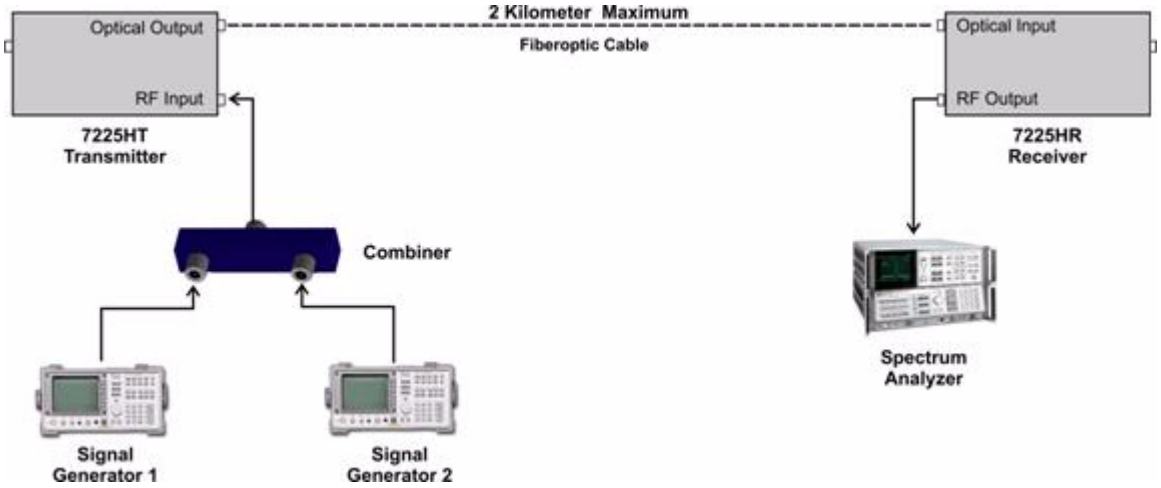



**Figure 12 Fiber Optic Alignment Setup**

6. If you are unable to perform this procedure see **Chapter 4: Gain Control**, on page 27.

# 3 Product Specifications



## 3.1 *7225H Interfacility Link* Specifications

| RF Specifications | |
|---|---|
| **Frequency range** | 950 – 2150 MHz [2500 MHz optional] |
| **Flatness 950 – 2150 MHz** | ± 1.0 db [typical] |
| **Flatness 950 – 2500 MHz[1]** | ± 2.5 db [max] |
| **Flatness @ 36 MHz** | ± 0.2 dB [max.] |
| **Input/Output impedance** | 50 Ω SMA [75 Ω optional] |
| **Return Loss** | 1.5:1 @ 50 Ω Impedance [max.]<br>1:57:1 @ @75 Ω Impedance [max.] |
| **Intermodulation products[2]** | -50 dBc [max.] |
| **Noise Figure[3]** | 25 dB |
| **OIP3[4]** | +15 dBm |
| **Input signal range [total power]** | -25 to -5 dBm |
| **Output signal range [total power]** | -25 to -5 dBm |
| **CNR @ 36 MHz / 36 dB / 2 Km** | 60 dB |
| **Gain control** | Manual |
| **Link gain[5]** | 0 ± 10 dB [within total power range] |
| **SFDR[6]** | 109 dB Hz $^{2}/_{3}$ @ -25 dBm [typical] |
| **RF connector** | F-type [standard] 50/75W BNC or SMA [optional] |
| **Maximum input power[7]** | 10± dBm |

**Table 3 *7225H Interfacility Link* Specifications**

1. Flatness between 950 – 2150 is ±1.5 dB. In the bandwidth between 2150 – 2500 MHz the flatness rises to ±2.5 dB
2. At nominal conditions
3. @ maximum input power @ 1 dB Optical loss @ Unity gain
4. This specification is true when: IMD = -40 dBc, Pout = -5 dBm
5. Full gain range is obtainable when in the input/output signal power is within the specified range
6. @ maximum input
7. With no damage

| Optical Specifications | |
|---|---|
| **Optical Wavelength** | 1310 ± 10 nm [1550 nm optional] |
| **Optical power output** | +3 to +7 dBm/ 2 to 5 mW |
| **Optical connector** | FC/APC |
| **Optical budget** | 5 Km @ 3 dB |
| **Optical return loss** | -60 dB |
| **Physical Specifications** | |
| **Chassis capacity** | 8 plug-ins, and 2 power supplies |
| **Chassis size** | 19” × 3U × 7” |
| **Power for rackmount [max.]** | 100 to 240 VAC 50/60Hz 90 Watts |
| **Standalone size** | 5” × 4.8” × 1.3” |
| **Power for standalone** | |
| **Transmitter** | +15 VDC @ 330 mA max.<br>(450 mA temp.< 10° C) |
| **Receiver** | +15 VDC @ 360 mA max. |
| **Operating Temperature Range** | -10°C to +55°C |
| **Storage Temperature Range** | -40°C to +85°C |
| All specifications are subject to change without prior notice | |

**Note** Optical fiber plant must be single-mode 9/125 and low reflections. Use FC/APC connectors only.

## 3.2 Model Dimensions

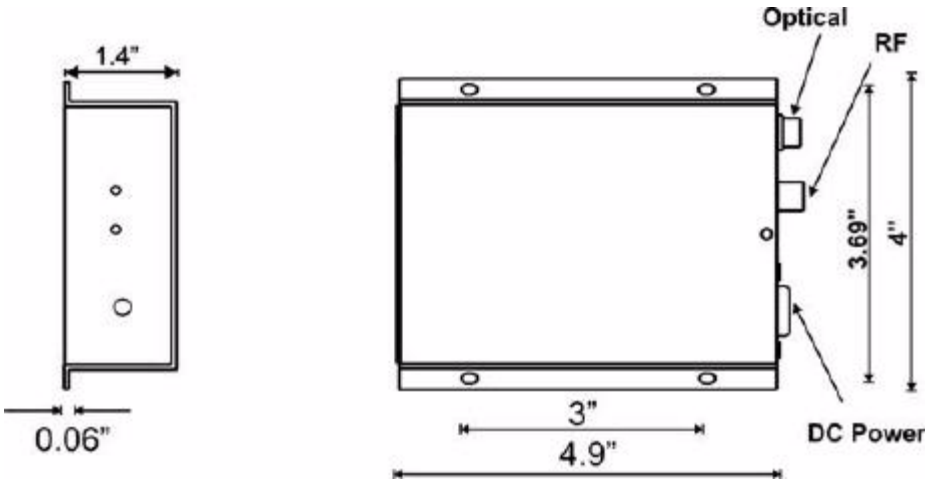



**Figure 13 Unit dimensions**

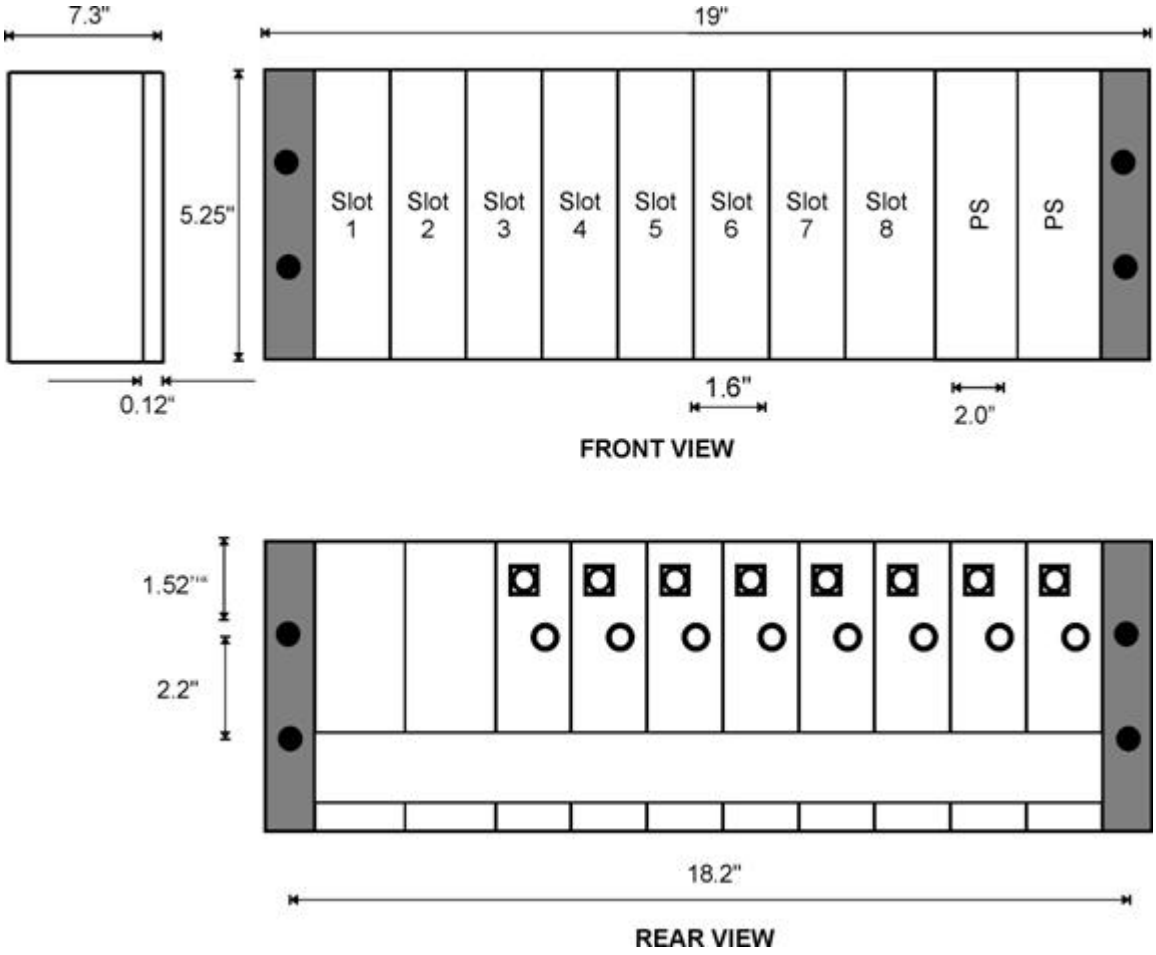



**Figure 14 7810M Chassis Dimensions**

## 3.3 *7225H Interfacility Link* Pinouts

### 3.3.1 Transmitter Pinout

| Standalone 9-Pin Connector [J13] | 7180M Chassis Backplane Connector | 2380 Relay Adapter Connector | Name | Description |
|---|---|---|---|---|
| 1 | — | — | +15 or 18V Power | 330 mA [excluding. LNB option] |
| 2 | — | — | Spare | Not Used |
| 3 | J11-P9<br>J12-P25<br>J13-P25 | J-P25<br>J4-P25 | GND | Chassis Ground |
| 4 | J13-P1 to J13-P8 | J4-P1 to J4-P8 | RF-SSI | **RF S**ignal **S**trength **I**ndicator; Range 3.0 to 4.0VDC |
| 5 | J13-P9 to J13-P16 | J4-P9 to J4-P16 | LOR | Measures Laser Optical Power range -2 to -4.5 V |
| 6 | J13-P17 to J13-P24 | J4-P17 to J4-P24 | LSRI | Indicates **L**aser **B**ias; Range -4.2 to -4.8VDC |
| 7 | J12-P1 to J12-P8 | J2: P1-P2<br>P3-P4, P5-P6<br>P7-P8, P9-P10<br>P11-P12,<br>P13-P14<br>P15-P16 | RF-A | **RF A**larm: Open collector interface.[1] Sinks current when RF level is low, up to 30 mA. |
| 8 | J12-P9 to J12-P16 | See note below | OA | **O**ptical **A**larm: Open Collector Interface[1]. Sinks current at low optical, up to 30 mA. |
| 9 | J11-P1 to J11-P6 | | LNB bias [optional][2] | External LNB Bias |

**Table 4 7225HT Transmitter Pinout**

1. If the 2380 Relay Adapter is installed, the alarms are dry contact. See **Appendix 3 The 2380 Relay Adapter** on page 37.
2. Dependent on order

**Note** If a 2380 Relay Adapter is installed RF and Optical Levels are measured together; the alarm indicates a problem in either the RF or Optical Levels.

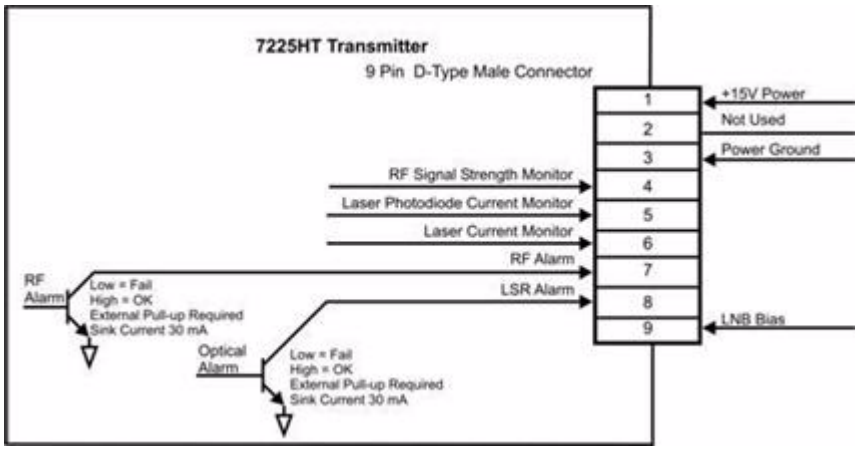



**Figure 15 7225HT Transmitter pinout**

### 3.3.2 Receiver Pinouts

| Standalone 9 Pin Connector [J14] | 7180M Chassis Backplane Connector | 2380 Relay Adapter Connector | Name | Description |
|---|---|---|---|---|
| 1 | — | — | +15 or 18V Power | 330 mA |
| 2 | — | — | Spare | Not Used |
| 3 | J11-P9<br>J12-P25<br>J13-P25 | J2-J25<br>J4-P25 | GND | Chassis Ground |
| 4 | J13-P1 to J13-P8 | J4-P1 to J4-P8 | RF-SSI | **RF S**ignal **S**trength **I**ndicator<br>Range 0.2 - 10.5 V |
| 5 | J13-P9 to J13-P16 | J4-P9 to J4-P16 | ROP | Indicates **R**eceived **O**ptical **P**ower<br>Range 1V/!mW optical power |
| 6 | — | — | Spare | Not Used |
| 7 | J12-P1 to J12-P8 | J2: P1-P2<br>P3-P4, P5-P6<br>P7-P8, P9-P10<br>P11-P12<br>P13-P14<br>P15-P16 | RF-A | **RF A**larm: Open collector interface[1]. Sinks current when RF level is low, up to 30 mA. |
| 8 | J12-P9 to J12-P16 | See note below | OA | **O**ptical **A**larm: Open collector interface[1]. Sinks current when optical level is low, up to 30 mA. |
| 9 | — | — | Spare | Not Used |

**Table 5 7225HR Receiver Pinout**

1. If the 2380 Relay Adapter is installed, the alarms are dry contact. See **Appendix 3 The 2380 Relay Adapter** on page 37.

**Note** If a 2380 Relay Adapter is installed RF and Optical Levels are measured together; the alarm indicates a problem in either the RF or Optical Levels.

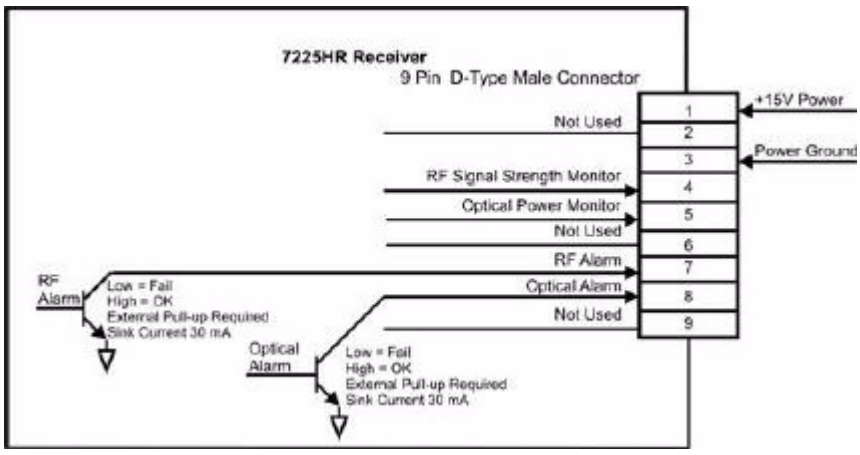



**Figure 16 7225HR Receiver pinout**

**Caution** *When monitoring the voltage outputs use only a high resistance DVM.*

## 3.4 7180M Chassis Pinouts

The unit's pins are found at the backplane of the 7180M chassis. The 7180M chassis backplane incorporates eight slots. Pinouts from the 9-pin connector at each slot are sent through the backplane assembly to the two 25-pin D-connectors, J12 and J13, and one 9-pin connector, J11. Any monitor voltages to be measured may be done between the chassis ground and the required pin.

For more information about pinouts, see **Appendix 4 Pinout Charts and Diagrams** on page 43.

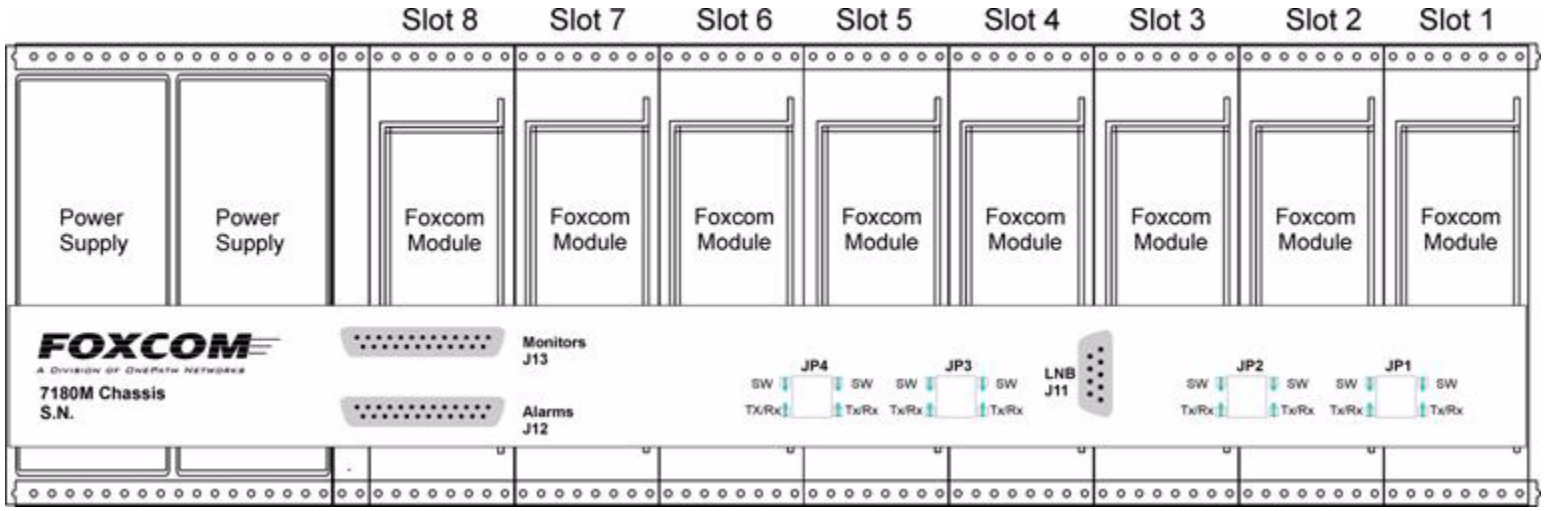



**Figure 17 7180M Chassis rear view**

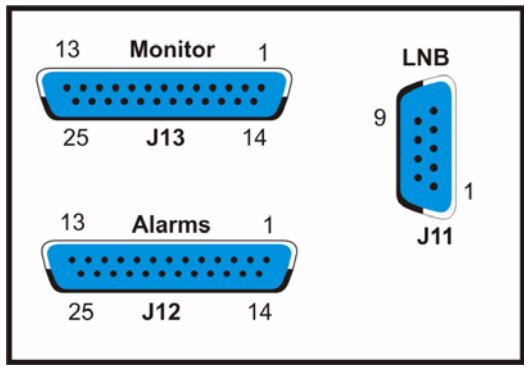



**Figure 18 7180M Chassis Pin numbers**

### 3.4.1 7180M Alarm Connector Pinouts [J12]

| Pin No. | Function | Name | Slot No. |
|---|---|---|---|
| **1** | RF Alarm | RfAlm1 | 1 |
| **2** | RF Alarm | RfAlm2 | 2 |
| **3** | RF Alarm | RfAlm3 | 3 |
| **4** | RF Alarm | RfAlm4 | 4 |
| **5** | RF Alarm | RfAlm5 | 5 |
| **6** | RF Alarm | RfAlm6 | 6 |
| **7** | RF Alarm | RfAlm7 | 7 |
| **8** | RF Alarm | RfAlm8 | 8 |
| **9** | Optical Alarm | OptAlm1 | 1 |
| **10** | Optical Alarm | OptAlm2 | 2 |
| **11** | Optical Alarm | OptAlm3 | 3 |
| **12** | Optical Alarm | OptAlm4 | 4 |
| **13** | Optical Alarm | OptAlm5 | 5 |
| **14** | Optical Alarm | OptAlm6 | 6 |
| **15** | Optical Alarm | OptAlm7 | 7 |
| **16** | Optical Alarm | OptAlm8 | 8 |
| **17** | | | |
| **18** | | | |
| **19** | | | |
| **20** | | | |
| **21** | Standby Power Supply | SPSNOP | |
| **22** | Standby Power Supply | SPSCOM | |
| **23** | Main Power Supply | MPSNOP | |
| **24** | Main Power Supply | MPSCOM | |
| **25** | Chassis Ground | GND | |

**Table 6 7180M Alarm Connector [J12} Pinouts**

### 3.4.2 7180M Monitor Connector Pinout [J13]

| Pin No. | Function | Name | Slot No. |
|---|---|---|---|
| **1** | RSSI Monitor | RSSI1 | 1 |
| **2** | RSSI Monitor | RSSI2 | 2 |
| **3** | RSSI Monitor | RSSI3 | 3 |
| **4** | RSSI Monitor | RSSI4 | 4 |
| **5** | RSSI Monitor | RSSI5 | 5 |
| **6** | RSSI Monitor | RSSI6 | 6 |
| **7** | RSSI Monitor | RSSI7 | 7 |
| **8** | RSSI Monitor | RSSI8 | 8 |
| **9** | PDI Monitor | PDI1 | 1 |
| **10** | PDI Monitor | PDI2 | 2 |
| **11** | PDI Monitor | PDI3 | 3 |
| **12** | PDI Monitor | PDI4 | 4 |
| **13** | PDI Monitor | PDI5 | 5 |
| **14** | PDI Monitor | PDI6 | 6 |
| **15** | PDI Monitor | PDI7 | 7 |
| **16** | PDI Monitor | PDI8 | 8 |
| **17** | LSRI Monitor | LSRI1 | 1 |
| **18** | LSRI Monitor | LSRI2 | 2 |
| **19** | LSRI Monitor | LSRI3 | 3 |
| **20** | LSRI Monitor | LSRI4 | 4 |
| **21** | LSRI Monitor | LSRI5 | 5 |
| **22** | LSRI Monitor | LSRI6 | 6 |
| **23** | LSRI Monitor | LSRI7 | 7 |
| **24** | LSRI Monitor | LSRI8 | 8 |
| **25** | Chassis Ground | GND | |

**Table 7 7180M Monitor Connector [J13] Pinout**

### 3.4.3 LNB Connector Pinout [J11]

| Pin No. | Function | Name | Slot No. |
|---|---|---|---|
| **1** | LNB Powering | LNB | 1 |
| **2** | LNB Powering | LNB | 2 |
| **3** | LNB Powering | LNB | 3 |
| **4** | LNB Powering | LNB | 4 |
| **5** | LNB Powering | LNB | 5 |
| **6** | LNB Powering | LNB | 6 |
| **7** | LNB Powering | LNB | 7 |
| **8** | LNB Powering | LNB | 8 |
| **9** | Chassis Ground | GND | |

**Table 8 LNB Connector Pinout**

### 3.4.4 7180M and Redundancy Switching

The 2040 Switch provides optional 1:1 redundancy switching for all Foxcom Interfacility Links. If the customer chooses to add redundancy switching to the link, the pin connector jumpers need to be moved.

Detailed instructions on moving the jumpers are provided in the *Model 2040 1:1 Redundant Switch Installation and User's Guide (Document Number 93-005-26-A1).*

# 4 Gain Control

The 7225H IFL unit requires no maintenance, but the user can adjust the transmitter and receiver gain by 20 dB. The gain can be between 0 to -20 dB.

All internal adjustments have been set up at the factory; the only user adjustments are input and output RF signal levels accessible from the front panel and described in the following sections. A detailed procedure for optimizing the gain control is provided in section **2.7 Aligning the Fiber Optic Link** on page15.

If you do not have a signal generator or spectrum analyzer, adjust the gain according to the following procedure.

**To adjust the Transmitter Gain:**

1. Set the input power to the expected power level.
2. Set the nominal RSSI signal at 3.5 V ± 0.5.

**To adjust the Receiver Gain:**

1. Set the input power to the expected power level.
2. Set the nominal RSSI signal at 5.0 V ± 2.

# 5 Troubleshooting

The *7225H Interfacility Link* unit was tested before it left the factory. However if you are experiencing difficulties see the list below for possible solutions. If you are still experiencing problems, attempt to isolate and identify the malfunctioning unit before consulting Foxcom's technical support.

| Problem | Possible Cause |
|---|---|
| 1. Laser LED not on | a. No DC power to the unit. Possible power supply problem or AC power input problem. Check the power supply fuse.<br>b. Verify LSRI monitor is between -4.8 and -4.2VDC. If not, laser may have overheated. Disconnect power or remove plug and allow to cool. Try again with better airflow.<br>c. If an optical power meter is available, measure the optical power out of the transmitter. The power should between 2 to 5 mW [+3 to 7 dBm]. If an optical power meter is not available, use another receiver to determine if there is optical power emerging from the transmitter (use a 5 meter jumper cable). If there is no optical power, then the transmitter unit is malfunctioning.<br>If any or all the above are not within the guidelines, the transmitter unit is faulty. |
| 2. Lack of RF signal present at Receiver, yet optical power is functioning. | a. If the unit has an LNB drive option, verify correct LNB bias is coming down the center of the RF connector at the transmit site.<br>b. Verify dish is pointed and correctly receiving satellite signals.<br>Conclusion: If signal still not present then transmitter input stage amplifier is defective. Contact factory. |

**Table 9 Troubleshooting the Transmitter**

| | |
|---|---|
| 3. No optical power, LED not illuminated | a. No optical power, LED not illuminated.Transmitter is not functioning, see above.<br>b. There is a break or severe bend in the fiber optic cable. Use an optical power meter or another functioning receiver unit to verify optical power coming down the fiber.<br>c. Optical power too low, too many splits, too long a distance (thus exceeding optical budget). System *may still function* without LED illuminated although at reduced performance. |
| 4. Optical power light illuminated with disconnected optical input. | Leaky photodiode or DC Amplifier offset. Unit may still function, otherwise contact factory. |

**Table 9 Troubleshooting the Transmitter**

# Appendix 1 Cleaning Fiber Optic Connections



The unit has an FC/APC angle polished optical connector for very high optical return loss performance. The units are specified into single mode fiber i.e. 9/125 micron core diameter. Full performance is specified only for low return loss optical plant - meaning that the fiber must be fusion spliced and all connections or splices must have a return loss greater than -60 dB. With these guidelines in mind, link lengths beyond 20 kilometers (DFB based products) can be achieved with high performance. Specific performance and/or design assistance is available by request from Foxcom.

If there is low/no signal or noisy signal at a Foxcom module, the connector should be cleaned. Dirt on the inside connector tip can impair the flow of light causing problems in signal transmission. Foxcom modules are sealed but dirt can occasionally enter during installation and alignment.

The input and output optical ports of all Foxcom equipment are known in the fiber optic world as bulkhead ports. Foxcom uses FC/APC connectors.

The following materials are representative of the types of cleaning materials that should be used for cleaning the fiber optic ports and connectors. They are available from several suppliers.

| Description | Manufacturer |
|---|---|
| Kim wipes | Kimberly Clark |
| Cletop Automatic Connector Cleaner | Cletop |
| fiber optic Swab | Cletop or FIS |
| fiber optic Compressed Air | Chemtronics |

**Table 10 Cleaning materials**

Wiping clothes should be made of lint free alcohol free nonabrasive materials. Swabs should have a tightly wrapped tip and be talcum-free. For removing dust from receptacles, a canned compressed gas is recommended. Do not use commercial compressed air because of risk of contamination.

## Appendix 1.1 Cleaning Procedures for FC/APC Connectors

Use a Kim Wipe to gently wipe the end face surface of the connector. Alternatively a Cletop automatic connector cleaner can be used.

**Figure 19 Wiping the connector with a Kim wiper**

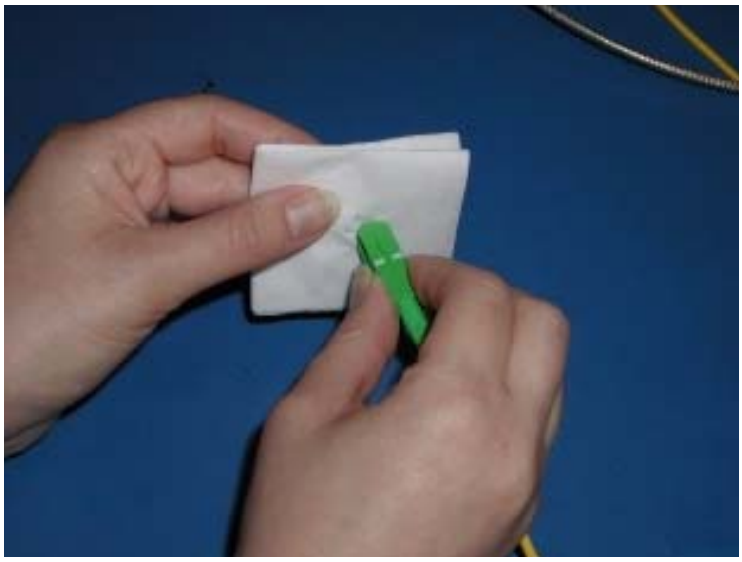


**Figure 20 Wiping the connector with a Kim wiper [2]**

## Appendix 1.2 Cleaning Procedure for FC/APC Bulkhead Ports

**Caution** *Clean the transmitter and receiver optical ports only when there is evidence of contamination or reduced performance.*

### Appendix 1.2.1 Swab Method

Using a clean fiber optic cleaning swab, gently wipe out the optical port. Discard the swab after use.

**Figure 21 Cleaning the Optical Port**

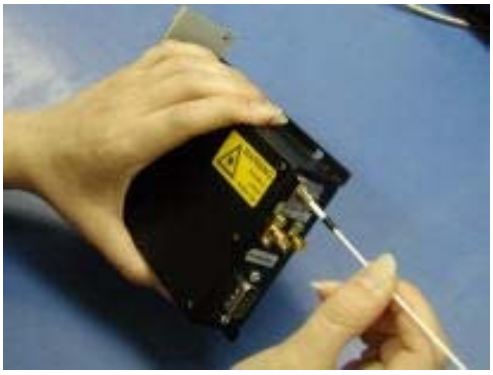


**Figure 22 Cleaning the Optical Port [2]**

### Appendix 1.2.2 Compressed Air Method

Using the extension tube of the compressed air, blow into the port to remove any dust or debris. Do not allow the tube to touch the bottom of the port. Do not use commercial compressed air due to potential oil contamination.

**Note** To prevent contamination, the optical ports should be connected or covered with a dust cap at all times.

Use dry air or nitrogen only.

# Appendix 2 Installing a Standalone Unit

**To install the 7225HT-STD or 7225HR-STD Standalone:**

1. Place the *7225HIFL* unit on the standalone flange, matching the holes.
2. Using four screws (#4 or #6) secure the unit and the flange to the wall.
3. Apply AC power to the standalone power supply unit.
4. Connect the 7225HD unit to the power supply. The Laser LED should be lit.

All remaining steps are the same as in the product manual. See sections **2.1 Setting up the Transmitter** on page 8 and **2.3 Setting Up the Receiver** on page 10.

# Appendix 3 The 2380 Relay Adapter

The following section describes how to install the 2380 Relay adapter onto the 7180M Chassis. The 2380 Relay adapter assembly provides dry contact output signals as an option to the standard open collector signals available on the 7180M chassis backplane.

If the 2380 Relay adapter is ordered separately from the 7180M chassis, it must mounted by the user. The 2380 is mounted directly over the connectors on the 7180M backplane, as shown below.

## Appendix 3.1 Installing the 2380 Relay Adapter

### Appendix 3.1.1 Parts Required for Installing the 2380

- 2380 Relay Adapter
- Two pin guides
- Four one-inch screws
- Screw driver

### Appendix 3.1.2 Mounting the the 2380 Relay Adapter

1. **Very Important**: Disconnect the electricity **before** performing this procedure.
2. Make sure that you have all the needed equipment.
3. Install the pin guides.

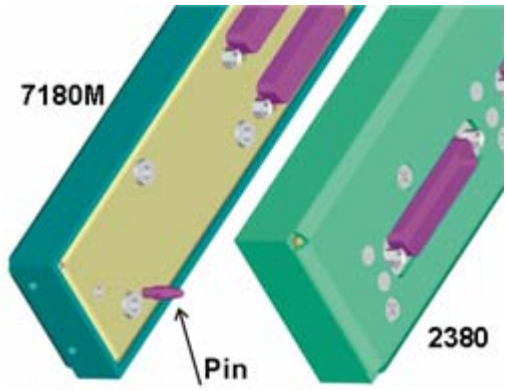



**Figure 23 Installing the guide pins**

4. Mount the unit onto the pin guides.

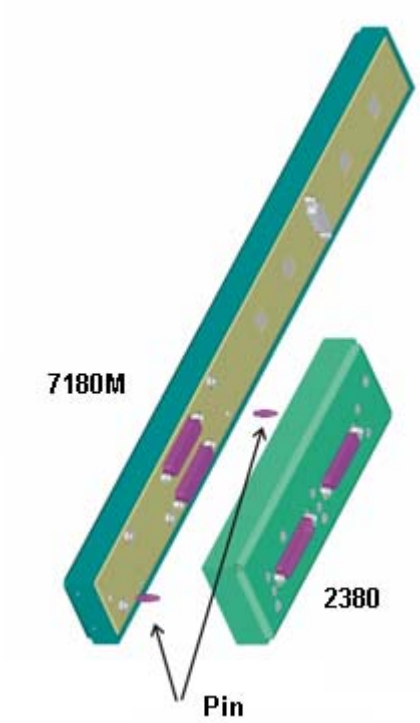



**Figure 24 Mounting the adapter**

5. Mount the four screws. The screws must be installed in the order shown in **Figures 25** and **26**.

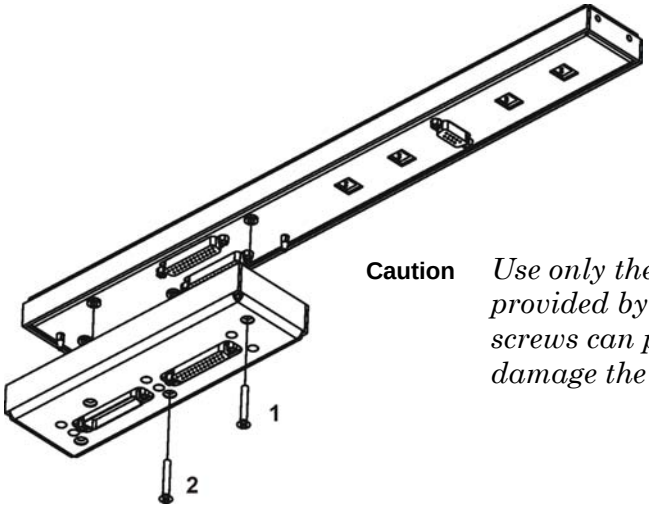



**Figure 25 Mounting the screws [1]**

**Caution** *Use only the mounting screws provided by Foxcom.Other screws can permanently damage the unit!*

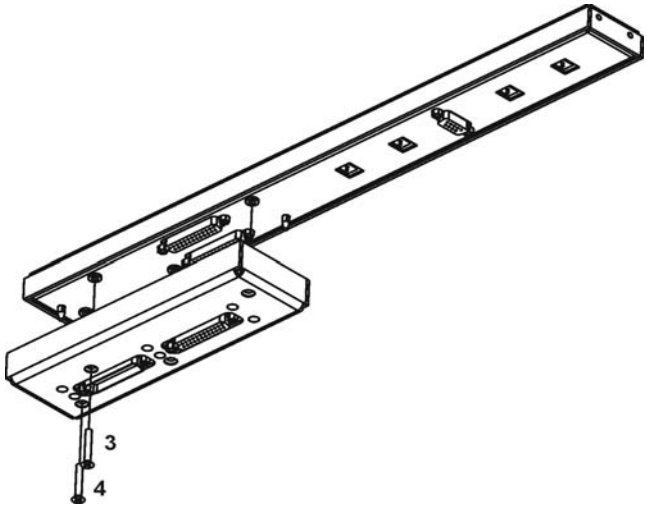



**Figure 26 Mounting the screws [2]**

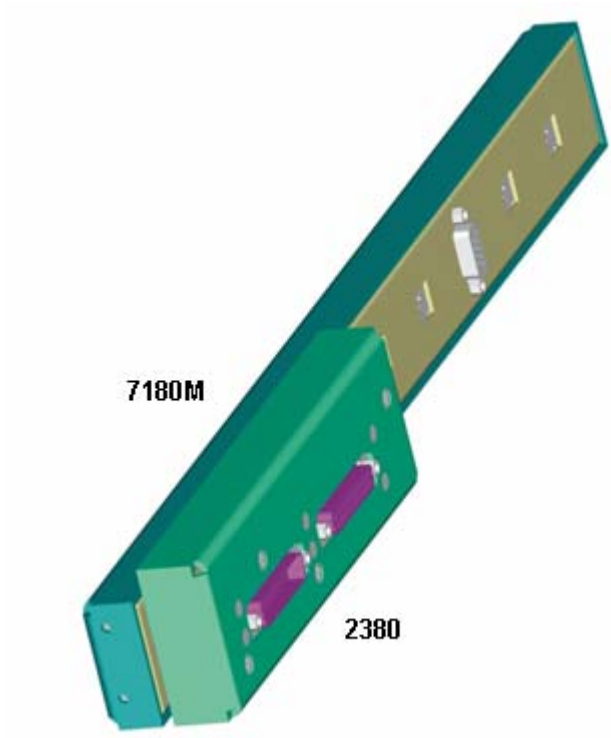



**Figure 27 Mounted 2380**

6. Connect the cables.

## Appendix 3.2 2380 Dimensions and Front Panel Label

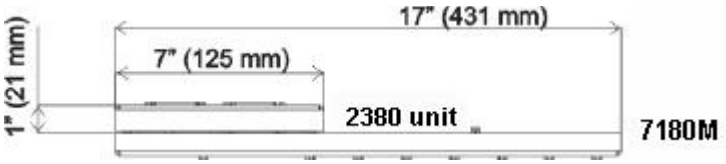



**Figure 28 2380 Dimensions**

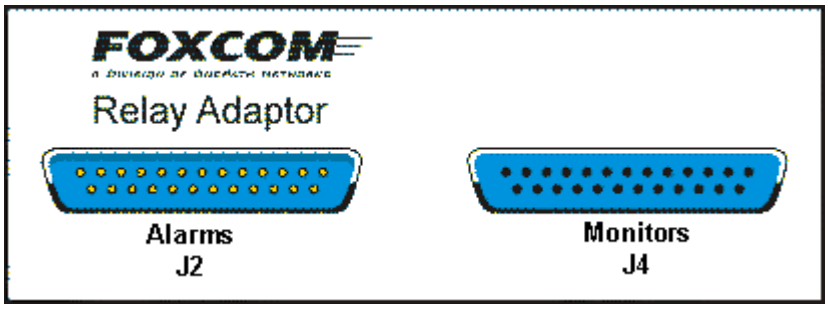



**Figure 29 2380 Front Label**

## Appendix 3.3 2380 Adapter Pinouts

**Table 11 2380 Alarms Pinouts [J2]**

| Pin Number | Function | Name | Slot Number |
|---|---|---|---|
| 1 | Alarm | NOP1 | 1 |
| 2 | Alarm | COM1 | 1 |
| 3 | Alarm | NOP2 | 2 |
| 4 | Alarm | COM2 | 2 |
| 5 | Alarm | NOP3 | 3 |
| 6 | Alarm | COM3 | 3 |
| 7 | Alarm | NOP4 | 4 |
| 8 | Alarm | COM4 | 4 |
| 9 | Alarm | NOP5 | 5 |
| 10 | Alarm | COM5 | 5 |
| 11 | Alarm | NOP6 | 6 |
| 12 | Alarm | COM6 | 6 |
| 13 | Alarm | NOP7 | 7 |
| 14 | Alarm | COM7 | 7 |
| 15 | Alarm | NOP8 | 8 |
| 16 | Alarm | COM8 | 8 |
| 17 | | | |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | | | |
| 22 | | | |
| 23 | Main PS Alarm | MPSA | |
| 24 | Standby PS Alarm | SPSA | |
| 25 | Power Supply Comm. | PSCOM | |

**Note** Alarms in Pins 1 through 16 function if there is either an RF or Optical signals failure.

**Table 12 2380 Monitor Connector Pinouts [J4]**

| Pin Number | Function | Name | Slot Number |
|---|---|---|---|
| 1 | RSSI Monitor | RSSI | 1 |
| 2 | RSSI Monitor | RSSI | 2 |
| 3 | RSSI Monitor | RSSI | 3 |
| 4 | RSSI Monitor | RSSI | 4 |
| 5 | RSSI Monitor | RSSI | 5 |
| 6 | RSSI Monitor | RSSI | 6 |
| 7 | RSSI Monitor | RSSI | 7 |
| 8 | RSSI Monitor | RSSI | 8 |
| 9 | PDI Monitor | PDI1 | 1 |
| 10 | PDI Monitor | PDI2 | 2 |
| 11 | PDI Monitor | PDI3 | 3 |
| 12 | PDI Monitor | PDI4 | 4 |
| 13 | PDI Monitor | PDI5 | 5 |
| 14 | PDI Monitor | PDI6 | 6 |
| 15 | PDI Monitor | PDI7 | 7 |
| 16 | PDI Monitor | PDI8 | 8 |
| 17 | LSRI Monitor | LSRI1 | 1 |
| 18 | LSRI Monitor | LSRI2 | 2 |
| 19 | LSRI Monitor | LSRI3 | 3 |
| 20 | LSRI Monitor | LSRI4 | 4 |
| 21 | LSRI Monitor | LSRI5 | 5 |
| 22 | LSRI Monitor | LSRI6 | 6 |
| 23 | LSRI Monitor | LSRI7 | 7 |
| 24 | LSRI Monitor | LSRI8 | 8 |
| 25 | Chassis Ground | GND | |

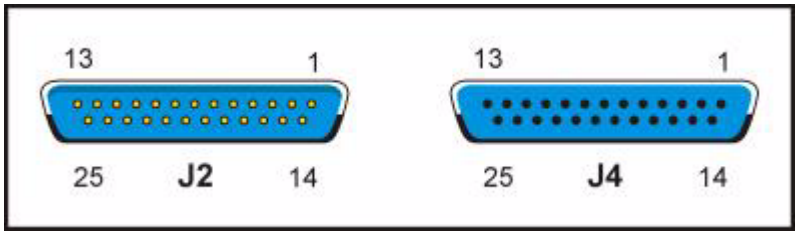



**Figure 30 2380 Pin numbers**

# Appendix 4 Pinout Charts and Diagrams

Figures 31 through 36 give detailed pinout information for the 7180M chassis, the 2380 Relay Adaptor and the 2040 RF Switch.

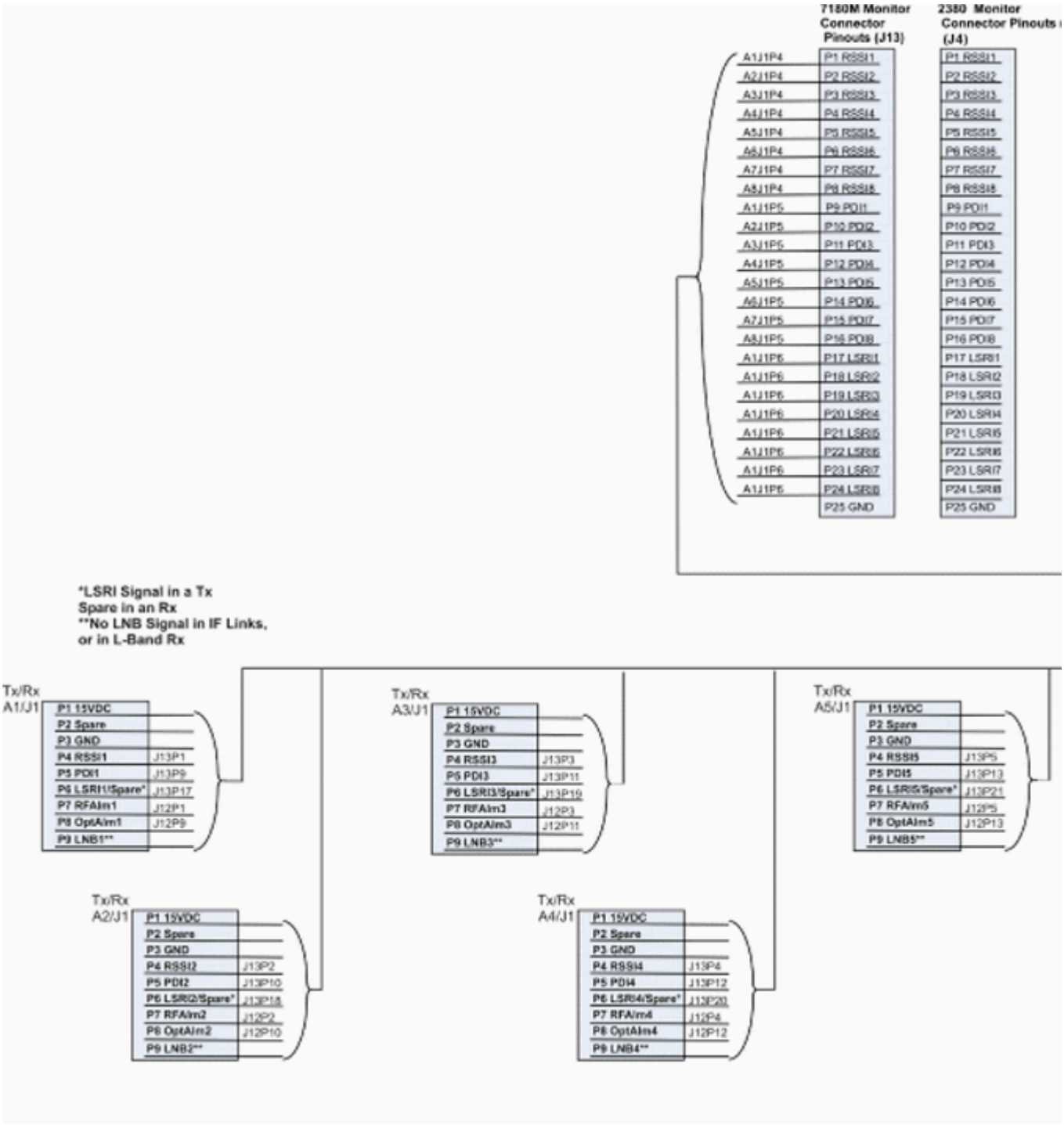
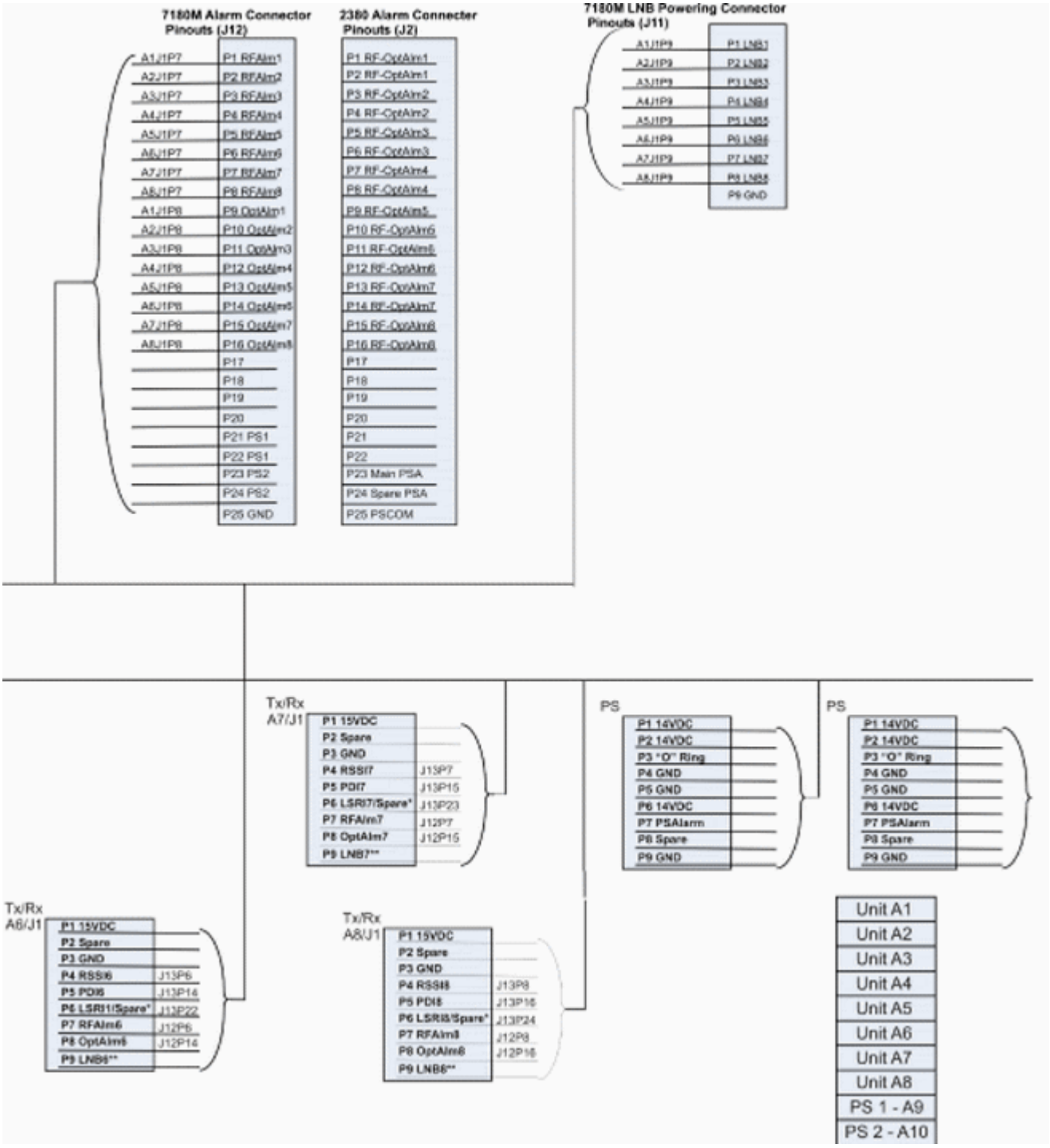



**Figure 31 Standard 7180M and 7180M with 2380 Relay Adapter Pinout**


7180M Alarm Connector Pinouts (J12)
A1/J1P7 P1 RFAlm1
A2/J1P7 P2 RFAlm2
A3/J1P7 P3 RFAlm3
A4/J1P7 P4 RFAlm4
A5/J1P7 P5 RFAlm5
A6/J1P7 P6 RFAlm6
A7/J1P7 P7 RFAlm7
A8/J1P7 P8 RFAlm8
A1/J1P8 P9 OptAlm1
A2/J1P8 P10 OptAlm2
A3/J1P8 P11 OptAlm3
A4/J1P8 P12 OptAlm4
A5/J1P8 P13 OptAlm5
A6/J1P8 P14 OptAlm6
A7/J1P8 P15 OptAlm7
A8/J1P8 P16 OptAlm8
P17
P18
P19
P20
P21 PS1
P22 PS1
P23 PS2
P24 PS2
P25 GND
2380 Alarm Connector Pinouts (J2)
P1 RF-OptAlm1
P2 RF-OptAlm1
P3 RF-OptAlm2
P4 RF-OptAlm2
P5 RF-OptAlm3
P6 RF-OptAlm3
P7 RF-OptAlm4
P8 RF-OptAlm4
P9 RF-OptAlm5
P10 RF-OptAlm6
P11 RF-OptAlm6
P12 RF-OptAlm6
P13 RF-OptAlm7
P14 RF-OptAlm7
P15 RF-OptAlm8
P16 RF-OptAlm8
P17
P18
P19
P20
P21
P22
P23 Main PSA
P24 Spare PSA
P25 PSCOM
7180M LNB Powering Connector Pinouts (J11)
A1/1P9 P1 LNB1
A2/1P9 P2 LNB2
A3/1P9 P3 LNB3
A4/1P9 P4 LNB4
A5/1P9 P5 LNB5
A6/1P9 P6 LNB6
A7/1P9 P7 LNB7
A8/1P9 P8 LNB8
P9 GND
Tx/Rx A7/J1
P1 15VDC
P2 Spare
P3 GND
P4 RSSI7 J13P7
P5 PDI7 J13P15
P6 LSR7/Spare* J13P23
P7 RFAlm7 J12P7
P8 OptAlm7 J12P15
P9 LNB7**
PS
P1 14VDC
P2 14VDC
P3 "O" Ring
P4 GND
P5 GND
P6 14VDC
P7 PSAlarm
P8 Spare
P9 GND
PS
P1 14VDC
P2 14VDC
P3 "O" Ring
P4 GND
P5 GND
P6 14VDC
P7 PSAlarm
P8 Spare
P9 GND
Tx/Rx A6/J1
P1 15VDC
P2 Spare
P3 GND
P4 RSSI6 J13P6
P5 PDI6 J13P14
P6 LSR1/Spare* J13P22
P7 RFAlm6 J12P6
P8 OptAlm6 J12P14
P9 LNB6**
Tx/Rx A8/J1
P1 15VDC
P2 Spare
P3 GND
P4 RSSI8 J13P8
P5 PDI8 J13P16
P6 LSR8/Spare* J13P24
P7 RFAlm8 J12P8
P8 OptAlm8 J12P16
P9 LNB8**
Unit A1
Unit A2
Unit A3
Unit A4
Unit A5
Unit A6
Unit A7
Unit A8
PS 1 - A9
PS 2 - A10

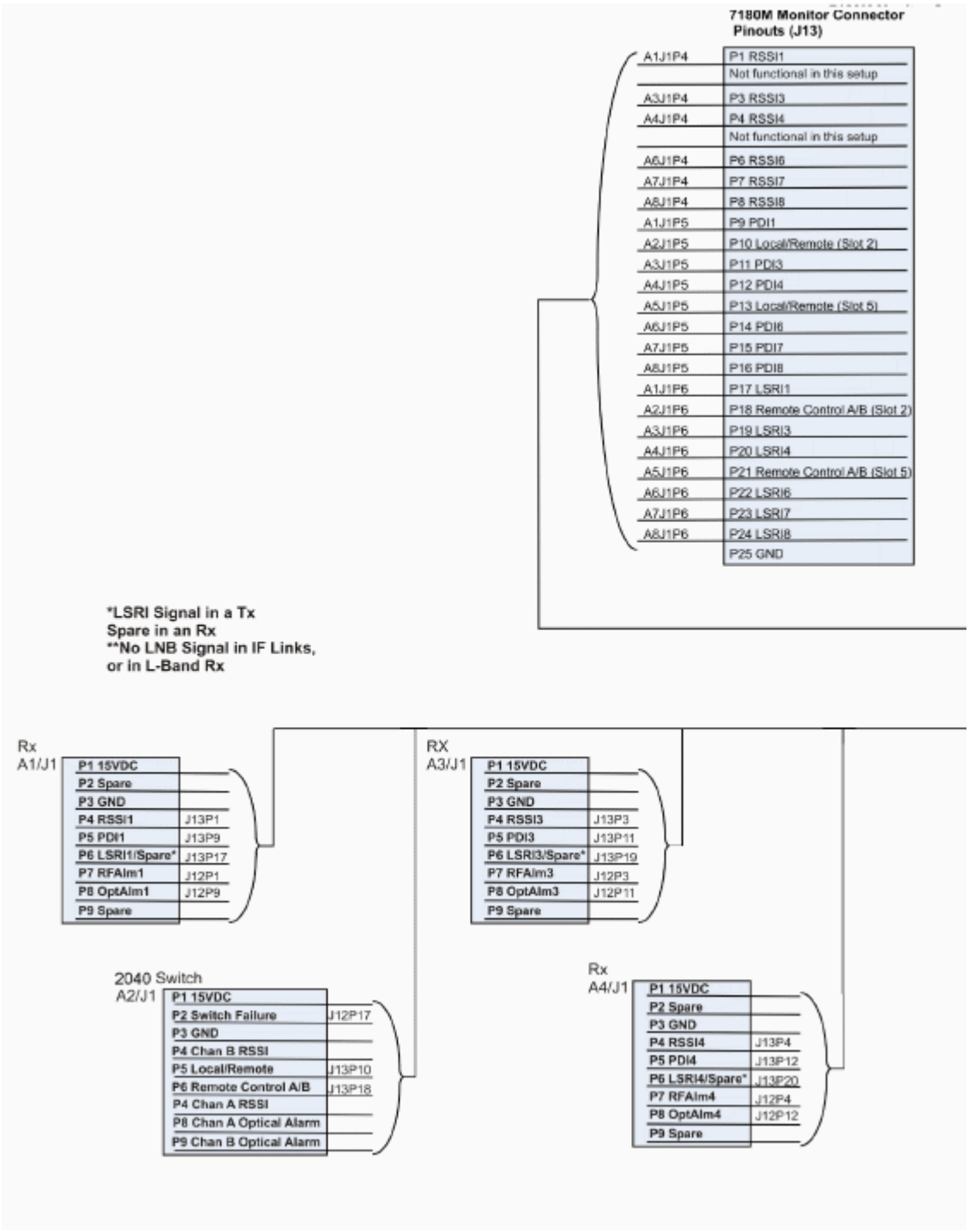
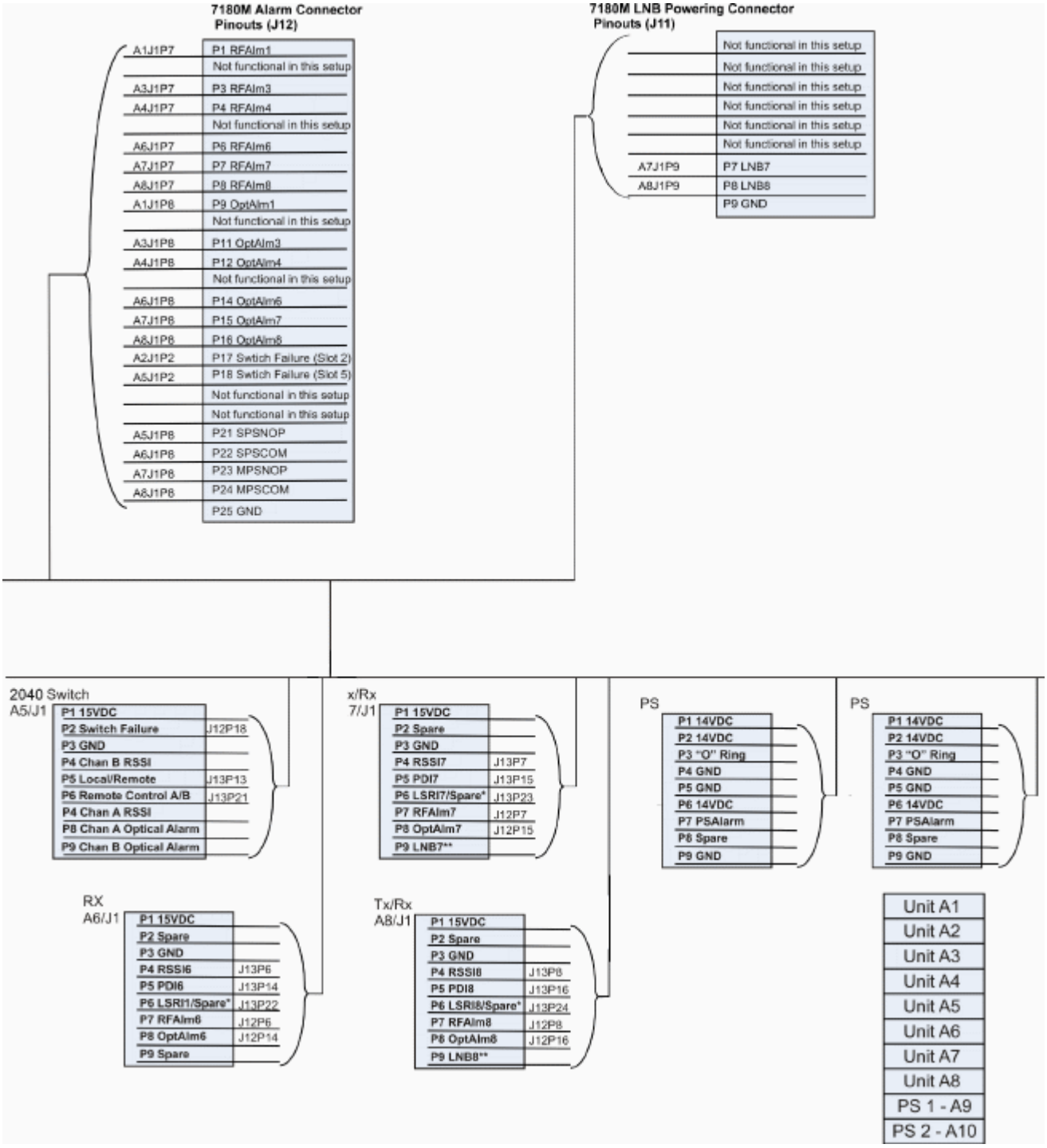



**Figure 32 7180M with 2040 RF Switch Pinout**


7180M Alarm Connector Pinouts (J12)
A1J1P7 P1 RFAlm1
Not functional in this setup
A3J1P7 P3 RFAlm3
A4J1P7 P4 RFAlm4
Not functional in this setup
A6J1P7 P6 RFAlm6
A7J1P7 P7 RFAlm7
A8J1P7 P8 RFAlm8
A1J1P8 P9 OptAlm1
Not functional in this setup
A3J1P8 P11 OptAlm3
A4J1P8 P12 OptAlm4
Not functional in this setup
A6J1P8 P14 OptAlm6
A7J1P8 P15 OptAlm7
A8J1P8 P16 OptAlm8
A2J1P2 P17 Switch Failure (Slot 2)
A5J1P2 P18 Switch Failure (Slot 5)
Not functional in this setup
Not functional in this setup
A5J1P8 P21 SPSNOP
A6J1P8 P22 SPSCOM
A7J1P8 P23 MPSNOP
A8J1P8 P24 MPSCOM
P25 GND
7180M LNB Powering Connector Pinouts (J11)
Not functional in this setup
Not functional in this setup
Not functional in this setup
Not functional in this setup
Not functional in this setup
Not functional in this setup
A7J1P9 P7 LNB7
A8J1P9 P8 LNB8
P9 GND
2040 Switch
A5/J1
P1 15VDC
P2 Switch Failure J12P18
P3 GND
P4 Chan B RSSI
P5 Local/Remote J13P13
P6 Remote Control A/B J13P21
P4 Chan A RSSI
P8 Chan A Optical Alarm
P9 Chan B Optical Alarm
x/Rx
7/J1
P1 15VDC
P2 Spare
P3 GND
P4 RSSI7 J13P7
P5 PDI7 J13P15
P6 LSRI7/Spare* J13P23
P7 RFAlm7 J12P7
P8 OptAlm7 J12P15
P9 LNB7**
PS
P1 14VDC
P2 14VDC
P3 "O" Ring
P4 GND
P5 GND
P6 14VDC
P7 PSAlarm
P8 Spare
P9 GND
PS
P1 14VDC
P2 14VDC
P3 "O" Ring
P4 GND
P5 GND
P6 14VDC
P7 PSAlarm
P8 Spare
P9 GND
RX
A6/J1
P1 15VDC
P2 Spare
P3 GND
P4 RSSI6 J13P6
P5 PDI6 J13P14
P6 LSRI1/Spare* J13P22
P7 RFAlm6 J12P6
P8 OptAlm6 J12P14
P9 Spare
Tx/Rx
A8/J1
P1 15VDC
P2 Spare
P3 GND
P4 RSSI8 J13P8
P5 PDI8 J13P16
P6 LSRI8/Spare* J13P24
P7 RFAlm8 J12P8
P8 OptAlm8 J12P16
P9 LNB8**
Unit A1
Unit A2
Unit A3
Unit A4
Unit A5
Unit A6
Unit A7
Unit A8
PS 1 - A9
PS 2 - A10

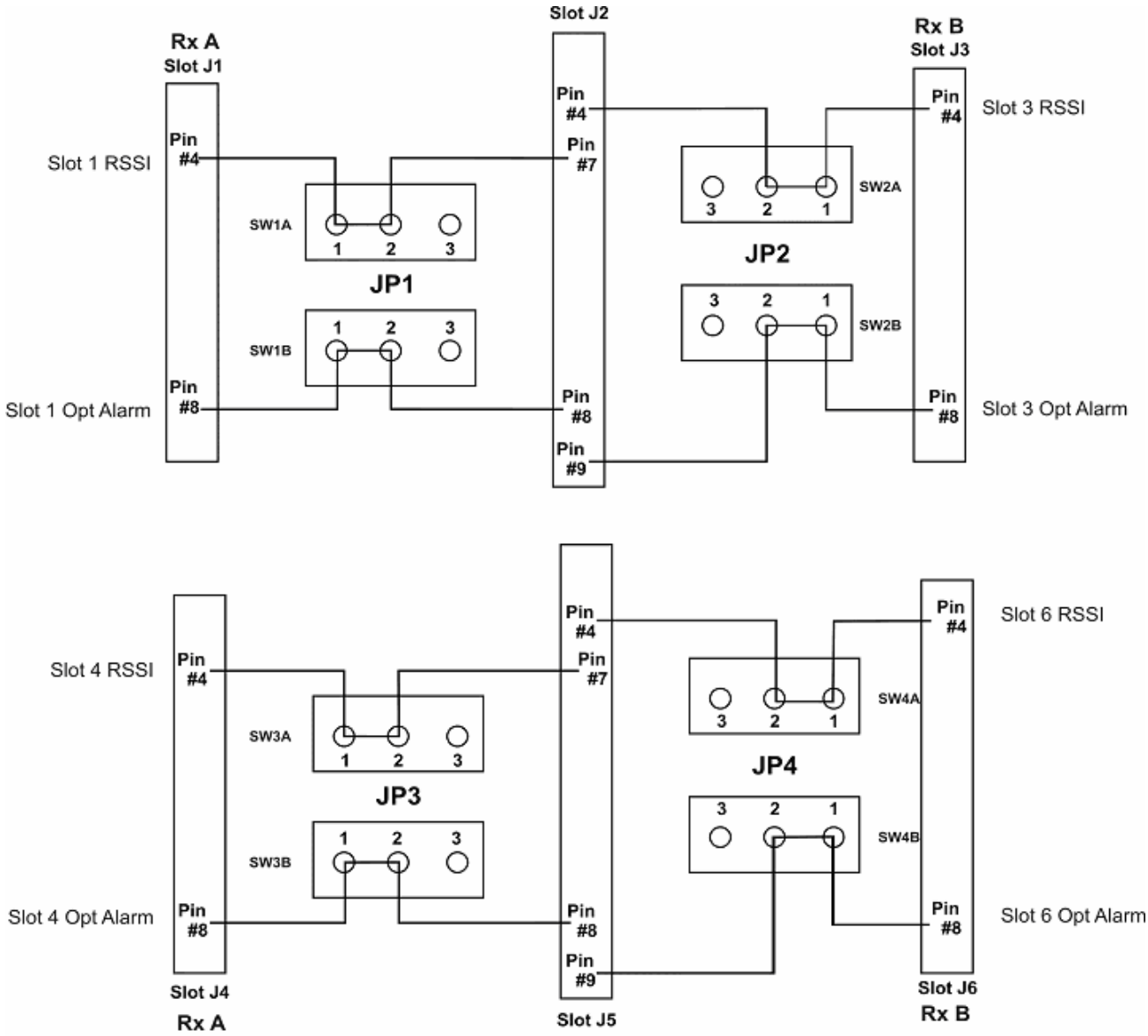



**Figure 33 Pinout of 7180M Jumper with 2040 RF Switch in slots 2 and 5**

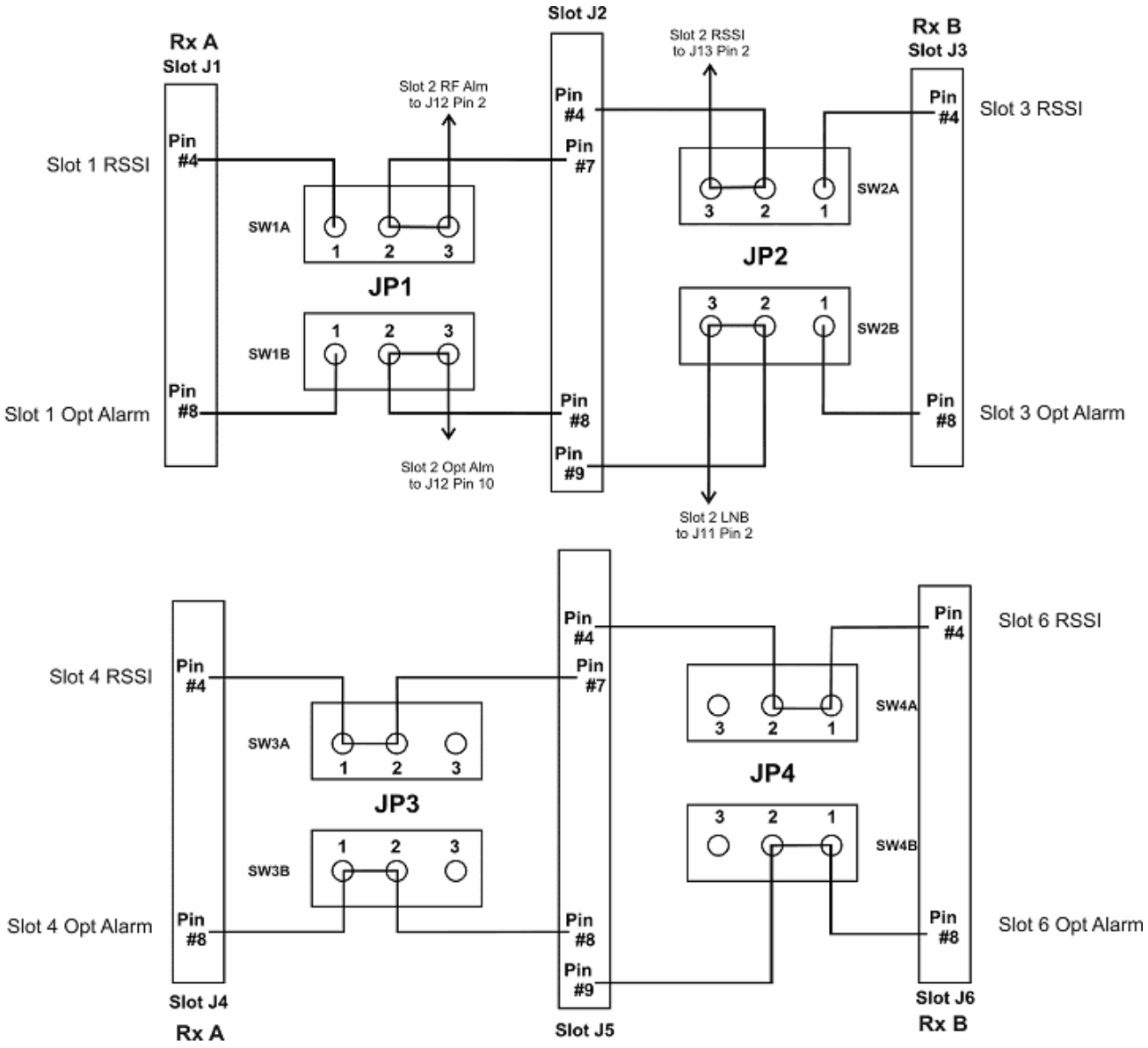



**Figure 34 Pinout of 7180M Jumper with 2040 RF Switch in slot 2**

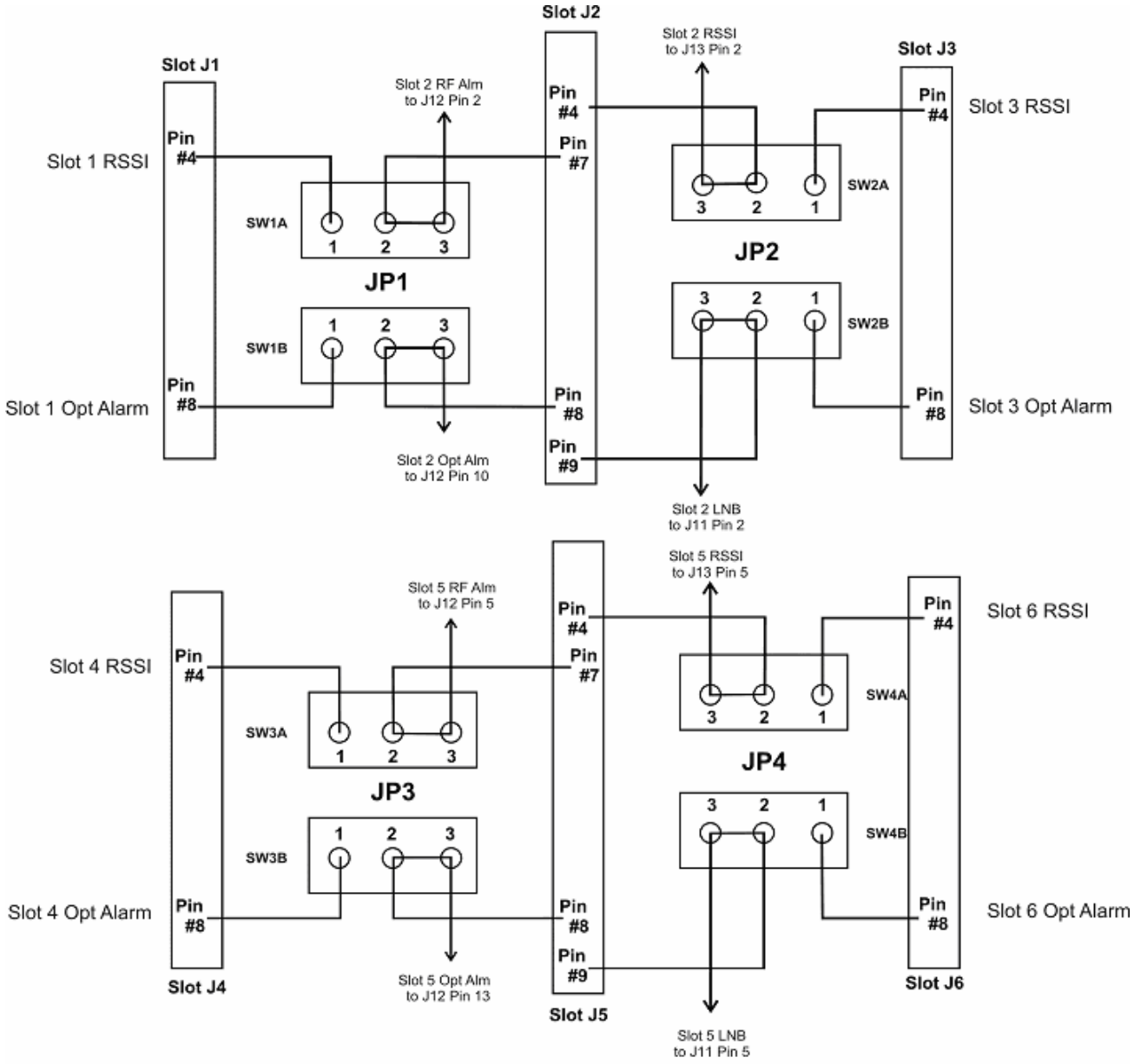



**Figure 35 Pinout of 7180M Jumper with 2040 RF Switch in slot 5**

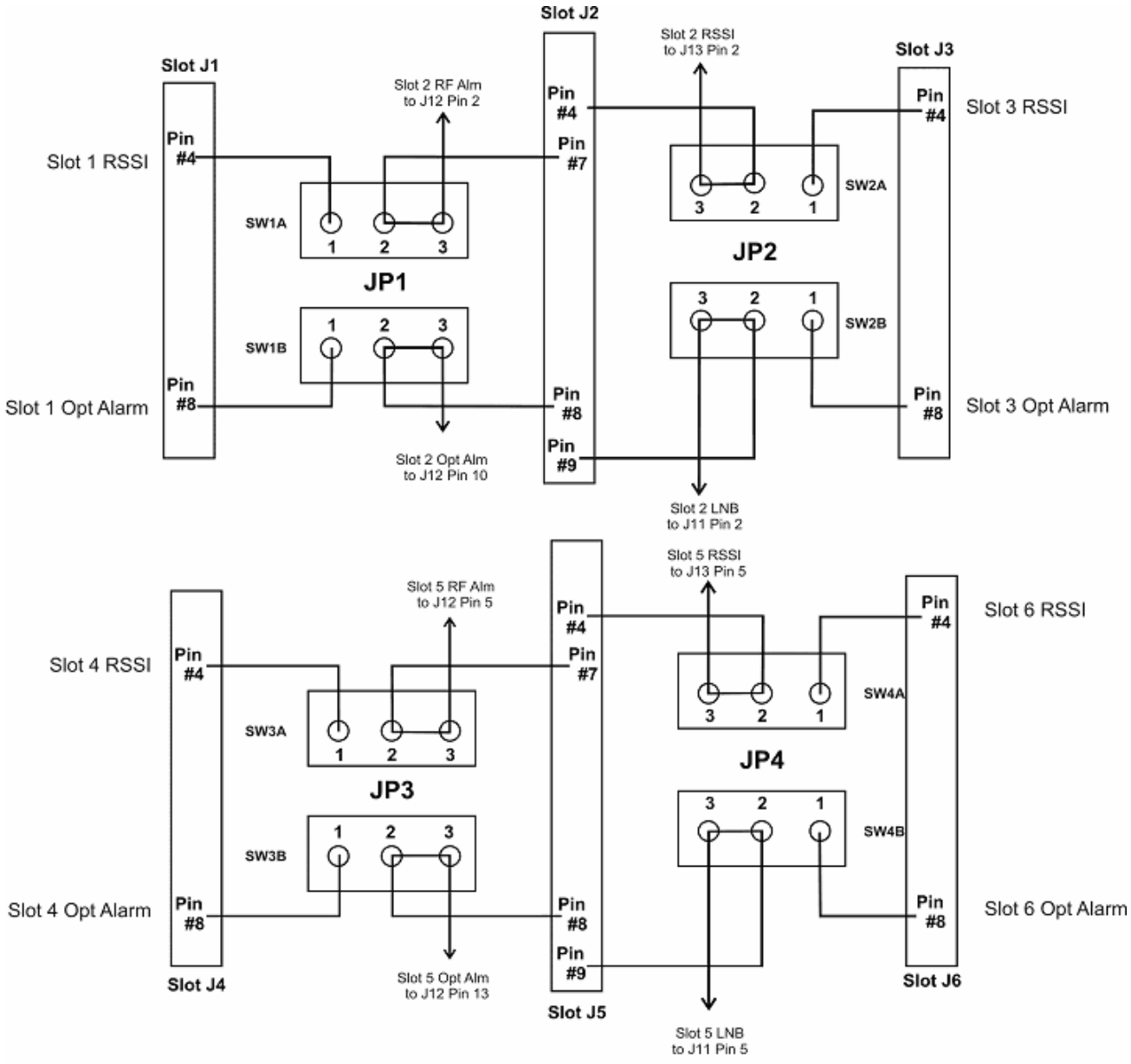



**Figure 36 Pinout of 7180M Jumper with Transmitter and Receiver units only**