




4 Wire T1 Fiber Link Card System

User Guide

 RLH Industries, Inc.

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Every effort has been made to ensure that the information in this document is accurate. RLH is not responsible for printing or clerical errors. Because we are constantly seeking ways to improve our products, specifications and information contained in this document are subject to change without notice.

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Important information

Intended Audience

This manual is intended for use by field engineering, installation, operation and repair personnel. Every effort has been made to ensure the accuracy of the information in this manual is accurate. However, due to constant product improvement, specifications and information contained in this document are subject to change without notice.

Conventions

Symbols for notes, attention, and caution are used throughout this manual to provide readers with additional information, advice when special attention is needed, and caution to prevent injury or equipment damage.



Notes: Helpful information to assist in installation or operation.



Attention: information essential to installation or operation.



Caution: Important information that may result in equipment damage or injury if ignored.

General Safety Practices

The equipment discussed in this manual may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment as required.

Caution - Severe Shock Hazard

- Never install during a lightning storm or where unsafe high voltages are present.
- Active T1 lines carry high DC voltages up to 56V. Use caution when handling T1 wiring.
- Active UHDSL lines carry high DC voltages up to 210V. Use caution when handling UHDSL wiring.
- Copper power supply wiring may carry high voltages. Remove power from local wiring before servicing.

Standards compliance

The RLH T1 Fiber Link Card System is compliant with the following industry standards.

NEBS Level 3

IEEE-487

BR 876-310-100 BT (Telcordia)

GR-63

FCC PART-15

IEEE-1590

Bellcore SR-3966

ANSI T1.403

FCC PART-68B

Motorola R56

GR-1089

Description and application

The Fiber Link T1 Model 2 (backwards compatible with the Model 1) System processes incoming bipolar signals (7.2 V P-P Max) within a bandwidth of 100 KHz to 10 MHz T1 (1.544Mbps) or (CCITT 2.048Mbps), optically transmits these signals over fiber optic cable and converts the signal to the original electrical signal with minimal gain or loss.

Output to the copper line is automatically maintained at a nominal level. The Fiber Link system is compatible with European E1. Transient voltages appearing on or between the 4 wire pairs and/or power supply input are limited by thermistors, gas tubes and MOVs.

Acronyms

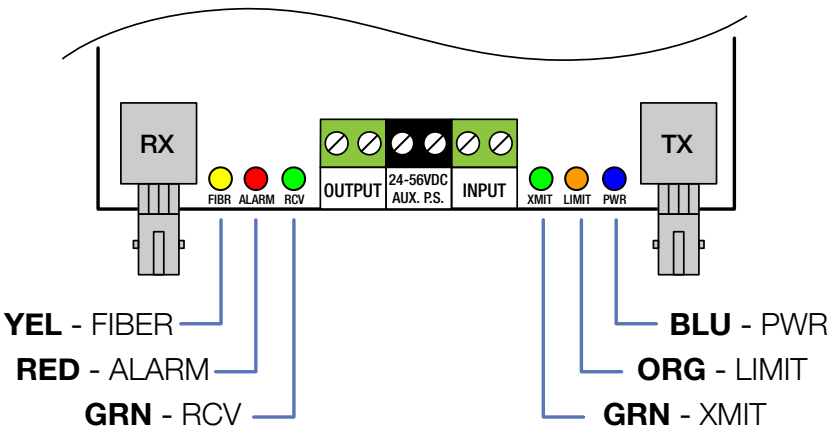
Commonly used acronyms and abbreviations

Acronym/Abbreviation	Description
B8ZS	Bipolar 8 Zero Substitution
AMI	Alternate Mark Inversion
CFJ	Copper Fiber Junction (also referred to as Demarc)
CO	Central Office
CPE	Customer Premises Equipment
Demarc	Location of RLH CO equipment and Telco connection
GPR	Ground Potential Rise
LED	Light Emitting Diode
Sub	Subscriber
NIU	Network Interface Unit
RX	Receive
TX	Transmit
P-P	Peak-to-peak (Commonly used with voltage measurements)

Color abbreviations

Abbreviation	Color
BLU	Blue
GRN	Green
ORG	Orange
RED	Red
YEL	Yellow

LED status indicators

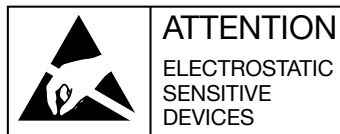


LED	Color	ON condition	OFF condition
FIBR (Fiber Test)	YEL	<ul style="list-style-type: none">“Fiber signal” switch SW2 is ON at the far end card.Fiber test signal is being received.	<ul style="list-style-type: none">Normal operation (“Fiber Signal” switch is OFF at the far end card)If SW2 is ON on far end card, check fiber continuity
ALRM (Alarm)	RED	Signal is below minimum operating level	Normal operation
RCV (Receive)	GRN	Signal is received from fiber	Normal operation
XMIT (Transmit)	GRN	Signal is received at copper input	Normal operation
LIMIT	ORG	Copper input signal overload	Normal operation
PWR (Power)	BLU	DC power is connected	No DC power is connected

Before installing

1. Observe special handling requirements

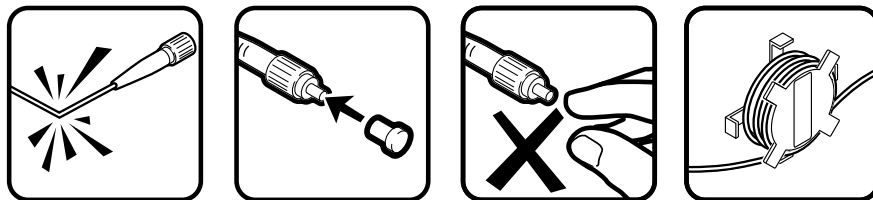
1.1 Be careful when handling electronic components



- This product contains static sensitive components.
- Handle the T1 cards at their edges only.
- Follow proper electrostatic discharge procedures.

This card utilizes circuitry that can be damaged by static electricity. When transporting the card, carry it in an ESD safe container such as the antistatic bag provided with the card. Before handling cards, discharge yourself of static electricity by physical bodily contact with earth ground. When handling cards, hold by outer edges and avoid touching circuitry. Failure to follow ESD precautions may cause serious damage to the card and prevent proper operation.

1.2 Guidelines for handling terminated fiber cable



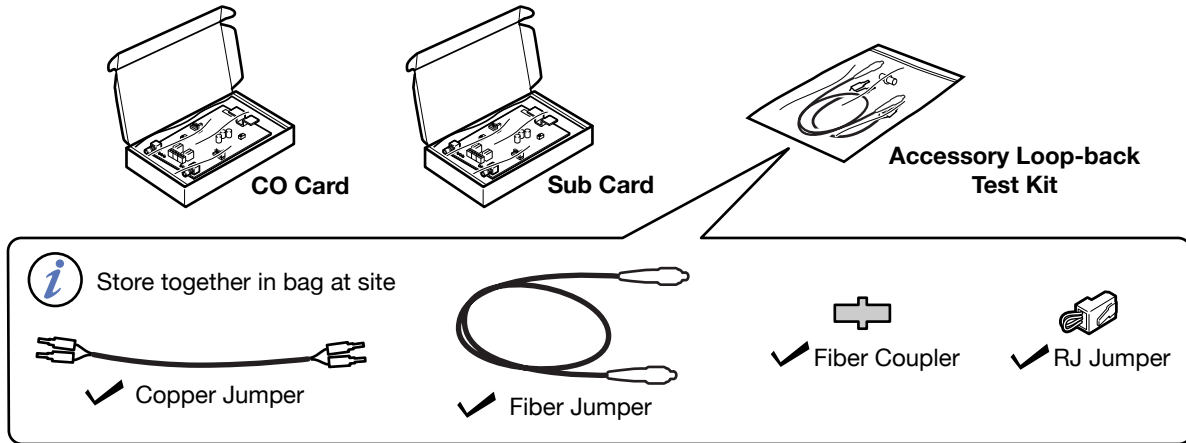
- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination will cause signal loss.
- Do not touch fiber ends.
- Store excess fiber on housing spools or fiber spools at site
- Do not staple fiber cable to back boards or over tighten cable ties. Excess pressure on fiber can cause damage.

2. Set up for installation

2.1 Check for shipping damage

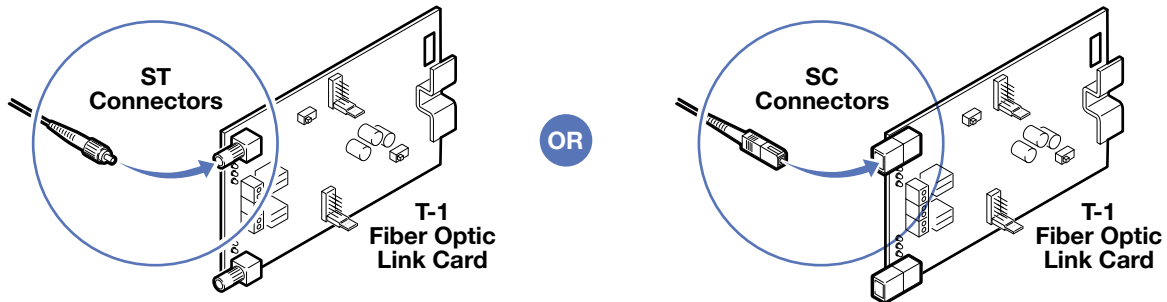
Contact RLH immediately if any components are damaged or missing. Electronic components, fiber optic cable, and accessories have special handling requirements to prevent damage and enhance system reliability.

2.2 Verify T1 System Contents



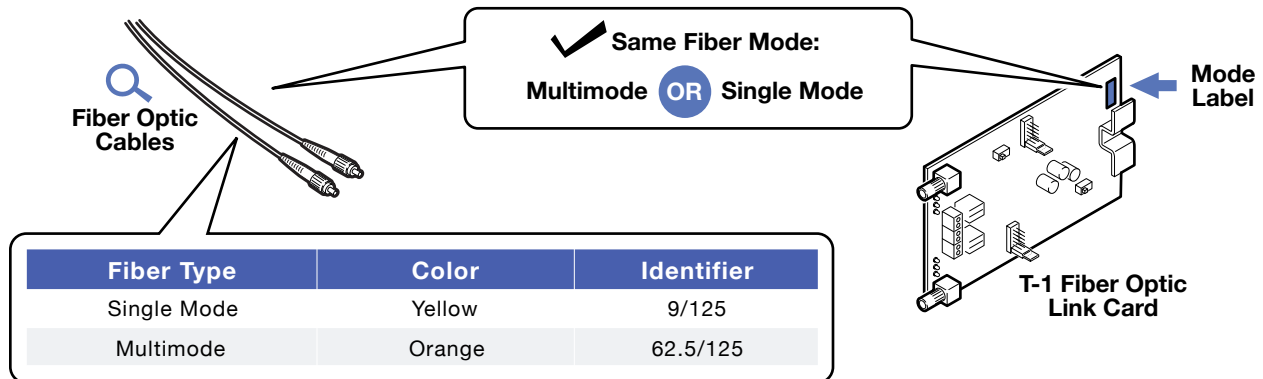
Refer to the **Ordering Information** section for part numbers.

2.3 Verify matching connector types on fiber cable and T1 cards



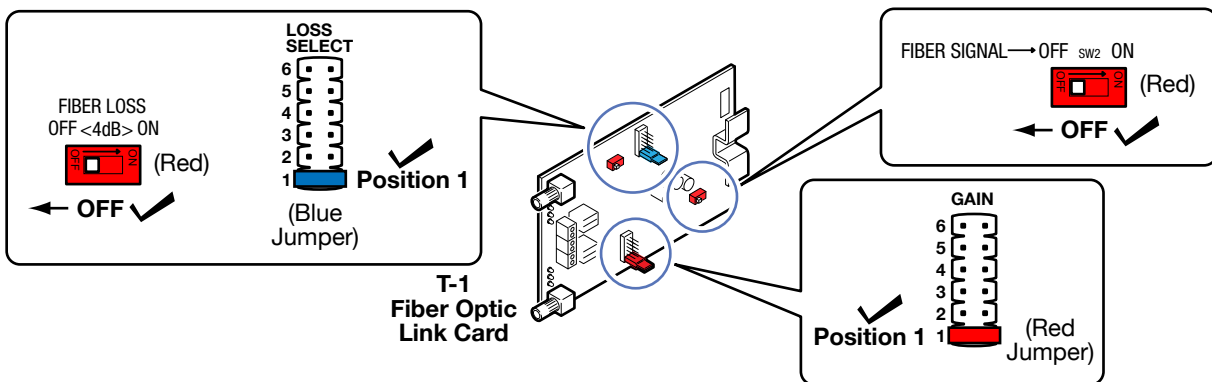
2.4 Verify matching card and fiber modes

Fiber mode and card mode must be the same.

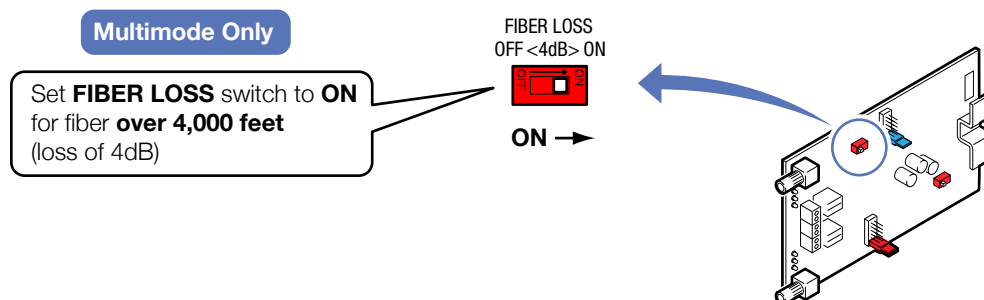


2.5 Set default T1 card settings

Settings are the same for both CO and Sub cards.



2.6 For extended distance multimode systems



3. Installing card housing

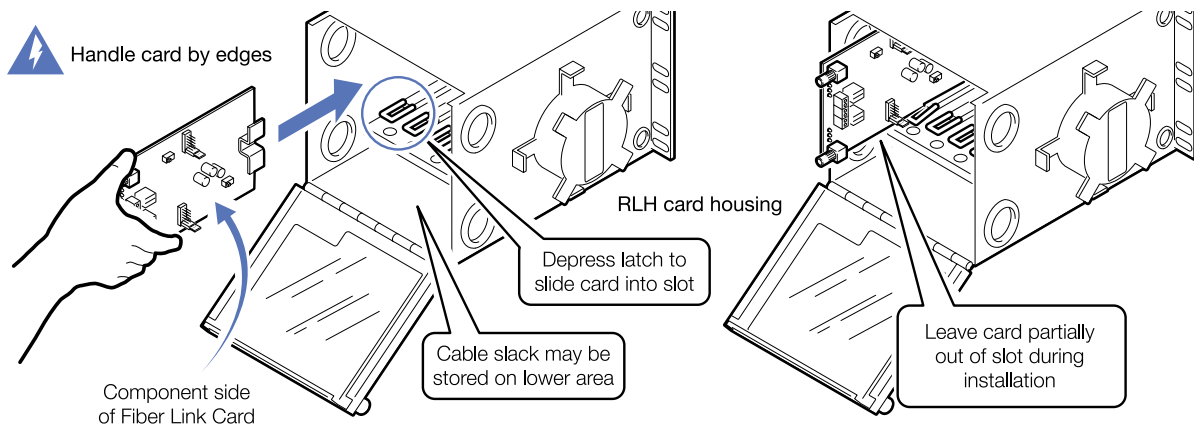
3.1 Mount housing in equipment rack or attach to backboard.

Leave room for the door to open, and enough slack in wiring and fiber to allow for card access.

4. Installing into card housing

4.1 Note card orientation in housing during installation

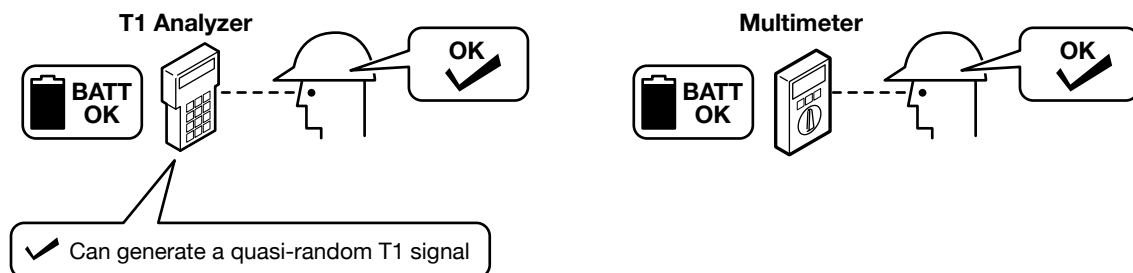
Handle card by edges. Install in slot 1 or next available card slot. Install card into housing before connecting copper wiring or fiber cable.



5. Required test equipment

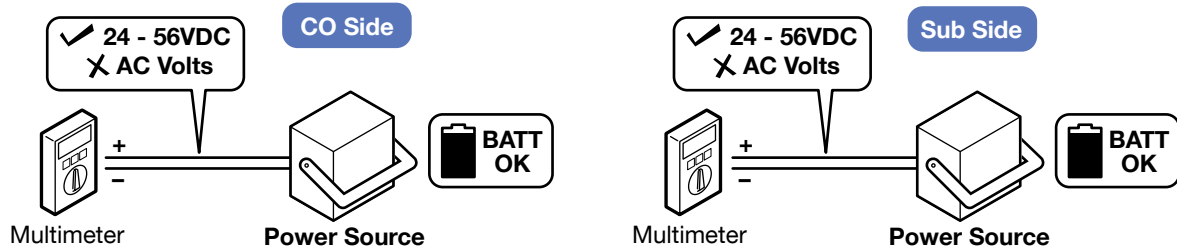
5.1 You will need a T1 analyzer such as a T-BERD and a multimeter

Be familiar with the test settings. Some analyzers have line power and multimeter capability. For installation where no T-1 signal is available, the analyzer must be capable of generating a quasi-random T-1 signal.



5.2 Required power sources if installing before T-1 service is available at the site

You will need to power the system to test it. Use a separate power source for powering the CO and Sub side card. A battery may be used.



! Use 22~24AWG solid wire for power supply connections.

⚡ Refer to the power supply connection and use information for fuse or circuit breaker requirements. Use caution when handling copper wiring. Power connections may carry high voltages.

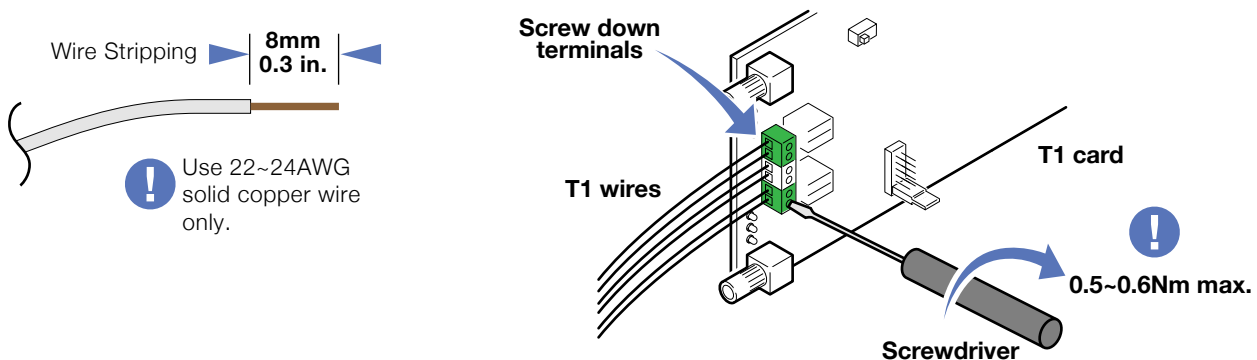
Fuses must be installed within a finger safe housing to prevent electric shock from accidental contact or during fuse replacement.

6. Copper wiring requirements

6.1 Copper wiring to the T1 cards

The connectors on the T-1 cards are designed for specific wire sizes and mechanical connections at the terminals.

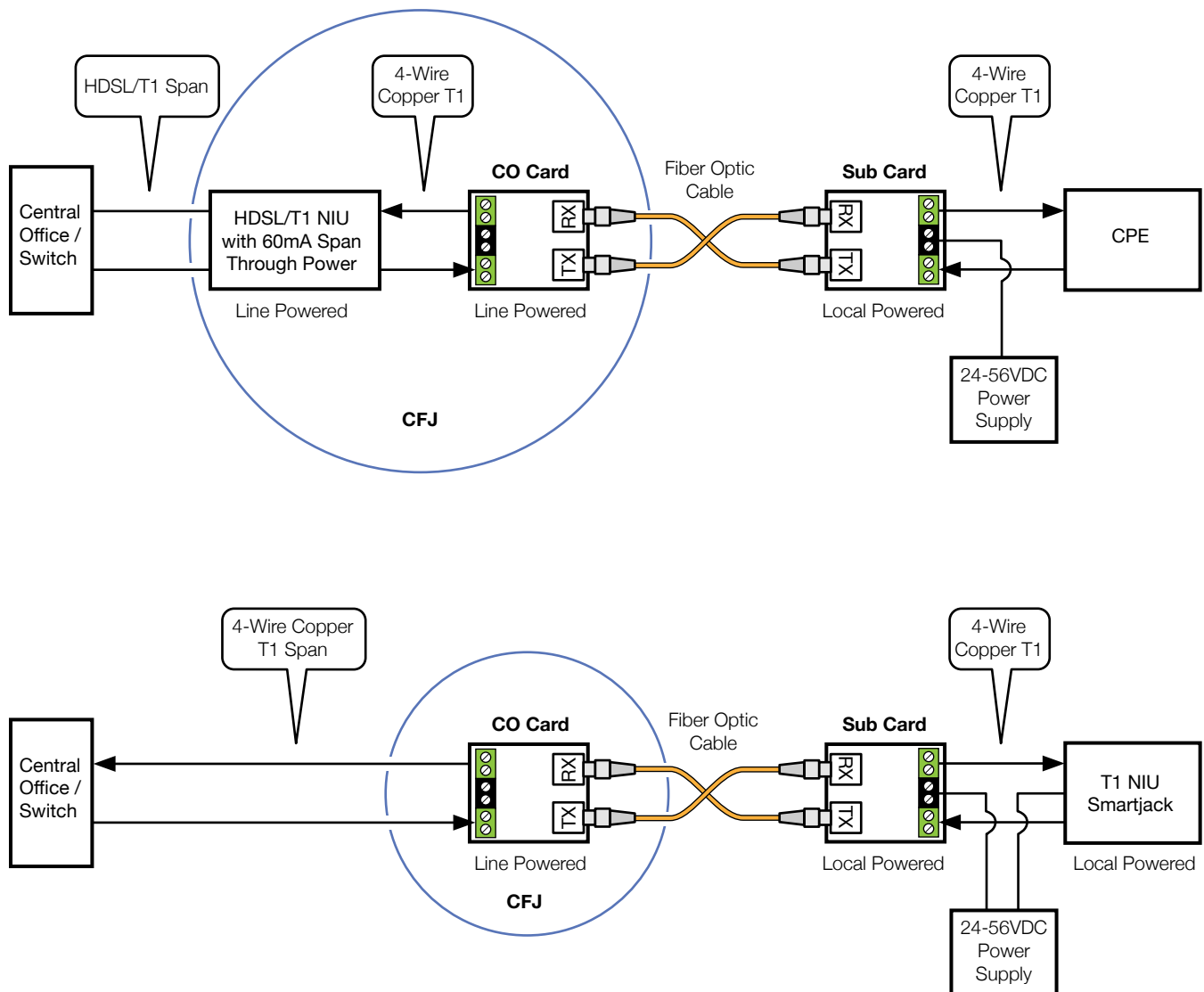
- Use 22~24AWG solid copper wire
- Stripping length: 8mm
- Connector tightening torque: 0.5~0.6 Nm. Do not over-tighten screw down wire terminals.



7. Verify your installation environment

7.1 Typical T1 application environments

Fiber optic cable needs to be installed at the location prior to connecting T1 Fiber Link Card system.



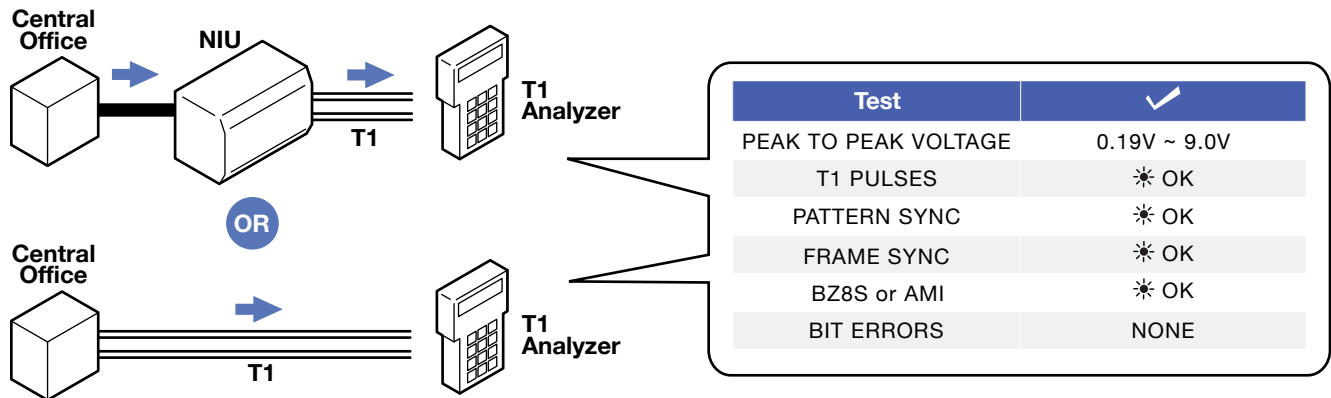
Installation when T-1 service is available

Also see [Installation prior to T1 service availability](#) on page 23.

1 Connect CO card

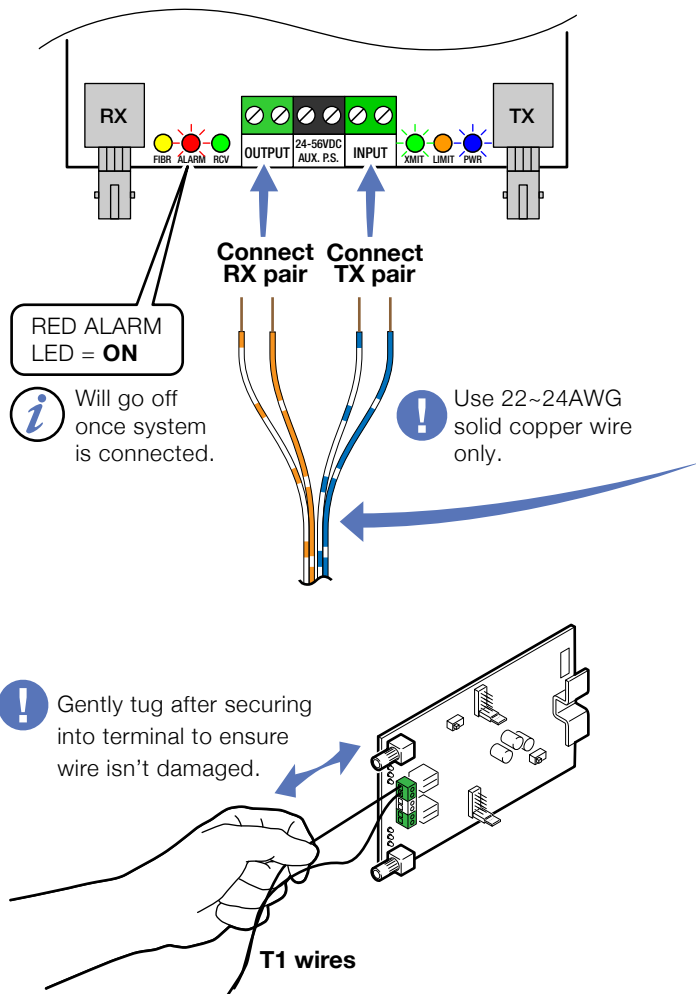
1.1 Verify acceptable T1 signal

Repair the T1 lines if service is not acceptable. Check for **NIU Compatibility** in the Troubleshooting section.



1.2 Connect T-1 pairs to card terminals

Install into housing for connecting and testing. Refer to **Installing into card housing** on page 9.
All LEDs will be ON for approximately 5 seconds after span power is first applied.

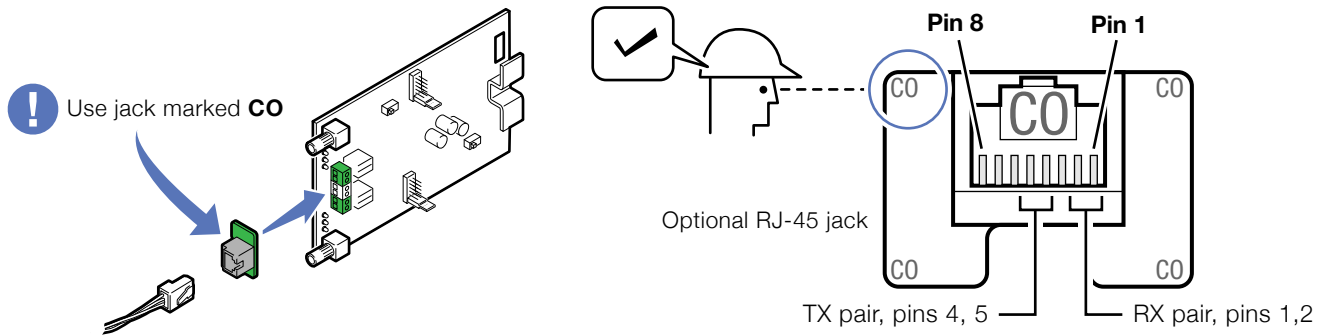


Standard 25-Pair Color Code

Pair #	First wire	Second wire
1		Blue
2		Orange
3	White	Green
4		Brown
5		Gray
6		Blue
7		Orange
8	Red	Green
9		Brown
10		Gray
11		Blue
12		Orange
13	Black	Green
14		Brown
15		Gray
16		Blue
17		Orange
18	Yellow	Green
19		Brown
20		Slate
21		Blue
22		Orange
23	Violet	Green
24		Brown
25		Gray

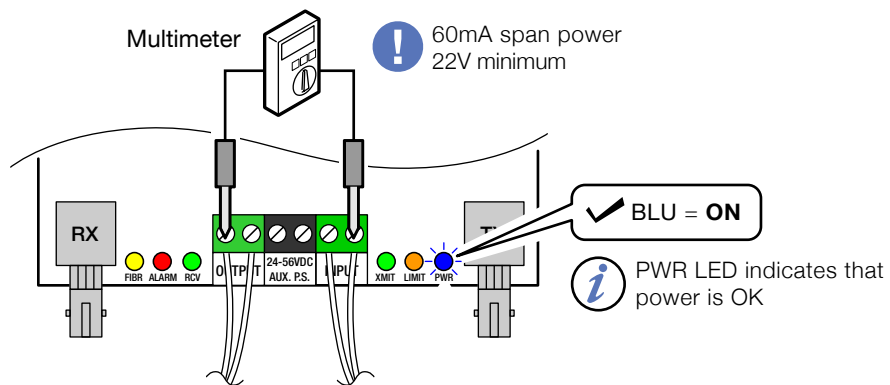
1.3 Connection using optional RJ connector

RJ connector may be pre-installed or obtained separately.



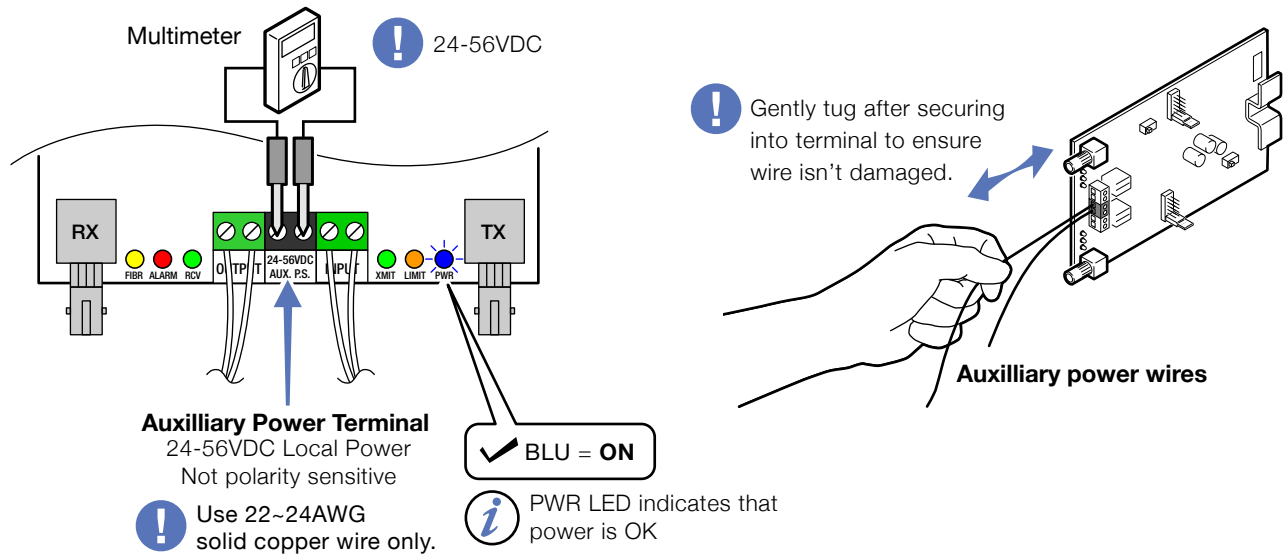
1.4 Verify power at the T1 card

Test for Span power.



1.5 Connect local power if Span power is not present

All LEDs will be ON for approximately 5 seconds after power is first applied.



Refer to the power supply connection and use information for fuse or circuit breaker requirements. Use caution when handling copper wiring. Power connections may carry high voltages.

Fuses must be installed within a finger safe housing to prevent electric shock from accidental contact or during fuse replacement.

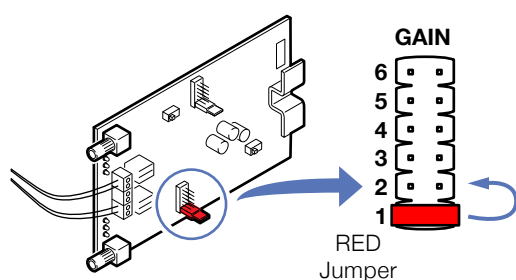
2 Set CO card gain

2.1 Set gain using red gain GAIN jumper

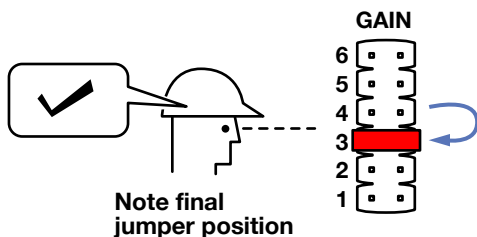
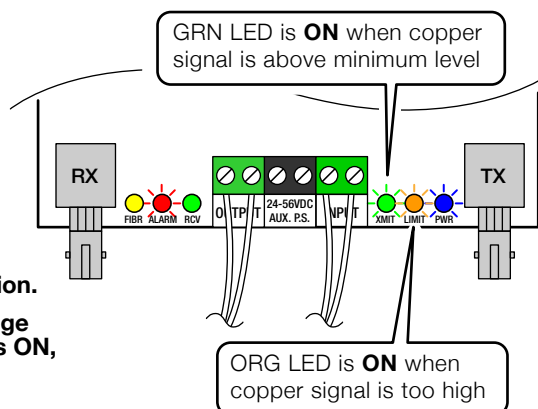
Set gain while T1 signal is present. Refer to the **Specifications** section for input signal requirements.



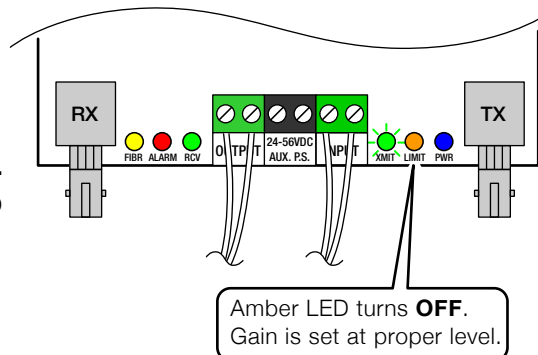
The blue LOSS SELECT jumper must remain at position 1.



- 1 Move jumper to next higher position.
Repeat until orange **LIMIT** LED comes ON, then stop.



- 2 Move jumper back one position.
Orange **LIMIT** LED will go OFF.
Green **XMIT** LED will stay ON.



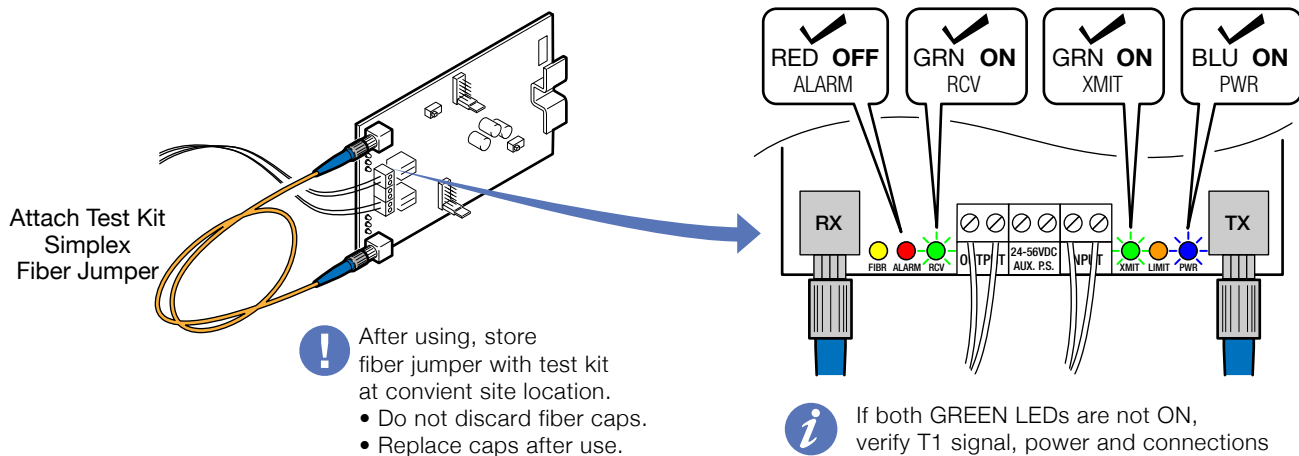
Each jumper position is equivalent to approximately 6dB of gain. Setting the CO gain at the correct level ensures that the fiber optic transceiver system operates within normal levels.

The gain on the CO card is offset by setting a matching attenuation using the loss select jumper on the Sub card.

3 Verify CO card operation

3.1 Check CO card operation

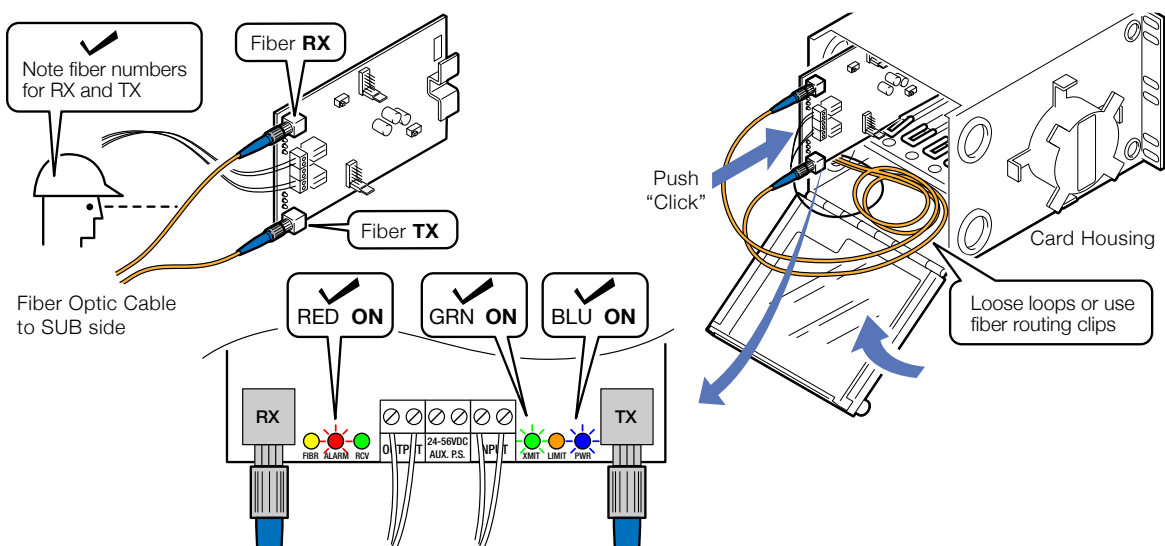
Perform loopback test using fiber jumper



4 Connect CO fiber cables

4.1 Connect fiber optic cable

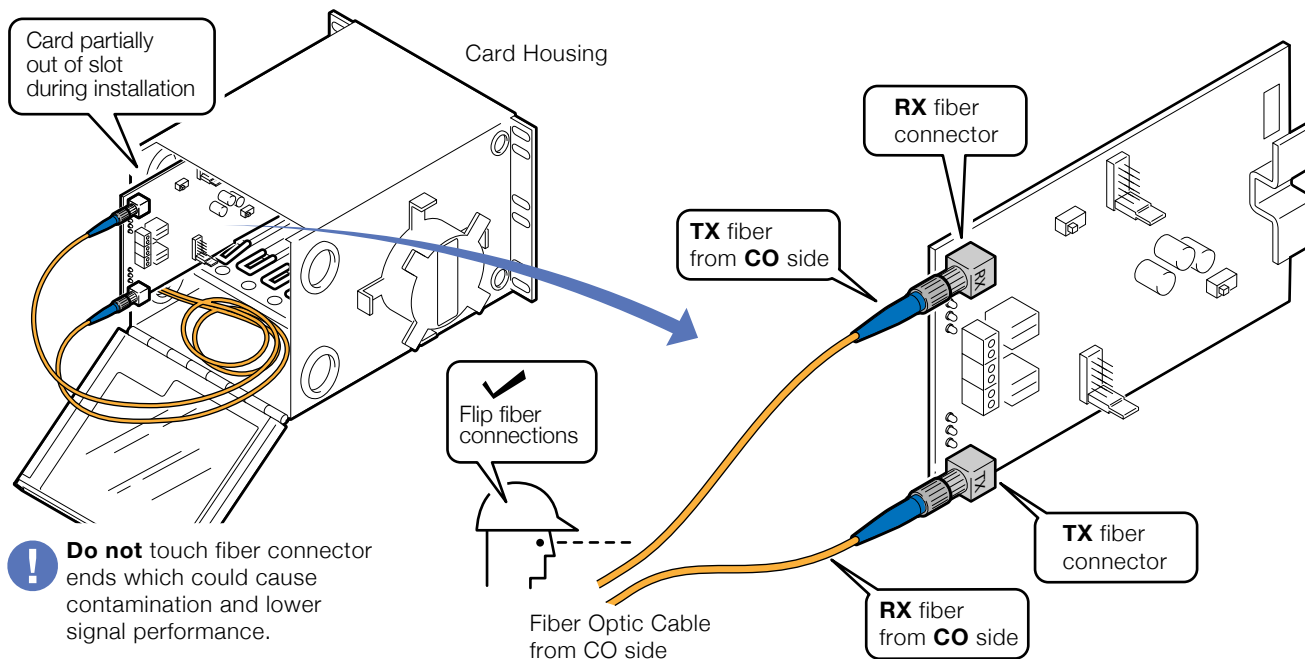
Move on to Sub side after verifying LEDs.



5 Connect Sub card

5.1 Connect fiber cables

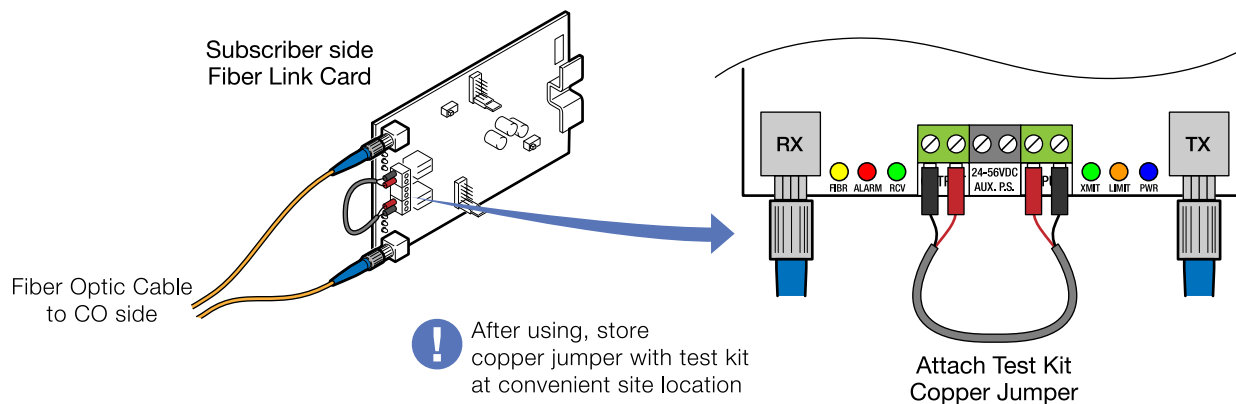
Flip or roll the fiber cables



6 Connect loopback jumpers and power

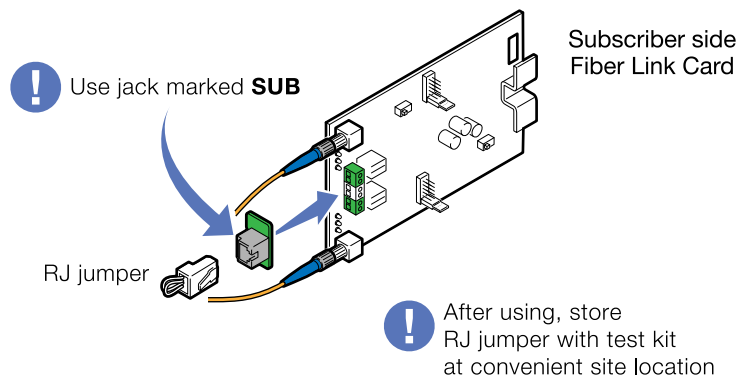
6.1 Connect copper loopback jumpers

When using wire terminals.



6.2 Connect optional RJ loopback jumper

When using RJ connections.



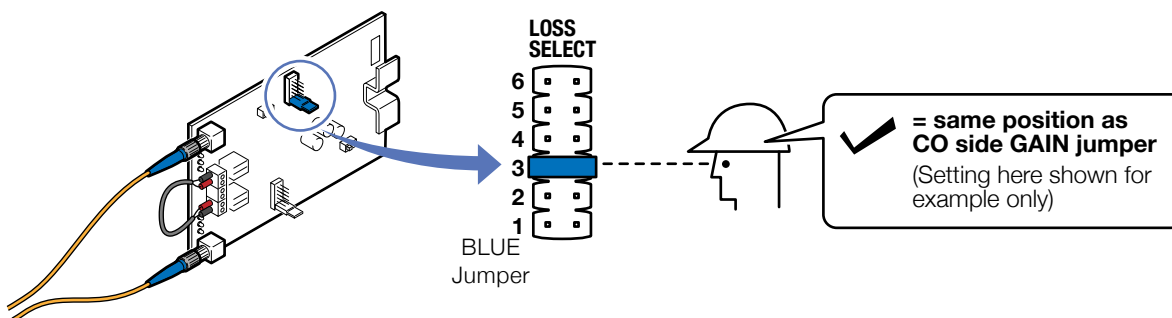
6.3 Set loss select jumper

Set the blue jumper to the same number as GAIN jumper on CO side card.

Refer to the **Specifications** section for output information.



The red GAIN jumper must remain at position 1.

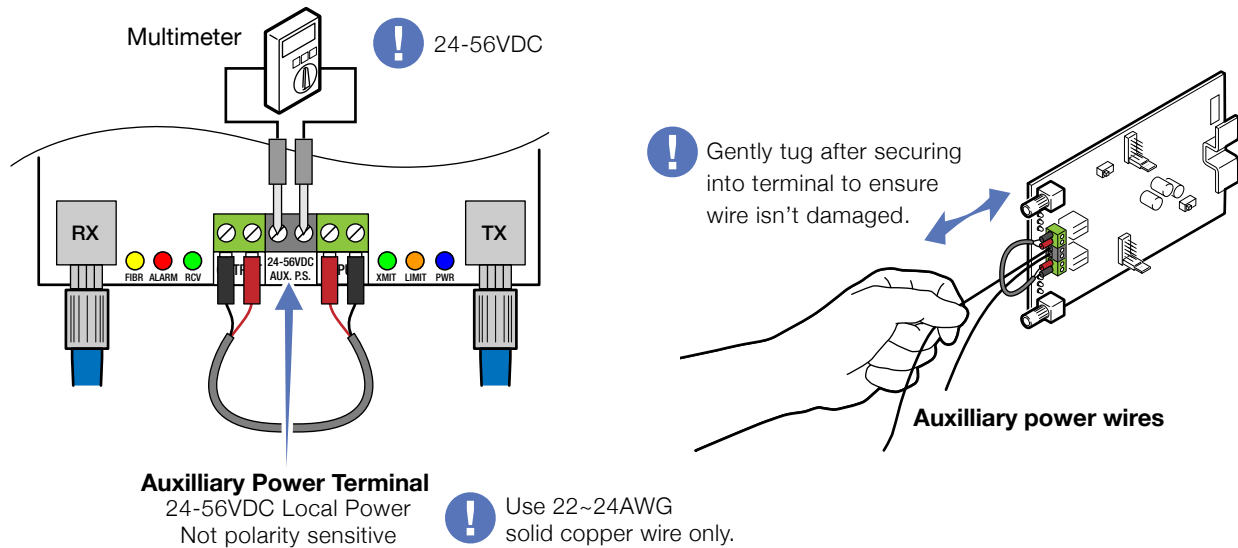


Each jumper position is equivalent to approximately 6dB of attenuation. Setting the Sub attenuation with the loss select jumper to the correct level ensures that the fiber optic transceiver system operates within normal levels.

This will enable the Sub card to compensate for the optics system gain previously set on the CO card.

6.4 Connect local power source

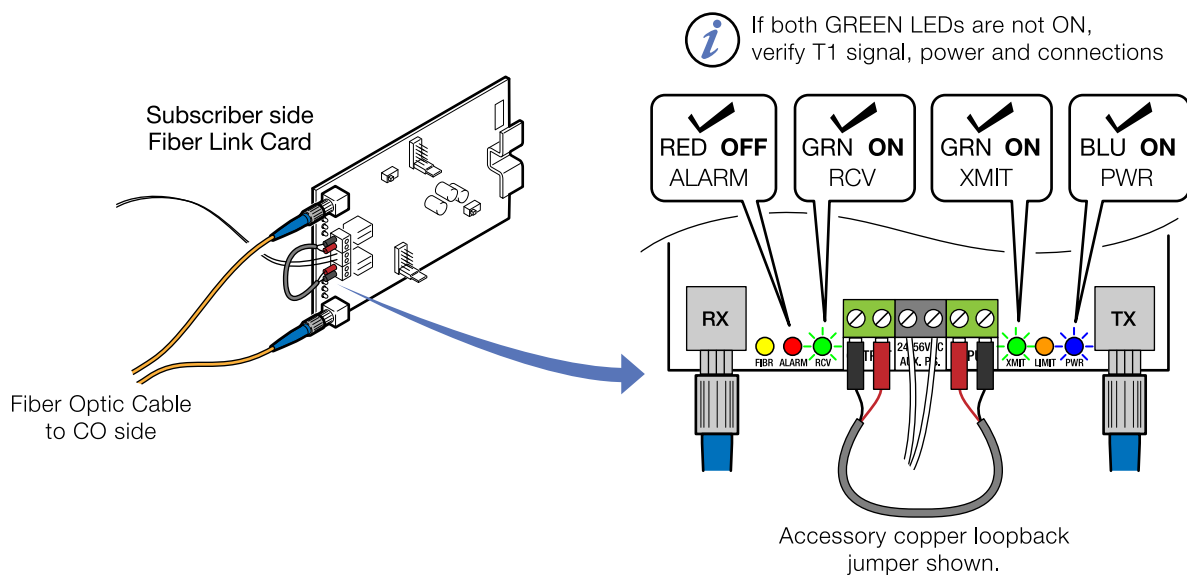
All LEDs will be ON for approximately 5 seconds after power is first applied. Copper loopback jumpers shown.



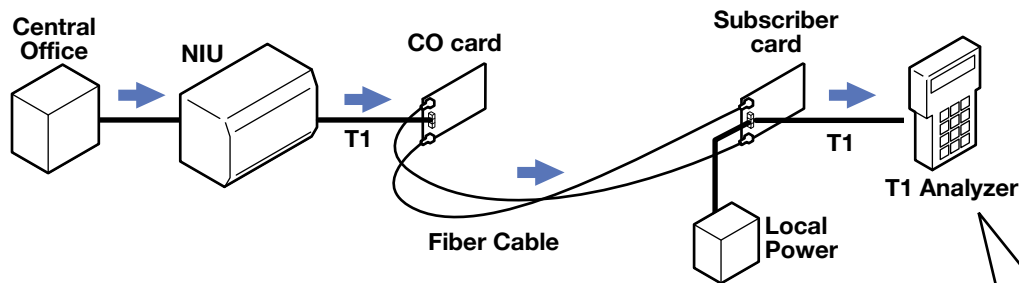
7 Verify Sub card operation

7.1 Verify subscriber card operation

Status LEDs are the same when using either copper loopback jumpers or optional RJ jumper.



7.2 Test Sub side T1 signal

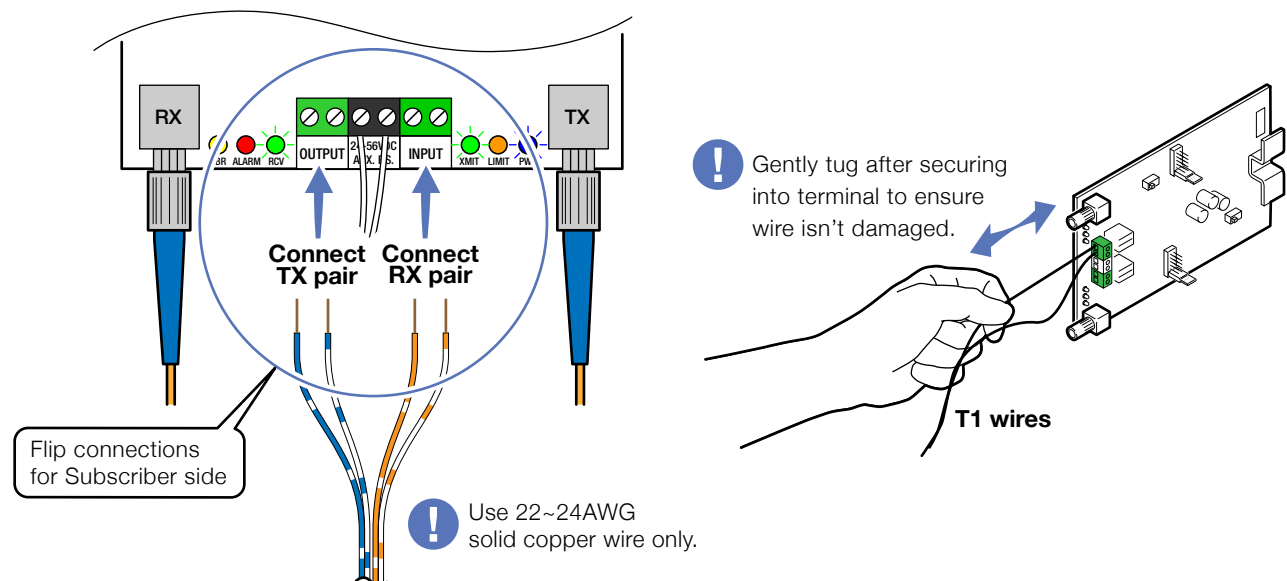


Test	✓
PEAK TO PEAK VOLTAGE	0.19V ~ 9.0V
T1 PULSES	✱ OK
PATTERN SYNC	✱ OK
FRAME SYNC	✱ OK
BZ8S or AMI	✱ OK
BIT ERRORS	NONE

8 Connect customer premises equipment

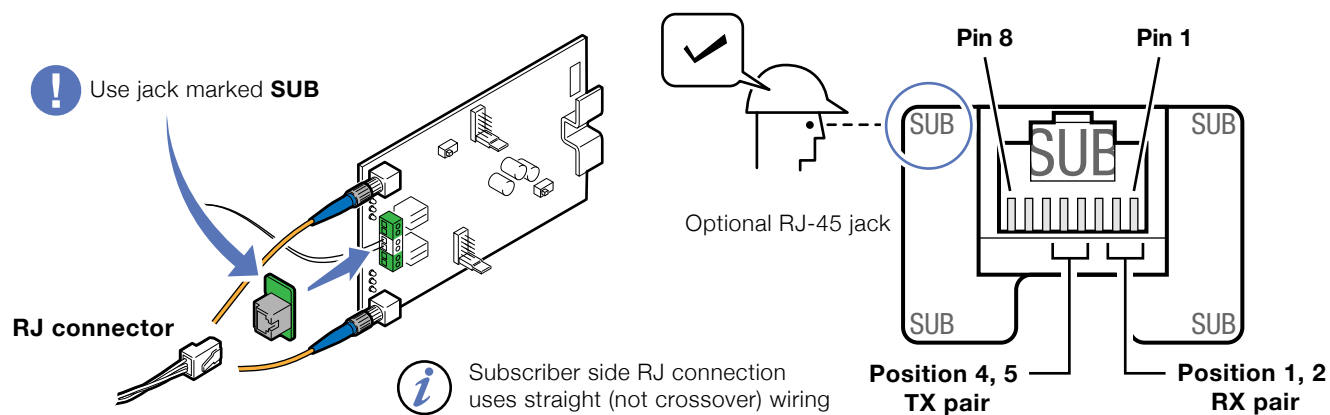
8.1 Connect Customer Premises Equipment

Connect CPE to Fiber Link Sub card.



8.2 Optional RJ connection

Connect CPE to the Fiber Optic Card using the RJ connector. Note RJ jack identifiers when installing.



8.3 Close Sub side housing

Store excess fiber cable. Installation is complete.

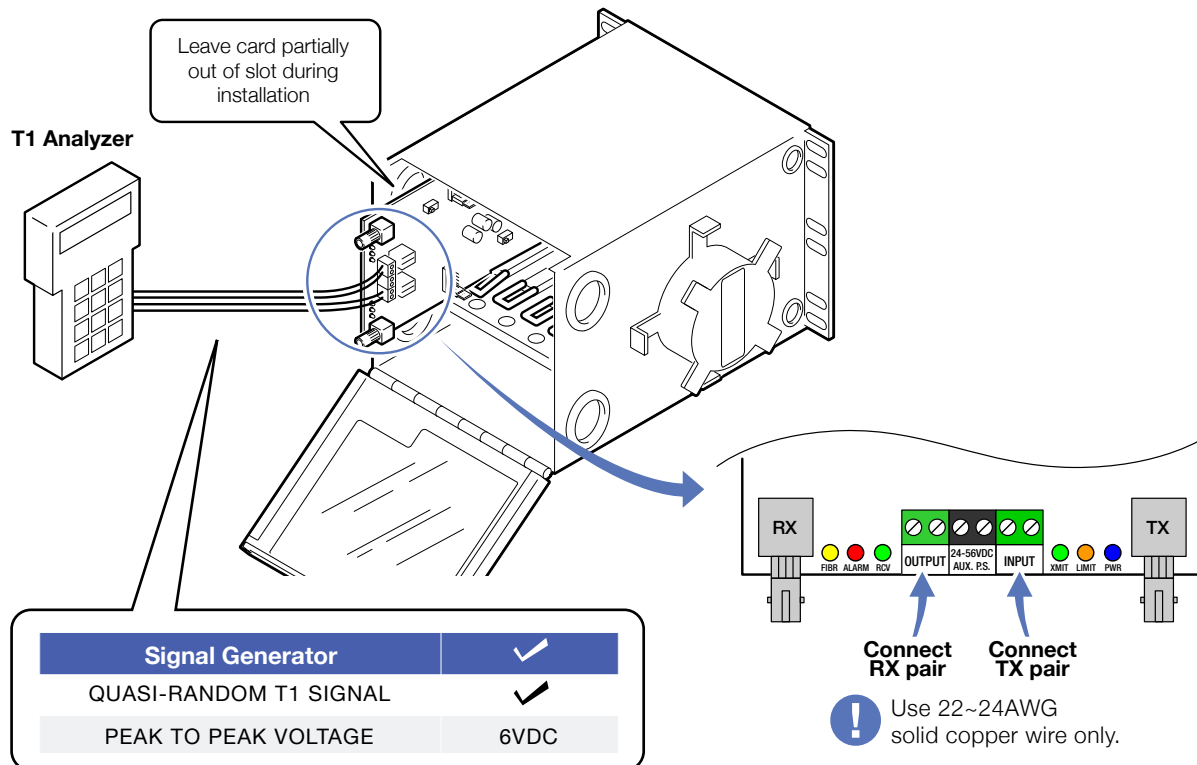
Installation prior to T1 service availability

Also see **Installation when T1 service is available** on page 13

1 Set up CO card

1.1 Connect T1 signal to CO card

If Span power is provided by the analyzer, all LEDs will be ON for approximately 5 seconds after signal and power are first applied.

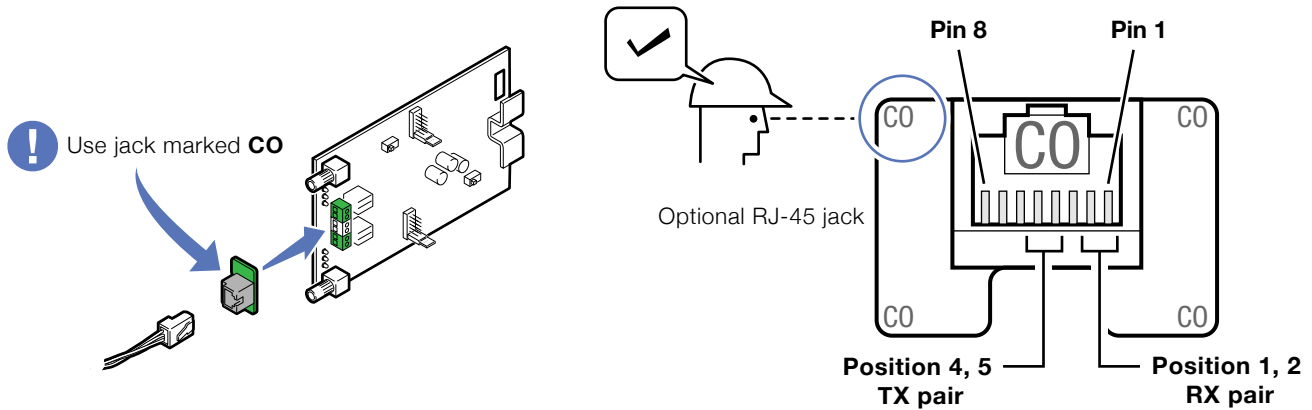


1.2 When using optional RJ connector

Connect T1 signal from analyzer using RJ connector. Note RJ jack identifiers when installing.

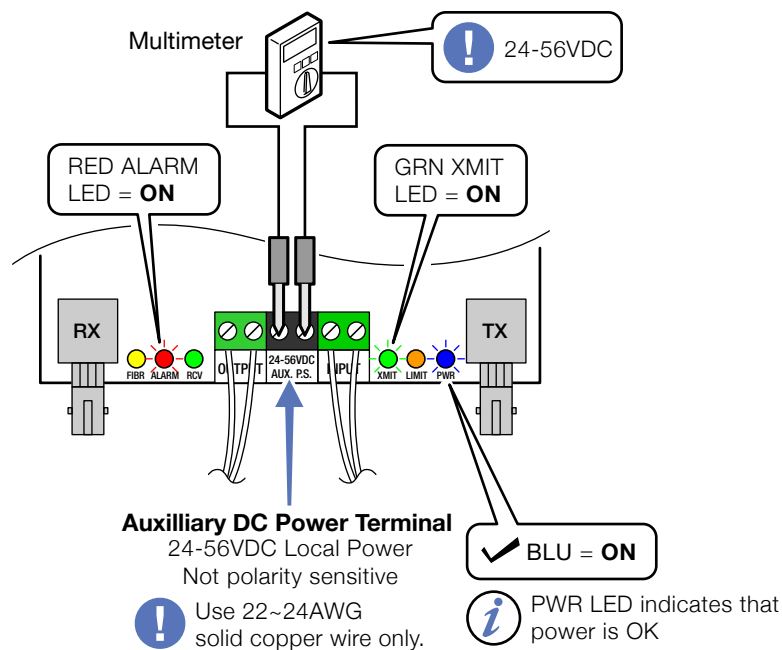


If Span power is provided by the analyzer, all LEDs will be ON for approximately 5 seconds after signal and power are first applied.



1.3 Connect Power to CO card

With the T1 signal applied, attach the 24-56VDC portable power source. All LEDs will be ON for approximately 5 seconds after power is first applied.



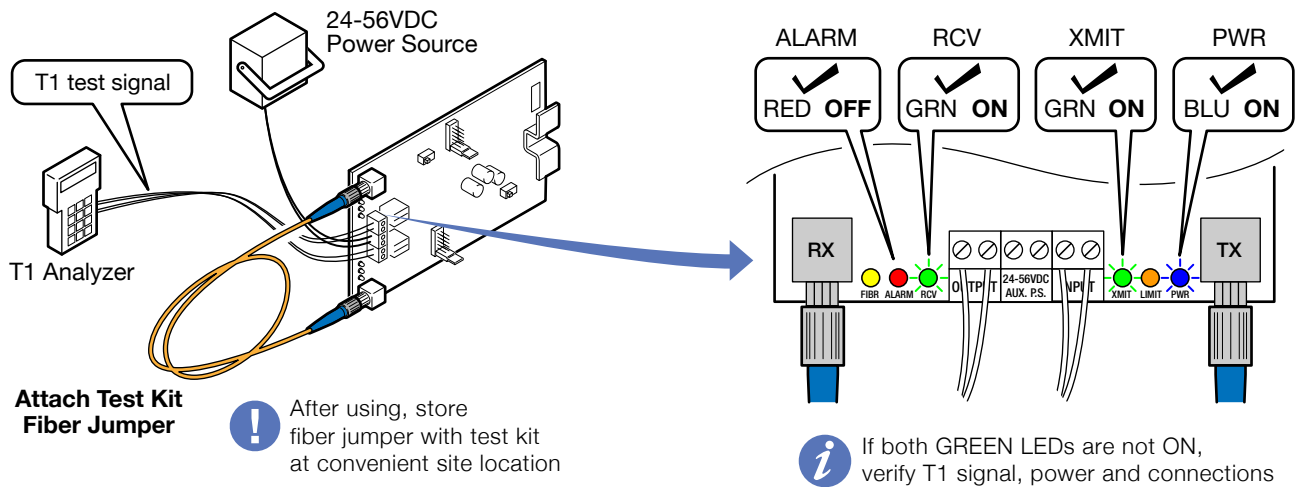
Refer to the power supply connection and use information for fuse or circuit breaker requirements. Use caution when handling copper wiring. Power connections may carry high voltages.

Fuses must be installed within a finger safe housing to prevent electric shock from accidental contact or during fuse replacement.

2 Verify CO card operation

2.1 Check CO card operation

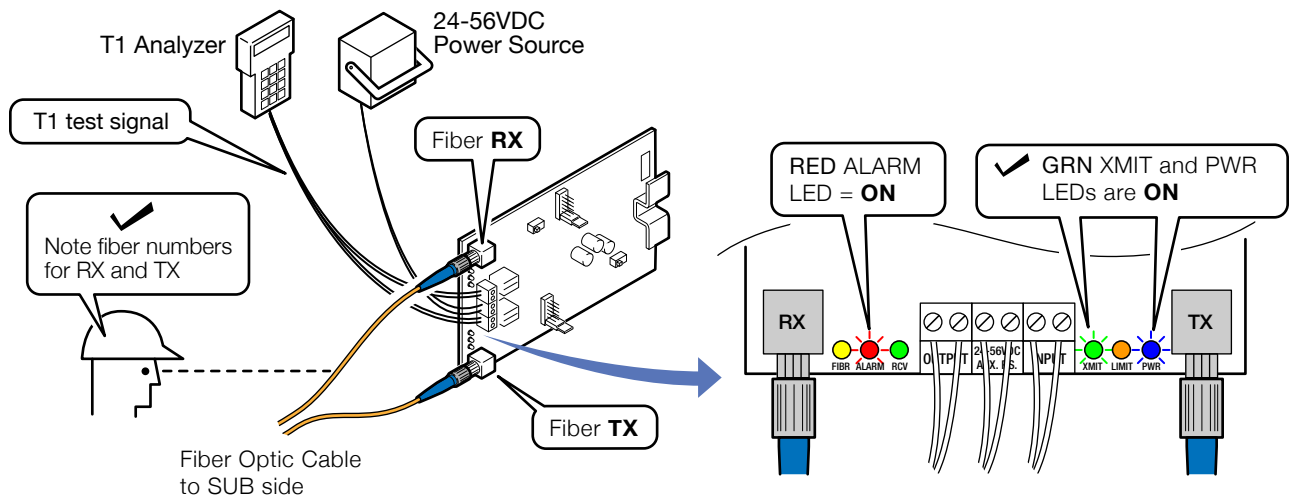
Perform loopback test. Attaching fiber jumper to TX and RX fiber connectors while T-1 signal and power are present.



3 Connect CO fiber cables

3.1 Connect CO side fiber optic cable

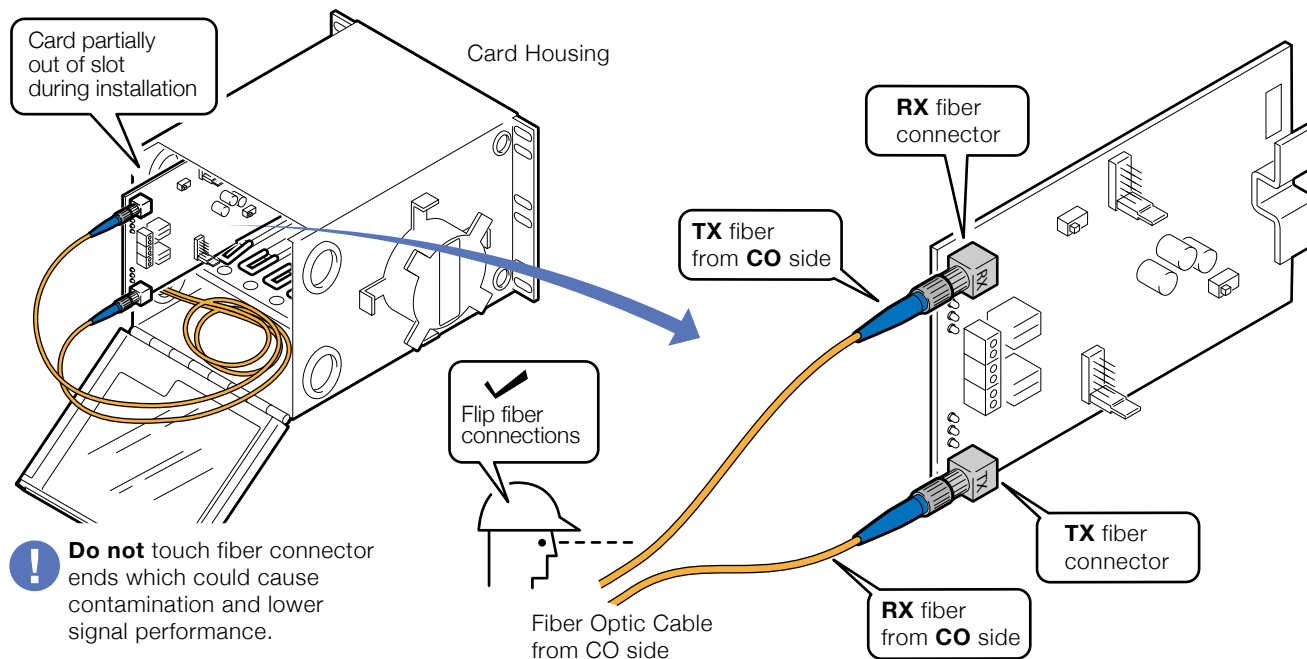
Remove test kit fiber jumper from CO card and connect fiber cable. T1 analyzer and power source remain connected. Proceed to Sub side.



4 Connect Sub card

4.1 Connect fiber cables

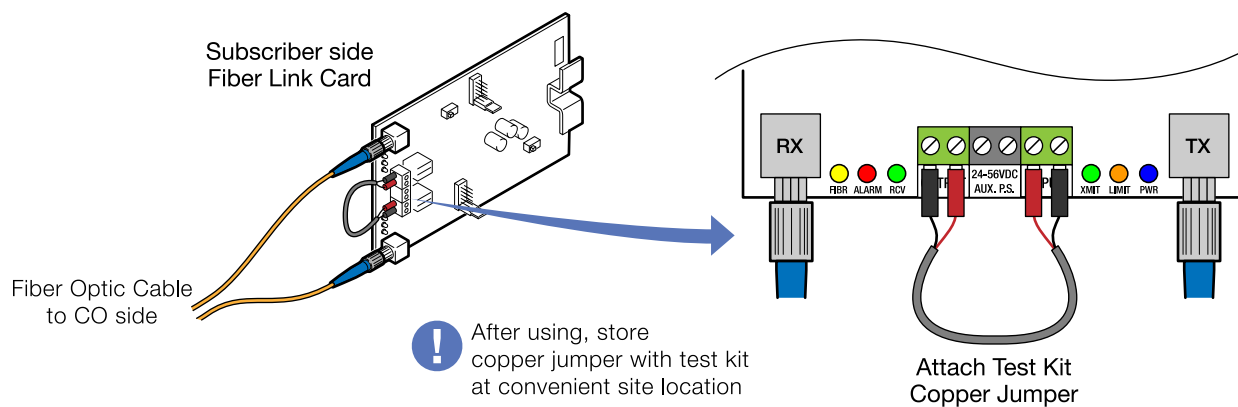
Flip or roll the fiber cables



5 Connect loopback jumpers and power

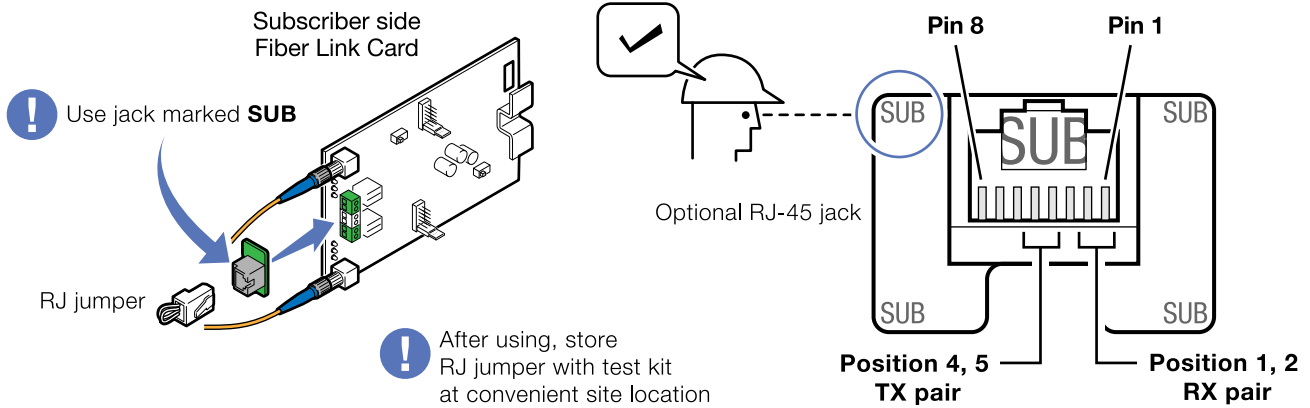
5.1 Connect copper loopback jumpers

When using wire terminals.



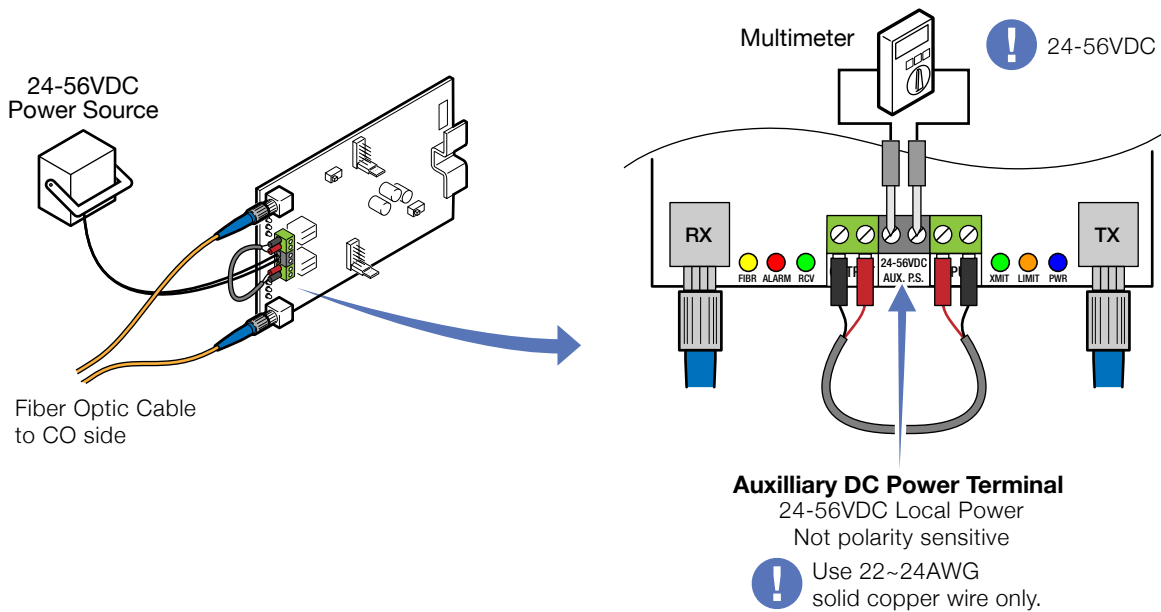
5.2 Connect optional RJ loopback jumper

When using RJ connections.



5.3 Connect local power source

All LEDs will be ON for approximately 5 seconds after power is first applied. Copper loopback jumpers shown.



Refer to the power supply connection and use information for fuse or circuit breaker requirements. Use caution when handling copper wiring. Power connections may carry high voltages.

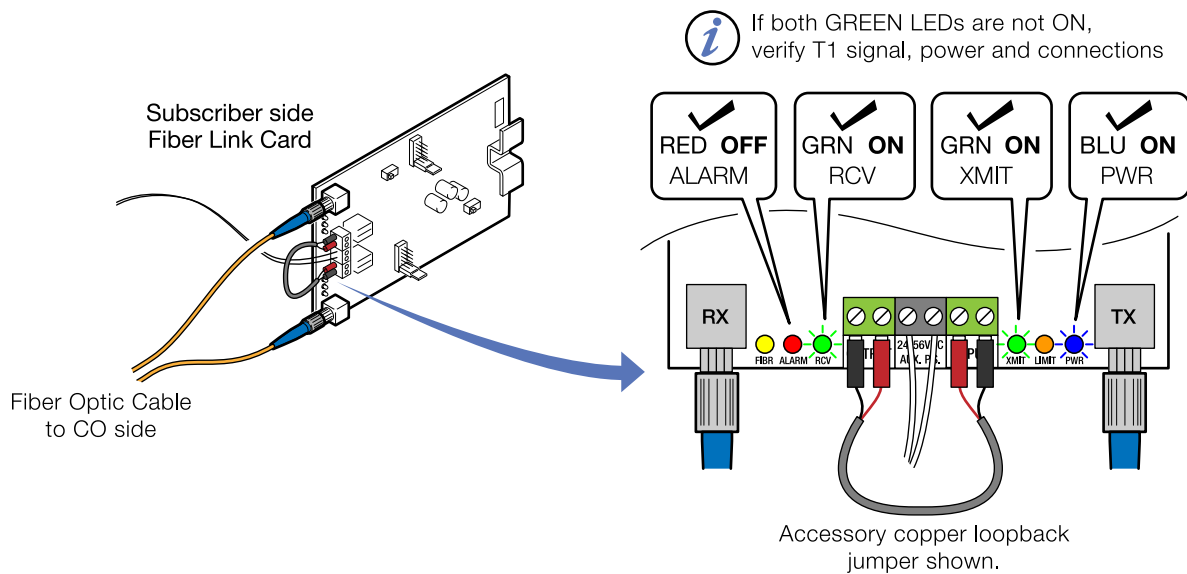
Fuses must be installed within a finger safe housing to prevent electric shock from accidental contact or during fuse replacement.

6

Verify Sub card operation

6.1 Verify subscriber card operation

Status LEDs are the same when using either copper loopback jumpers or optional RJ jumper.



6.2 Finish installation

Disconnect jumper, power, and T1 analyzer. Push cards into housings and close cover at both CO and Sub side. Leave fiber cables connected and properly store excess fiber.

Troubleshooting

First Step: Isolate the problem

Following the installation procedure will greatly speed any troubleshooting. It is designed to isolate different parts of the system during installation.

Isolating the source of trouble is essential to determining the steps needed to fix the problem. Most installation problems can be easily fixed in the field once the problem is properly identified.

Common Issues

Most problems encountered during installation and testing can be attributed to these 4 issues:

- Problems with the CO side or incoming T1 signal
- Problems with the Sub side or T1 signal output
- Problems providing correct power to the cards
- Problems with the copper connections wiring due to nicking, scoring or poor terminating
- Problems with the fiber optic cable

RLH T1 cards are built to the highest standards and fully tested before leaving the factory.

Isolating and ruling out common issues with the installation will help determine if there is a problem with the card itself.

CO side troubleshooting

Cannot set gain

The incoming T1 input peak-to-peak voltage is out of range.

If the P-P voltage is out of range you may not be able to set the gain correctly for the CO card to function normally. This can result in an output level on the Sub side card that is either too weak or too hot. If the Incoming T1 P-P voltage is too high on the incoming side, it may need to be attenuated before setting the CO card gain.

- Refer to the **Installation Section 2** for setting the CO card gain.

Each jumper position on the CO card is equivalent to approximately 6dB gain. Setting the gain correctly ensures the correct signal strength for transmission over fiber and a matching output signal on the Sub side output.

Fiber loopback doesn't turn on green RCV LED

A signal isn't being received at the fiber connection.

- Check the incoming power to the card with the BLU LED.
- Verify that the GRN XMIT LED is ON, indicating that a T1 signal is present.
- Check that the fiber jumper isn't damaged or contaminated.

Sub Side troubleshooting

The green XMIT LED remains OFF with copper loop-back jumper

Indicates that no T1 signal is being transmitted back to the CO card

- Check the correct connection of the fiber cable. The fiber connections must be flipped for correct operation.
- Verify that the fiber cable is good. Check that the GRN RCV LED is ON, indicating a fiber signal is being received from the CO card. See the section on testing the fiber.
- If using multimode system over 4,000 ft., verify that the CO and Sub multimode switches (SW1) are ON.

The output P-P V is out of range

- Check for correct T1 signal input at CO card.
- Check the GAIN jumper setting on the CO card.
The Sub card reproduces the signal transmitted by the CO card. If the Sub card output is too high or too low, the loss select jumper position may not match the CO side, or the CO gain may be set incorrectly. Refer to the **Installation Section 2** for setting the CO card gain.
- Make sure the LOSS SELECT jumper on the Sub card matches the CO card.
Refer to **Installation Section 6.3 Set loss select jumper** for setting the Sub card gain.
Refer to the **Specifications** section for output signal (Sub side card).

Power supply issues

Blue PWR LED remains off

The T1 card isn't receiving proper power.

- Check power by using a multimeter on the top of the screw-down terminals.

If using Span power

- Check across the INPUT and OUTPUT terminals. Power must be 22VDC minimum.
- Check the NIU compatibility chart for NIU systems providing span power.
- If Span power is too low or not provided, repair the T1 line or use an auxiliary power source.
- Check wiring for nicking, scoring or poor termination.



Use 22~24AWG solid wire for power supply connections.



Refer to the power supply connection and use information for fuse or circuit breaker requirements. Use caution when handling copper wiring. Power connections may carry high voltages.

Fuses must be installed within a finger safe housing to prevent electric shock from accidental contact or during fuse replacement.

If using auxiliary power

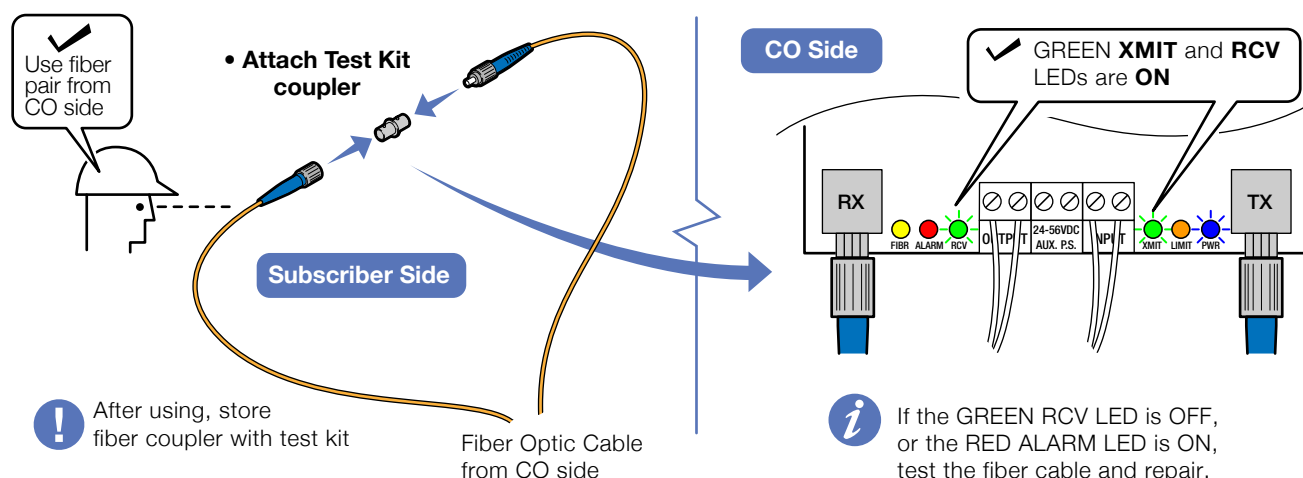
- Check the AUX P.S. terminals for 24-56VDC, 55-75mA.
- No AC power can be detectable on the DC power line.
- Check wiring for nicking, scoring or poor termination.

Verifying fiber cable

When T1 signal is present

Verify the fiber cable when the CO card fiber loopback test is good, but the Sub side GRN RCV LED will not go on, indicating that a fiber signal is not being received. Refer to **Installing into working environment step 5.5**, or **Installing prior to T1 service step 5.4** for information on the CO fiber loopback test.

Use the accessory test kit coupler to verify fiber cable continuity. The CO card must be powered and connected to a T1 signal.



To test the fiber cable, use a fiber optic cable test set with light source and meter.

T1 System Fiber Test Specifications

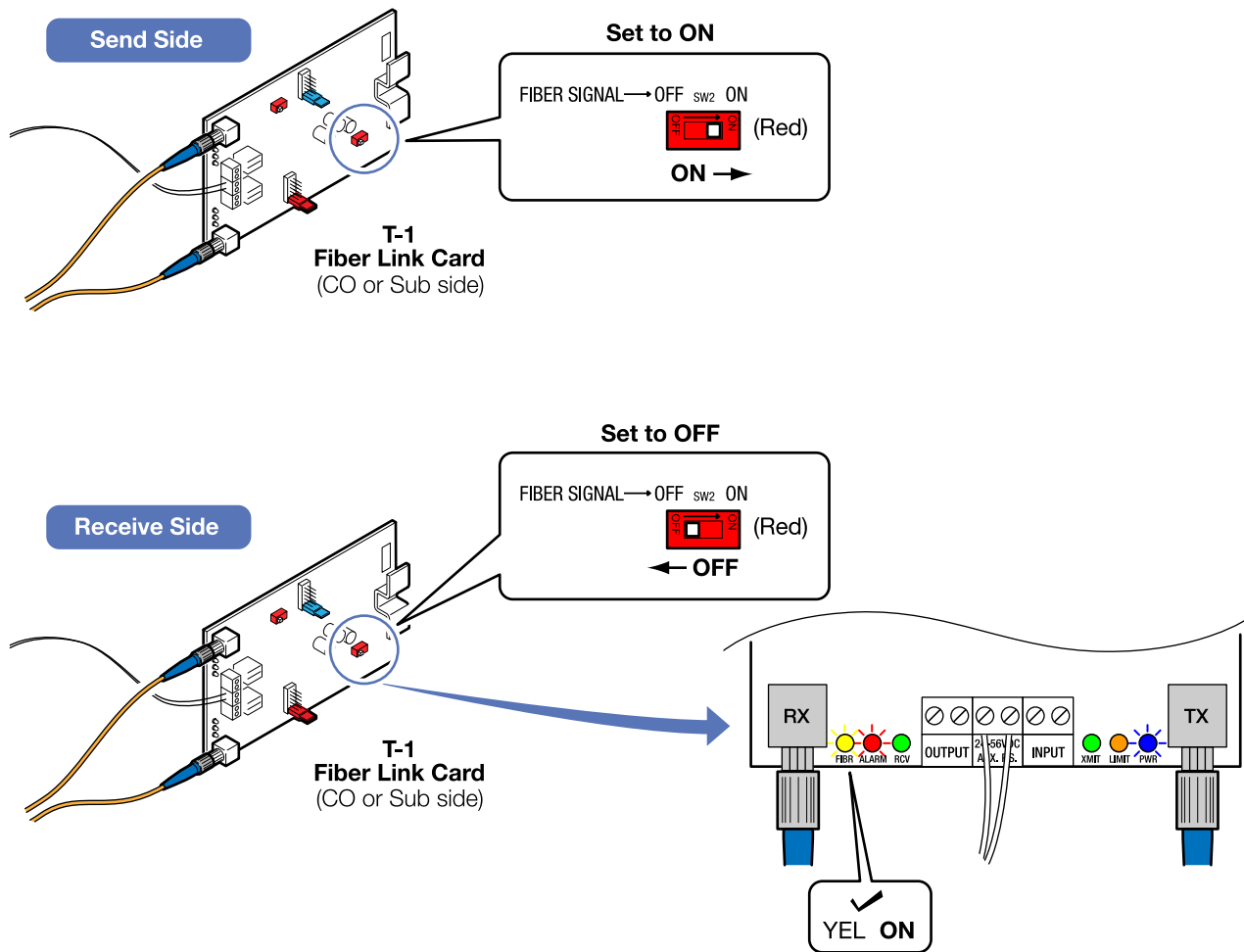
Fiber Type	Wavelength	Loss Budget	Maximum Distance
Multimode	850nm	10dB	1.5 miles (2.5km)
Single-mode	1310nm	8dB	9 miles (15km)
Single-mode Long Haul	1310nm	26dB, 8dB required min. loss	37 miles (60km)

Note: Distances equated using industry standard fiber and connector attenuation of 3dB/Km. Fiber condition, splices and connectors may affect actual range. When reconnecting fiber cables, check the correct connection of the fiber cable.

When T1 signal is not present

The T1 cards have a fiber signal test system built-in. You can verify the fiber cable when there is no T1 signal present. Both the CO and Sub cards need to be powered (a battery may be used) and the fiber cables need to be connected correctly to the cards. Refer to the installation sections for power and fiber connection information.

You may use either the CO or Sub card to send the test signal. On the send side, set the **SW2 FIBER SIGNAL** switch to ON. At the receive side, the yellow FIBR LED will go ON, indicating that the fiber cable is OK. You may repeat this test from the opposite side.



Set the SW2 FIBER SIGNAL switch to OFF once the test is completed.

If the receive side LED does not turn on, test the fiber cable using a fiber optic test set with light source and meter. See the T1 System Fiber Test Specifications chart on the previous page for test specifications.

Connecting T1 service after installation

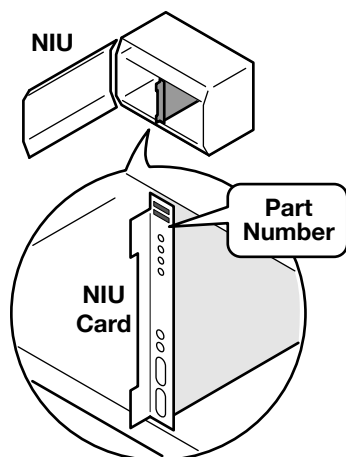
When connecting T1 Service AFTER the Fiber Link has been pre-installed, make sure to check the following.

- Verify span or auxiliary power to the CO card at the card terminals (page 15)
- Set the gain using the GAIN jumper on the CO card (page 16)
- Set the LOSS SELECT jumper on the Sub card to the same setting as the GAIN jumper on the CO card (page 19)
- Verify auxiliary power to the Sub card at the card terminals (page 20)

NIU Compatibility

Check for compatible NIU systems that supply Span Through-Power to the T-1 Fiber Link Cards.

Contact RLH for T1 compatibility with systems not listed.



HDSL/T1 Span Through Power NIU Compatibility Chart			
Manufacturer	Part Number	Description and Material ID	CLEI Code
HDSL1			
Adtran	1246026L4	T200 HTU-R (VZ# 594993)	T1L2C8J8AA
Adtran	1246026L5	T200 HTU-R (BST# 98001580)	T1L3KD5AAA
Adtran	1245024L1	T400 HTU-R	T1L2C8J8AA
Adtran	1247026L1	T200 HTU-R,	
ADC	SPX-HLXRD11	T400 HLXR	SND1FJRAAA
HDSL2			
Adtran	1223024L1	H2TU-R (VZ# 11018736)	T1L6VR8B_ _
HDSL4			
Adtran	1223424L1	H4TU-R (VZ# 11018731)	T1L6EYHB_ _
Repeated T1			
Adtran	1181315L1-5B	T1 NIU, Total Access	T1L3PU0A
Hyperedge	520-10-SWI3	T200 T1 NIU (BST# 300058336)	
Westell	DNI5760LNI3	T1 NIU (VZ# NCIUV9A)	NCIUV9A4AA
Westell	A90-3128-70	T1 NIU (VZ# T1L3P96)	T1L3P96CAA
Westell	A90-3115-31	T1 NIU (VZ# T1S1AEF)	T1S1AEFAAA

Ordering Information

4 Wire T1 Cards

Each 4 Wire T1 Fiber Link Card is identified with the part number on the card.

Optics	Distance	Fiber	Description	CLEI	Part Number	Life Cycle Status
Multimode ST	2.4km/1.5 miles	62.5µm	CO Card	NPIFEJ01AA	8806-1315-02	NRND
			SUB Card	NPIFGJ01AA	8806-1325-02	NRND
Singlemode ST	15km/9 miles	8~9µm	CO Card	NPIFEDA1AA	8806-1300-02	End of Life
			SUB Card	NPIFFD01AA	8806-1310-02	End of Life
Singlemode SC	15km/9 miles	8~9µm	CO Card	NPIFEDA1AA	8805-1300-02	End of Life
			SUB Card	NPIFFDA1AA	8805-1310-02	End of Life
Long Haul Singlemode ST	60km/37 miles	8~9µm	CO Card	-	8806-1300-02-LH	End of Life
			SUB Card	-	8806-1310-02-LH	End of Life
Long Haul Singlemode SC	60km/37 miles	8~9µm	CO Card	-	8805-1300-02-LH	End of Life
			SUB Card	-	8805-1310-02-LH	End of Life

- ▶ A complete system requires a CO card and a SUB card
- ▶ Add -RJ to part number to include RJ adapter with the card
- ▶ **End of Life product are no longer available for sale**
- ▶ **NRND - Not Recommend for New Designs**

RJ-48C Adapters

RJ-48C adapters must be ordered for the card type that they will be applied to.

Description	Part Number
RJ-48C Adapter for CO 4 Wire T1 Card	RLH-RJT1-CO
RJ-48C Adapter for SUB 4 Wire T1 Card	RLH-RJT1-SUB

- ▶ Please contact your RLH sales representative for pricing and delivery information.

Specifications

Transmission method	Amplitude modulated light via two optical fibers	
	Multimode: 850nm (Tx level: -16dB +/- 1dB)	
	Single-mode: 1310nm (Tx level: -23dB +/- 1dB)	
	Single-mode Long Haul: 1310nm (Tx level: -8dB +/- 2dB)	
Maximum Fiber Attenuation / Distance*	Multimode: 10dB / 1.5 miles (2.5 km)	
	Single-mode: 8dB / 9 miles (15 km)	
	Single-mode Long Haul: 26dB / 37 mi. (60 km), Required min. loss 8dB	
	*Note: Distances equated using industry standard fiber and connector attenuation of 3dB/Km. Fiber condition, splices and connectors may affect actual range.	
Fiber Type	(ST or SC connectors) Multimode: 62.5/125µm, 50/125µm	
	Single-mode: 8-9/125µm	
Temperature Limits	-40°F to +158°F (-40°C to +70°C)	
Humidity	95% non-condensing	
Bandwidth	100 kHz to 10 MHz	
Signal to Noise	>45 dB for line attenuation up to 30 dB at 772 kHz	
Digital Data Type	Bipolar digital data stream with no DC reference	
Maximum Data Rate	3.152 Mbps	
BER	<10 ⁻⁹	
Input (Receive) Level - CO Side	0.19V P-P to 9.0V P-P (-30dB to +6dB)	
Output (Transmit) Level - Sub Side	0.19V P-P to 9.0V P-P (-30dB to +6dB) - See Note	
Surge Protection	Fuses, thyristors, PTC thermistors, zeners, and MOVs	
Power Requirements	CO/ Sub Cards: 24-56 VDC, 57-66mA	
Powering Method	Line power simplex on Send and Receive pairs, or an isolated DC power source connected to AUX. P.S. input.	
RJ-45 Adapter	Rx Pair	Pins 1,2
	Tx Pair	Pins 4,5
Warranty	Limited Lifetime	Visit www.fiberopticlink.com for warranty details

Note: Please refer to the **Installation Section** for output level setting.

Support

Technical Support

Email:	support@fiberopticlink.com
24/7 technical support:	Toll Free 1-855-RLH-24X7 Toll Free 1-855-754-2497

Contact Information

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Specifications subject to change without notice.