

## 4-Wire Data/SCADA Interface Fiber Optic Link System

4RU Plug-in card Installation Information

### Description

The Fiber Optic Link 4-wire Data system provides a transmission of 4-wire data signal over two optical fibers. The 4-wire data supports full duplex constant transmission up to 9600bps (9.6Kbps) in voice-frequency or audio-tone range (300Hz-3.4KHz). Additionally, it also supports DDS data rates of 2.8Kbps and 4.8Kbps. LED indicators show fiber receive and power status (Cards with WARR # <625 do not have LEDs). Common applications include SCADA and protective relay systems.

#### 4-Wire Data CO (Central Office) Side Card

The 4-Wire Data CO Card provides the electrical-optical interface between a Central Office or PBX 4-wire copper line and two fiber strands. The CO card is typically powered from Telco sealing current or line power (12mA minimum). If sealing current is not available the 4-wire Data CO card can be locally powered by a 24-56V DC power source. The power input is not polarity sensitive.

**Note:** The following Telco DST units can provide span through line powering to the 4-wire CO fiber card: Westell p/n's: 4368-02, 5496LG I2 (Verizon# 934461), 5497FA I3. The DST card must be installed into a Westell mounting assembly p/n: DAS296 or similar with SXR and SXT terminals. Refer to the DST 4W Wiring Instructions sheet for additional information.

#### 4-Wire Data Sub (Subscriber) Side Card

The 4-Wire Data Sub Card provides the optical-electrical interface between the two fiber strands and a 4-wire copper line to a RTU, PBX, or modem. The Sub card is powered by a local 24-56VDC source, and can provide 18mA@24VDC output for powering customer equipment.



RLH 4 Wire Data Card

#### Contents

Description	1
General Safety Practices	2
Special Handling Requirements	2
Installation	3
Troubleshooting	4
Warranty Repair	5
Ordering	5
Specifications	6

#### Compliance Information

The RLH 4W Data Fiber Optic Link System is compliant with the following industry standards:

- **NEBS Level 3**
- **FCC PART-15**
- **FCC PART-68B**
- **IEEE-80 IEEE-367**
- **IEEE-487**
- **IEEE-1590**
- **IEEE-1615**
- **Motorola R56**
- **BR 876-310-100 BT (Telcordia)**
- **Bellcore SR-3966**
- **GR-1089**
- **GR-63**

Specifications subject to change without notice.

## General Safety Practices

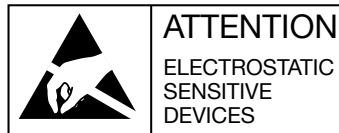
The equipment discussed in this document may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment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

### Caution - Severe Shock Hazard

- Never install during a lightning storm or where unsafe high voltages are present.
- Active phone lines may carry high DC voltages. Use caution when handling copper wiring.

## Special handling requirements

### Be careful when handling electronic components



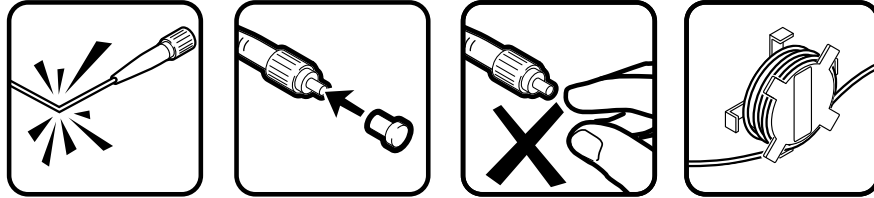
- This product contains static sensitive components.
- Handle the cards at their edges only.
- Follow proper electrostatic discharge procedures.

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.

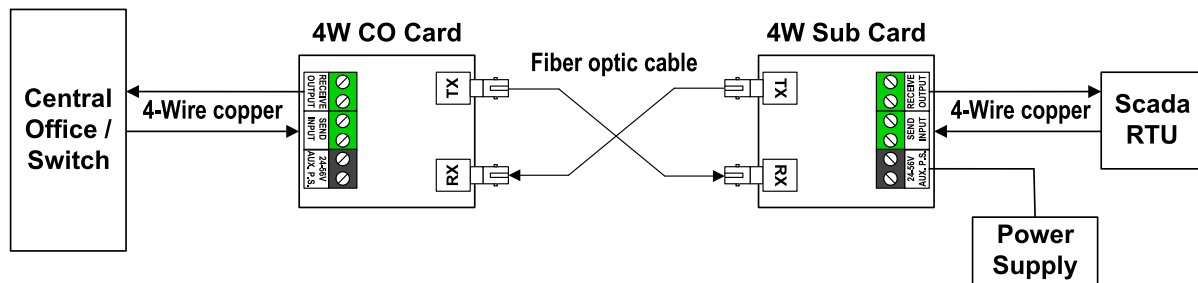
## Warning

The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment **MUST NOT** be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

## 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



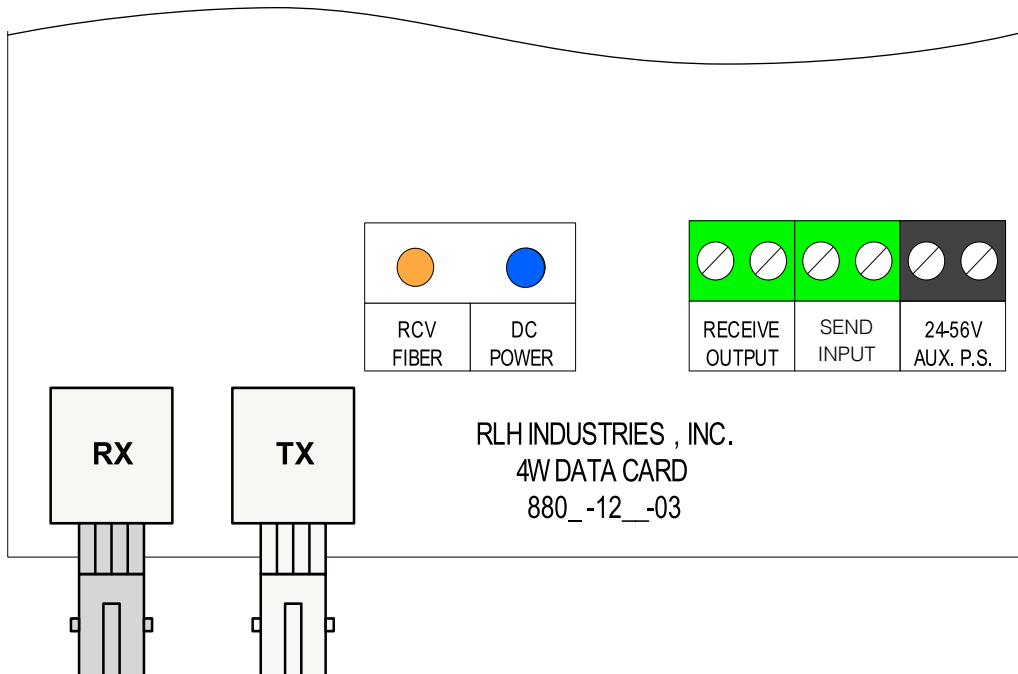
4-Wire Data System Diagram

## Installation

After unpacking the card, immediately inspect it for shipping damage. If damage is discovered file a claim immediately with the carrier, then contact RLH customer service. The Fiber Optic Link 4-wire data card can be installed into any RLH card housing. All electrical and fiber optic connection are made directly onto the card.

### Connect fiber optic cable

Fiber Optic Link Cards are equipped with two optical connectors. Connect fibers to the transmitter and receiver marked "TX" and "RX". For example, if fiber #1 is connected to "TX" on the CO Card, fiber #1 must be connected to "RX" on the Sub Card. Fiber cable should always be routed loosely avoiding tight bends.



Label	Name	Color	Status	Description
RCV FIBER	Receive Fiber Signal	ORG	ON	Fiber connection detected
			OFF	Fiber connection not detected
DC POWER	DC Power	BLU	ON	Power is applied to the card
			OFF	Power is not present

### 4-Wire Data Card Connectors and LEDs

#### Connect 4-wire copper pair

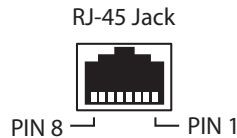
The copper pair from the CO or PBX connects to the green SEND/INPUT screw-down terminal on the CO Card. The copper pair receive wires connect to the green RECEIVE/OUTPUT screw-down terminals. Connections are similar for the SUB side card. The input and output pairs must be connected to the correct terminals, however the individual tip/ring pairs are not polarity sensitive.

#### RJ-48 connectors



Card with RJ-45 Adapter

RJ48S adapters are available to connect cards via standard RJ connector, see figure 3. RJ jacks are gel filled to prevent corrosion. CO side RJ adapters connect pins 1,2 to the card input connector and pins 7,8 to the card output. Sub side RJ adapters connect pins 7,8 to the card input and 1,2 to the card output. Refer to the Ordering information for CO and SUB side RJ connector part numbers.



Pin Description	
1 NC	5 GND
2 RS-232 TXD (Output)	6 NC
3 RS-232 RXD (Input)	7 NC
4 NC	8 NC

### Connect Power

Connect a 24-56VDC (12mA minimum) power source to the black “AUX. P.S.” screw-down terminal on the Card. The power input is not polarity sensitive.

**Note:** Local power is only required when simplex line power is not available on the 4-wire pairs. Simplex power on the 4-wire pair output is available on the SUB side as an option. Refer to the Ordering information.

## Troubleshooting

If trouble is encountered, verify all installer connections, signal and voltage levels. If trouble persists, replace the unit and retest. If technical assistance is required, contact RLH Industries, Inc. Technical support department.

## Ordering

RLH Fiber Optic Link products are available directly through RLH Industries, Inc. or its distributors nationwide. Please call RLH customer service for ordering assistance.

Each 4W Data card is identified with the part number.

Fiber Type	4W Data CO Card		4W Data Sub Card	
	Part Number	CLEI Code	Part Number	CLEI Code
Multimode ST	8806-1235-03	NPIFA401AA	8806-1245-03	NPIFAB401AA
Multimode SC	8805-1235-03	–	8805-1245-03	–
Single-mode ST	8806-1279-01	NPIFCC01AA	8806-1289-01	NPIFDC01AA
Single-mode ST (Long Haul)	8806-1279-01LH	–	8806-1289-01LH	–
Single-mode SC	8805-1279-01	–	8805-1289-01	–
Single-mode SC (Long Haul)	8805-1279-01LH	–	8805-1289-01LH	–

- ▶ Add “RJ” to part number for installed RJ48S adapter
- ▶ Add “S” to part number for simplex current output option on Sub card only.

## General Specifications

<b>Transmission method</b>	Amplitude modulated light via two optical fiber
	Multimode: 850nm (Tx level: -26dB ± 1dB)
	Single-mode: 1310nm (Tx level: -29dB ± 1dB)
	SM Long Haul: 1310nm (Tx level: -6dB ± 2dB)
<b>Maximum Fiber Loss / Distance*</b>	Multimode: 8dB / 1.2 miles (2km)
	Single-mode: 8dB / 9 miles (15km)
	SM Long Haul: 26dB / 31 miles (50km); minimum 8dB
	*Note: Distances equated using industry standard fiber and connector attenuation of 3dB/Km. Fiber condition, splices and connectors may affect actual range.
<b>Fiber Type</b>	Multimode: 62.5/125µm, 50/125µm ; Single-mode: 9/125µm
<b>Fiber Connector Types</b>	ST or SC
<b>Wire Connector</b>	Screw clamp, 12-26 AWG
<b>Bandwidth</b>	300 Hz to 3.4 KHz
<b>Channel Noise</b>	< 20dBmC (15dBmC typical)
<b>DC Resistance Limits</b>	2000 Ohms typical for 50V DC CO battery
<b>Maximum Analog Data Rate</b>	9600 bps (9.6Kbps)
<b>DDS Data Rate</b>	2.8 Kbps
	4.8Kbps
<b>Nominal Impedance</b>	600 Ohm input and output
<b>Insertion Loss</b>	0dB +/- 0.5dB each direction
<b>Overload Level</b>	8dBm into 600 Ohms
<b>Surge Protection</b>	PTC thermistors, zener diodes and varistors
<b>Power Requirements</b>	12mA-20mA @ 24-56VDC
<b>Powering Method</b>	Line or Local Power
<b>Simplex Current Output Option</b>	18mA@24VDC on XMIT pairs, Sub side only
<b>Operating Temperature</b>	-40° to +158° F (-40° to +70° C), 95% non-condensing
<b>Dimensions</b>	7"x4"x1"

Specifications subject to change without notice.

## Warranty

RLH is recognized throughout the U.S. and offers the only **UNCONDITIONAL LIFETIME WARRANTY** in the telecommunications industry. We are very proud of our warranty which simply states that our Fiber Optic Link Assemblies are warranted to be free of defects in material and workmanship for the **LIFE OF THE PRODUCT**.

### We can offer this warranty because:

- We believe our customers shouldn't have to incur additional costs due to failure or damage
- We engineer and manufacture our Fiber Optic Links in the USA, with total confidence in our quality
- We understand how safety and reliability impact the total cost of ownership
- We know that customer support extends beyond the initial sale, so **we stand behind our products**

RLH will replace any product, or part thereof, that fails **FOR ANY REASON**, provided the defective part is returned to RLH Freight prepaid. This warranty is **UNCONDITIONAL** and valid even when RLH Fiber Optic Link Assemblies have been abused or mishandled, where unauthorized repairs have been attempted or performed, or product has been damaged as a result of a natural disaster. Compare this warranty to our competitors and see how our warranty will reduce your costs and simplify your maintenance activities.

**To make a warranty claim, or schedule repair or replacement of your RLH product, please contact us for an RMA number.** You will be promptly assisted by one of our warranty specialists. All returns must have an RMA number before we can receive any items.

## Technical Support

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<b>Normal technical support:</b> (Mon - Fri 6am - 6pm PST)	Local (714) 532-1672 Toll Free (800) 877-1672 Toll Free (866) DO-FIBER
<b>24/7 Technical support:</b>	(714) 366-2503 (714) 396-8982 (714) 457-5740

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## Contact Information

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<b>Corporate Headquarters:</b>	RLH Industries, Inc. 936 N. Main Street Orange, CA 92867 USA
<b>Phone:</b>	Local (714) 532-1672 Toll Free (800) 877-1672 Toll Free (866) DO-FIBER
<b>Fax:</b>	(714) 532-1885
<b>Email:</b>	info@fiberopticlink.com
<b>Web site:</b>	www.fiberopticlink.com

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# RLH FIBER OPTIC LINK

RLH Industries, Inc., The Leader in Fiber Optic Telecom Isolation Technology

LIFETIME

## UNCONDITIONAL WARRANTY

RLH INDUSTRIES, INC. FIBER OPTIC LINK assemblies are warranted to be free of defects in materials and workmanship for the life of the product. This lifetime warranty is effective for RLH products sold from February 2, 1988, to the present, with the exception of fiber optic cable assemblies which are warranted only to be free of defects in manufacturing and batteries, which carry a 5-year unconditional replacement warranty.

RLH Industries, Inc. will repair or replace any product, or part thereof, that fails for any reason, provided the defective part is returned to RLH, freight prepaid.

This warranty is UNCONDITIONAL and is valid even when RLH Fiber Optic Link assemblies have been abused or mishandled, where unauthorized repairs have been attempted or performed, or product has been damaged as a result of a natural disaster.

Authorized by:



J. RANDALL MEARES, Vice President, Engineering



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

Specifications subject to change without notice.