

## 2-Wire DID Fiber Optic Link System

4RU Plug-in card Installation Information

### Description

The Fiber Optic Link 2-wire DID (Direct Inward Dialing) system provides a fiber optic transmission of a Telco DID TRUNK line to a PBX (loop start) over two optical fibers. The 2-wire DID system transmits signals in the voice-frequency or audio range (300Hz-3.4KHz) while providing reverse battery signaling to communicate call status. The 2 Wire DID system is compatible with any RLH 4RU card housing or shelf, is temperature hardened for tough environmental conditions, and is covered by our **Exclusive Unconditional Lifetime Warranty**.

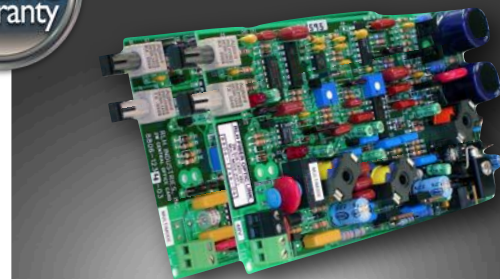
#### 2-Wire DID CO (TRUNK) Card

The 2-Wire DID CO Card provides the electrical-optical interface between a Central Office 2-wire copper line and two fiber strands. The CO card cannot be line powered. It must be powered by an isolated local DC power source. The CO Card has four LED status indicators, Sub off-hook (Green), CO off-hook (Orange), battery reversal (Yellow), and power (Blue).

**Note:** In order to maintain high voltage isolation, Fiber Optic Link CO and Sub cards must be powered from separate power sources.

#### 2-Wire DID Sub (Subscriber) Side Card

The 2-Wire DID Sub Card provides the optical-electrical interface between the two fiber strands and a 2-wire copper line to a DID PBX. The DID Sub Card is line powered by the copper pair from the PBX. The Sub Card has three LED status indicators, Sub off-hook (Green), CO off-hook (Orange), battery reversal (Yellow).



RLH 2-Wire DID 4RU Card

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### Compliance Information

The RLH 2-Wire DID Fiber Optic Link System is compliant with the following industry standards:

- **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

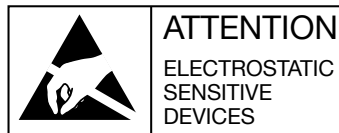
The equipment discussed in this document may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment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



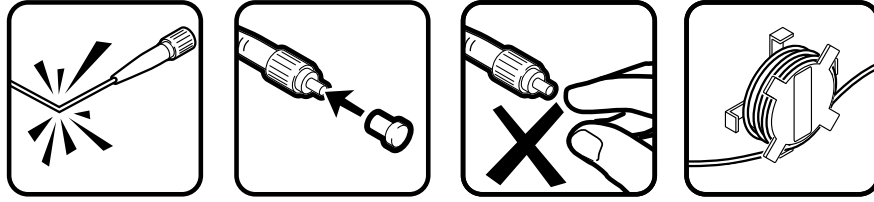
- This product contains static sensitive components.
- Handle the cards at their edges only.
- Follow proper electrostatic discharge procedures.

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.

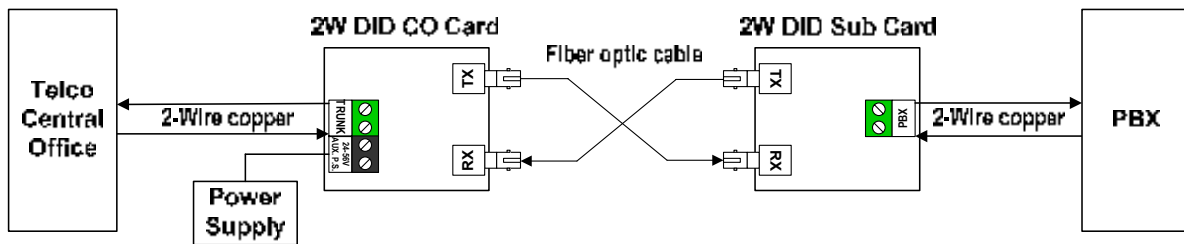
### Warning

The intra-building port(s) of the equipment or subassembly is suitable for connection to intrabuilding 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



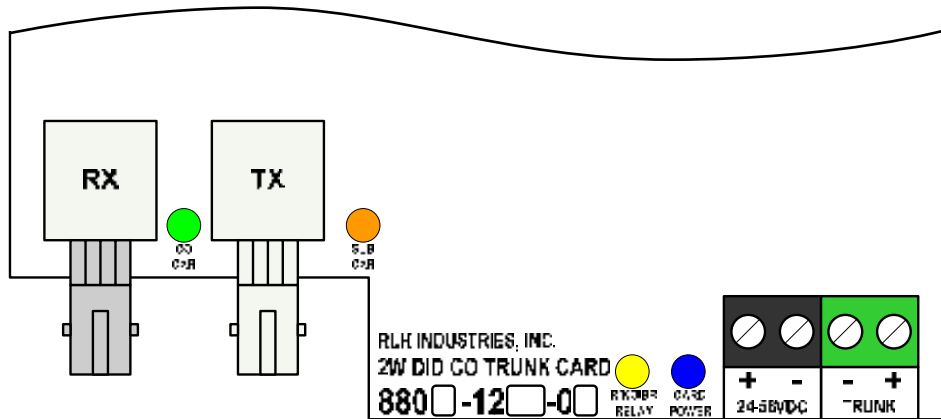
**2-Wire DID System Diagram**

## Installation

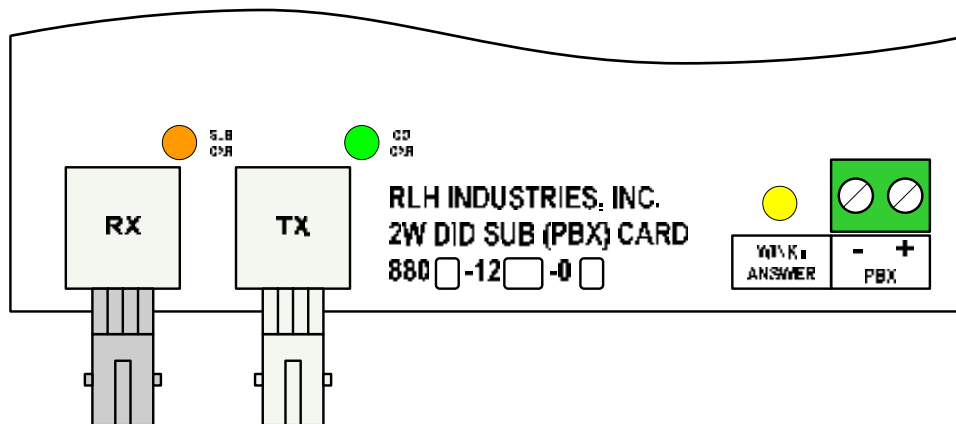
After unpacking the card, immediately inspect it for shipping damage. If damage is discovered file a claim immediately with the carrier, then contact RLH customer service. The Fiber Optic Link 2-wire DID Cards can be installed into any RLH card housing. All electrical and fiber optic connections are 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.



**2-Wire DID CO (Trunk) Card Connectors**



**2-Wire DID Sub (PBX) Card Connectors**

**Connect 2-wire copper pair**

The copper pair from the CO connects to the green TRUNK (+ and -) screw-down terminal on the CO Card. The connector is polarity sensitive, so measure the polarity of the PBX Tip and Ring to determine the positive lead and the negative lead before connecting

The copper pair from the PBX connects to the green PBX (+ and -) screw-down terminal on the Sub Card. The connector is polarity sensitive, so measure the polarity of the PBX Tip and Ring to determine the positive lead and the negative lead before connecting

**Connect Power**

Connect a 24-56VDC (12mA minimum) power source to the black AUX. P.S. screw-down terminal on the CO card. The power input is not polarity sensitive and marked with positive and negative. Wires may be inserted into either side.

Once connect is complete, use following test procedures to verify correct system operation.

### Testing

1. Measure the polarity of the PBX Tip and Ring to verify that the positive lead and the negative leads are connected to the correct terminals on 2-wire DID Sub Card.
2. At the CO side, use a telephone (butt-set) connected to the TRUNK terminal to go off-hook. When you go off-hook, you should see the Orange LED come ON followed by the Green LED, and then the Yellow LED should wink ON once.
3. If you go off-hook and the Yellow LED comes ON and blinks constantly (without dialing), you will need to reverse tip and ring on the PBX Sub side card.
4. You can dial a 4-digit extension to call in. When the call is answered the Yellow LED will be ON.
5. From a different line call the full 7 digit number for a DID extension. If the DID system does not function correctly, reverse Tip and Ring to the CO Trunk Card.

## 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 Information

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 2-wire DID card is identified with the part number.

Fiber Type	Part Number	
	2W DID CO Card	2W DID Sub Card
Multimode ST *	8806-1264-05	8806-1274-04
Multimode SC *	8805-1264-05	8805-1274-04
Single-mode ST	8806-1262-03	8806-1272-02
Single-mode SC	8805-1262-03	8805-1272-02
Single-mode ST (Long Haul)	8806-1262-03LH	8806-1271-02LH
Single-mode SC (Long Haul)	8805-1262-03LH	8805-1271-02LH

▶ \* 62.5µm multimode fiber compatibility is standard, add **-50** to part number for 50µm fiber compatibility

## 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:	10dB / 1.5 miles (2.5km)
	Single-mode:	8dB / 9 miles (15km)
	SM Long Haul:	26dB / 37 miles (60km); 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>Frequency Response</b>	300 Hz to 3.4 KHz+0.5dB to -2.0dB (Terminated 600 Ohms)	
<b>DID Signaling</b>	Reverse battery from the PBX is reflected on the CO Trunk Card	
<b>DC Resistance Limits</b>	1600 Ohms loop (including CO DC feed)	
<b>Insertion Loss</b>	0dB +/- 0.5dB each direction	
<b>Surge Protection</b>	PTC thermistors, zeners, diodes, thyristors and varistors	
<b>Power Requirements</b>	CO (Trunk) Card:	24-56VDC, On-hook 40mA maximum, off-hook 120mA maximum
	Sub (PBX) Card:	18-56VDC, 18-29mA (card will sink 30mA maximum from PBX)
<b>Powering Method</b>	CO (Trunk) Card:	Local isolated DC power source
	Sub (PBX) Card:	Line current from PBX
<b>Operating Temperature</b>	-40° to +158° F (-40° to +70° C), 95% non-condensing	
<b>Dimensions</b>	7"x4"x1", Standard RLH 4RU Plug-in Card	

Other company and product names mentioned herein are trademarks of their respective companies. Mention of third-party products is for informational purposes only and constitutes neither an endorsement nor a recommendation. RLH assumes no responsibility with regard to the performance or use of these products.

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

<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) 396-8982 (714) 457-5740

## Contact Information

<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

# 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 MEARS, Vice President, Engineering



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

Specifications subject to change without notice.