RLH Industries, Inc.

USER GUIDE

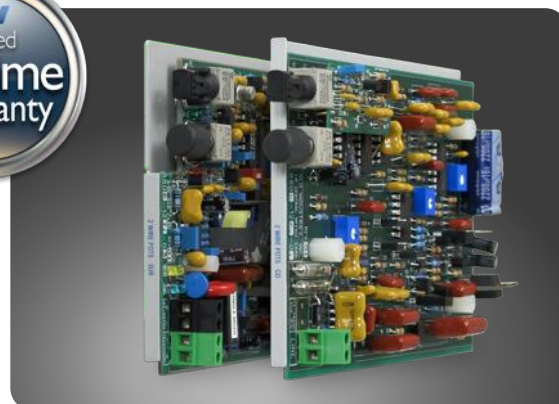*The leader in rugged fiber optic technology.*

2 Wire POTS Fiber Link Card System

SYSTEM INSTALLATION INFORMATION

ANALOG PHONE OVER FIBER

NEBS LEVEL 3

2 Wire POTS Fiber Link Card System

Description

The 2 wire POTS (Plain Old Telephone Service) system provides transmission of standard analog POTS, telemetering, or PBX loop start signals over two optical fibers. The system transmits signals in the voice-frequency or audio range (300Hz-3.4KHz) while providing ringing and off-hook detection. Common applications include telephone, faxes, and dial-up modems.

The 2 Wire POTS system is compatible with any RLH Fiber Link card housing or shelf, is temperature hardened for tough environmental conditions, and is covered by our **Limited Lifetime Warranty**.

Note: Special options are available for forward disconnect (SM07) and square wave ringing option (SM10).

Key Features

- Ideal for critical, high voltage, remote or un-manned locations that must remain operating 24/7/365
- FXO/CO cards are simplex powered
- Provides ringing and off-hook detection
- Environmentally hardened to operate in -40°F to +158°F (-40°C to +70°C) environments
- Standard RLH Fiber Link Card form factor
- **Limited Lifetime Warranty**

Contents

Compliance Information

The 2W POTS Fiber Link Card System is compliant with the following industry standards:

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

General Safety Practices

Intended Audience

This guide is intended for use by knowledgeable telco/network installation, operation and repair personnel. Every effort has been made to ensure the accuracy of the information in this guide 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.

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.

HVP 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.

Special Handling Requirements

Be careful when handling electronic components

ATTENTION
ELECTROSTATIC
SENSITIVE
DEVICES
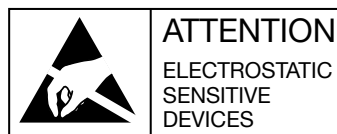
- This product contains static sensitive components.
- Handle Fiber Link Cards at their edges only.
- Follow proper electrostatic discharge procedures.

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.

Guidelines for handling terminated fiber cable
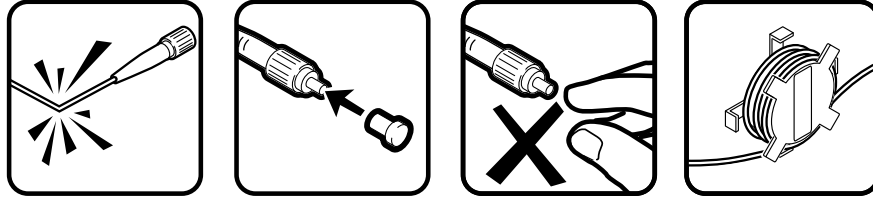
- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber connectors.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination will cause signal loss.
- Do not touch fiber connector ends.
- Store excess fiber on housing spools or fiber spools at site

Acronyms

Commonly used acronyms and abbreviations

Acronym/Abbreviation	Description
POTS	Plain Old Telephone Service (analog phone)
FXO/CO	Foreign Exchange Office or Central Office location
FXS/Sub	Foreign Exchange Station or Subscriber side location
PBX	Private Branch Exchange
TX	Transmit
RX	Receive
CPE	Customer Premises Equipment
MM	Multimode
SM	Single Mode
2W	2 wire copper analog phone line
RU	EIA Rack Space Unit (1.75")

Installation

Prior to installation:

Check for shipping damage:

• Check the contents to ensure correct model and fiber type
• Have a clean, dry, installation environment ready

Required for installation:

• 24~56VDC (200mA@24VDC min.) local power source for the FXS/Sub card
• RLH Fiber Link card housing or enclosure
• A weatherproof enclosure is required for outdoor use

The 2 Wire POTS Fiber Link Card can be installed into any compatible RLH card housing. All electrical and fiber optic connection are made directly onto the card.

## 2 Wire POTS FXO/CO (Central Office) Side Card

The 2 Wire POTS FXO/CO Card provides the electrical-optical interface between a Central Office or PBX 2-wire copper line and two optical fiber strands. The FXO/CO card is powered by 2 wire talk battery (18VDC 0.5mA on-hook/ 18mA off-hook minimum) current.

Note: If sealing current is not present, the 2 Wire POTS Power Coupler (P/N: 8806-1252-01, 8806-1252-02) must be used to insert simplex DC power onto the 2-wire line.

Note: To maintain high voltage isolation, Fiber Link FXO/CO and FXS/Sub cards must be powered from separate isolated power sources.

2 Wire POTS FXS/Sub (Subscriber) Side Card.

The 2 Wire POTS Sub Card provides the optical-electrical interface between the two fiber strands and a 2-wire copper line to a telephone, fax, or modem. The FXS/Sub card is powered by a local 24-56VDC source. The FXS/Sub Card provides 90VRMS sine wave ringing (REN 5.0 max 80VRMS). Square wave ringing is available as an option. LED Indicators on the card display power, ringing and off-hook conditions. The FXS/Sub card is switchable between 14V or 48V power to the telephone port.
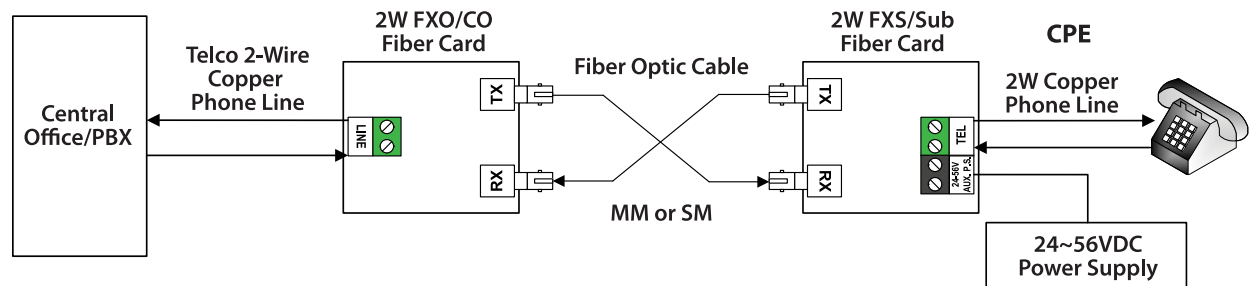

2 Wire POTS System Diagram

Connect fiber optic cable

The 2 Wire POTS Cards are each equipped with two optical connectors. Connect the fibers to the transmitter and receiver marked TX and RX respectively. The TX connector of one card is connected to the RX connector of the card at the other end. Refer to the *2 Wire POTS System Diagram*.

Note: Fiber cable should always be routed loosely avoiding tight bends.
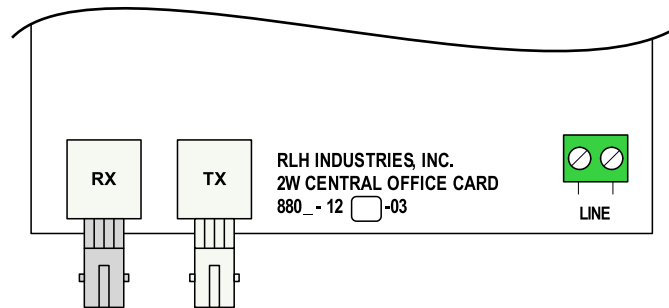
2 Wire POTS FXO/CO Card Connectors
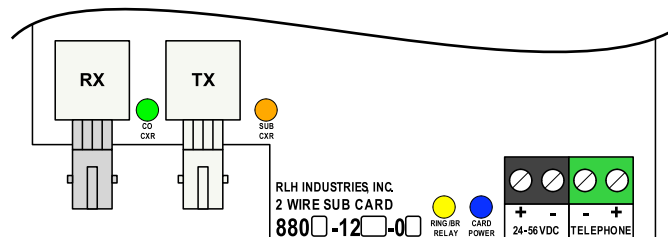
2 Wire POTS FXS/Sub Connectors

Connect 2 wire copper pair

The copper pair from the FXO/CO or PBX connects to the green LINE screw-down terminal on the FXO/CO Card. The LINE connector on the FXO/CO card is not polarity sensitive

The copper pair from the telephone connects to the green TELEPHONE and screw-down terminals on the FXS/Sub Card. Attach the copper pair, **+** is for **TIP** and **-** is for **RING**. Make connections according to the polarity markings on the connector.

Connect Power

Connect a 24-56VDC (200mA minimum) power source to the black "AUX. P.S." screw-down terminal on the Sub card.

Note: The power input is ***polarity sensitive*** and marked with positive and negative.

48V

SW2 Switch OFF for 14V, or ON for 48V telephone output

Red LED remains ON in off-hook state

SW1

SW1 Remains OFF unless using with CO card Forward Disconnect option (SM09).

Orange SUB CXR LED

Green CO CXR LED

Yellow Ring/BR Relay LED

Blue Card Power LED

Telephone, green terminal is for a copper pair.
+ = TIP / - = RING
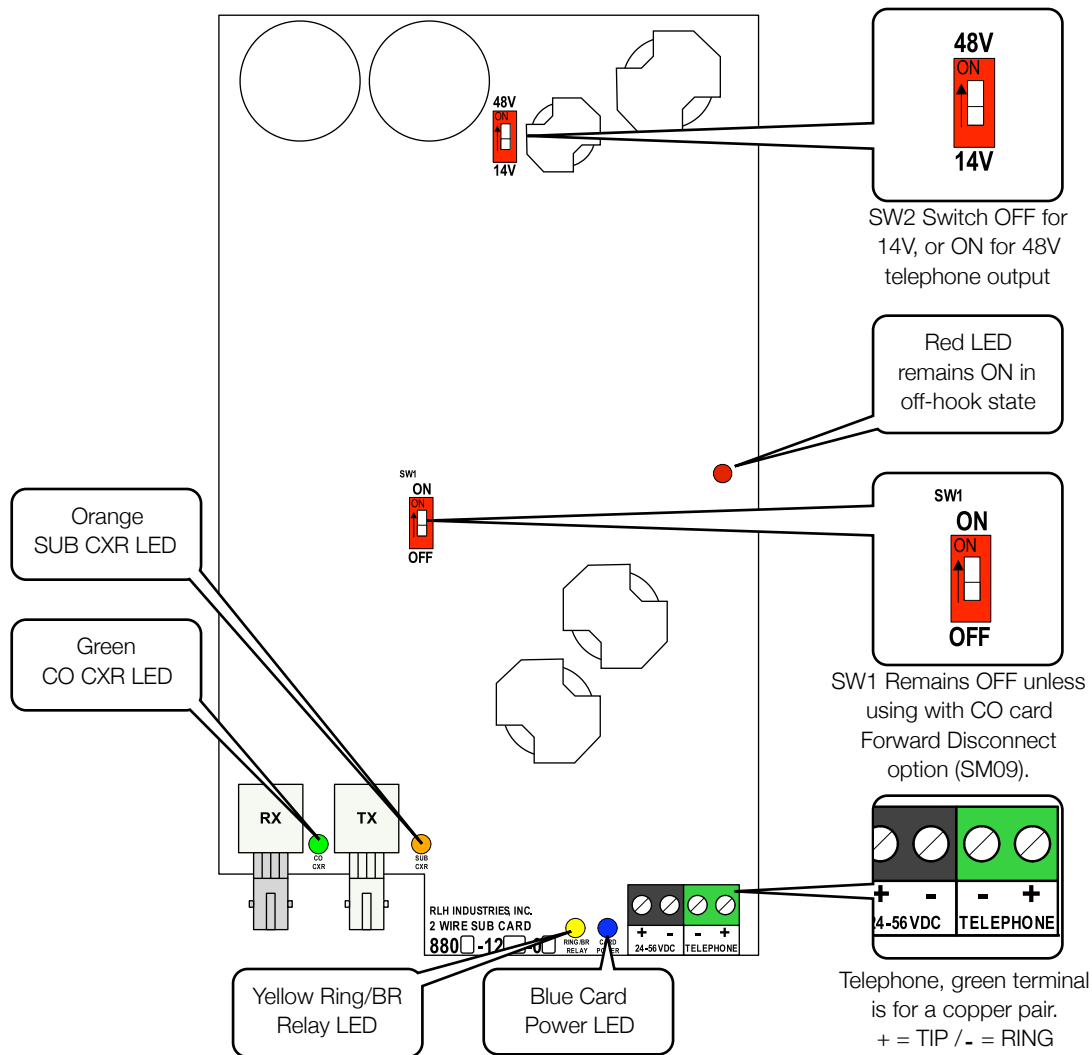
FXS/Sub LED indicators and switches

Switches

There are 2 user settable switches on the FXS/Sub card.

SW1 is only used together with a FXO/CO card that has the SM09 Forward Disconnect option. Set the switch to **OFF** in standard systems, and **ON** when using with the FXO/CO card with forward disconnect.

SW2 sets the telephone terminal output voltage. This can be useful in situations where power consumption is an issue. Set the Switch to **OFF** to operate in low power mode, with 14V telephone output. This is the default setting, and requires only approximately 4mA from the power supply.

Note: Remove power from the power connector before changing the SW2 setting.

Set the switch to **ON** for normal 48V operation. This simulates typical CO output and is useful for long distance or where connected equipment requires 48V. The telephone output current is always limited to 23mA regardless of the setting.

LED Indicators

The FXS/Sub card has several LED indicators to help determine card operation. Please refer to the LED indicators and switches diagram and the function chart below.

Indicator	Color	State	Description
CO CXR	Green	OFF	On-hook - no incoming signal from FXO/CO card
		Flashing	Off-hook - Incoming call
		ON	Off-hook
SUB CXR	Orange	OFF	On-hook - no outgoing signal from FXO/CO card
		ON	Off-hook
RING/BR RELAY	Yellow	OFF	On-hook - no signal to or from FXO/CO card
		Flashing	Off-hook - Incoming call
		ON	Off-hook - call is answered
CARD POWER	Blue	ON	Power is present
		OFF	No power is present or polarity is reversed
~	Red	ON	Off-hook power indicator
		OFF	On-hook power indicator

Troubleshooting

If trouble is encountered, verify all copper and fiber connections and settings. If trouble persists, replace the unit and retest. If technical assistance is required, contact RLH Industries, Inc. technical support department.

Ordering Information

Each 2 Wire POTS card is identified with the part number.

Optics	Distance	Fiber	Description	Part Number	CLEI
Multimode ST	1.5 mi / 2.4km	62.5µm	CO Card	**8806-1234-03**	VAUIASD9AA
			SUB Card	**8806-1244-05**	LFT1AAPEAA
Single-mode ST	9 mi / 15km	8~9µm	CO Card	**8806-1261-01**	NPIFCB01AA
			SUB Card	**8806-1271-03**	NPIFDB01AA
Single-mode SC	9 mi / 15km	8~9µm	CO Card	**8805-1261-01**	NPIFKD01AA
			SUB Card	**8805-1271-03**	NPIFLD01AA
Long Haul Single-mode ST	37 mi / 60km	8~9µm	CO Card	**8806-1261-01-LH**	-
			SUB Card	**8806-1271-03-LH**	-
Long Haul Single-mode SC	37 mi / 60km	8~9µm	CO Card	**8805-1261-01-LH**	-
			SUB Card	**8805-1271-03-LH**	-

▶ A complete system requires a **CO** side card and a **SUB** side card.

▶ Add **-RJ** to part number for installed RJ11 adapter.

▶ Add **-SM07** to part number for forward disconnect option.

▶ Add **-SM10** to part number for square wave ringing option.

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

General Specifications

Transmission method	Frequency modulated light via two optical fibers	Multimode	850nm (Tx level: -16dB ± 1dB)
		Single-mode:	1310nm (Tx level: -23dB ± 1dB)
		SM Long Haul:	1310nm (Tx level: -8dB ± 2dB)
Maximum Fiber Loss / Distance*	Multimode:	10dB / 1.5 miles (2.4km)	
	Single-mode:	8dB / 9 miles (15km)	
	SM Long Haul:	26dB* / 37 mi. (60 km), *min. required loss -8dB	
	* Note: Distances equated using industry standard fiber and connector attenuation. Fiber condition, splices and connectors may affect actual range.		
Fiber Type	Multimode:	62.5/125µm	
	Single-mode:	8-9/125µm	
Fiber Connector Types	ST or SC		
Wire Connector	Screw clamp, 12-26 AWG		
Bandwidth	300 Hz to 3.4 KHz		
Dialing Protocol	Pulse or tone dialing		
Ringing	Sine wave matched to input frequency, REN 5.0		
	Square wave ringing option available - SM10		
Drop Voltage / Current	Source voltage selectable between 48V and 14V (power saving) 22± 1mA		
Insertion Loss	0dB +/- 0.5dB each direction		
Surge Protection	PTC thermistors, zener diodes and varistors		
Power Requirements	CO Card:	18-56VDC, On-hook 0.5mA maximum, off-hook 18mA minimum (card will sink up to 30mA line seizure).	
	Sub Card:	24-56VDC, 200mA maximum	
Powering Method	CO Card:	Line Power (DC Simplex or Talk Battery)	
	Sub Card:	Local Power Supply	
Operating Temperature	-40° to +158° F (-40° to +70° C), 95% non-condensing		
Dimensions	Standard RLH Fiber Link Card Form Factor (7"x4"x1")		
Warranty	Limited Lifetime	*Visit* www.fiberopticlink.com *for warranty details*	

Technical Support

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

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

Specifications subject to change without notice.