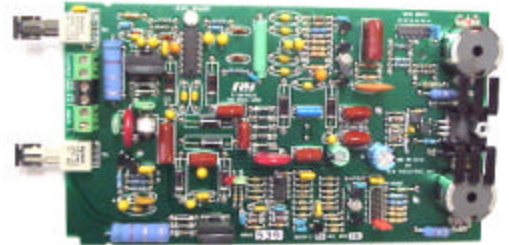


RLH Fiber Optic Link Data Sheet No.22 Rev.2

T-1 Data System Description and Installation

Fiber Type	T1 CO Card	T1 Sub Card	T1 CO Unit	T1 Sub Unit
Multimode ST (62.5/125μ)	8806-1315-01	8806-1325-01	8806-1338-02	8806-1337-02
Single-mode ST (8-10/125μ)	8806-1300-01	8806-1310-01	8806-1319-01	8806-1320-01
Single-mode SC (8-10/125μ)	8805-1300-01	8805-1310-01	8805-1319-01	8805-1320-01
Short Haul (Plastic)	8806-1316-01	8806-1326-01	8806-1308-02	8806-1307-02



T-1 CO & SUB CARD

* Multimode and Single-mode Units include a card with housing p/n 8806-1200-04. Add LD to the unit part number for housing p/n 8806-1200-03.

** Short Haul Units include a card with housing p/n 8806-1200-03.

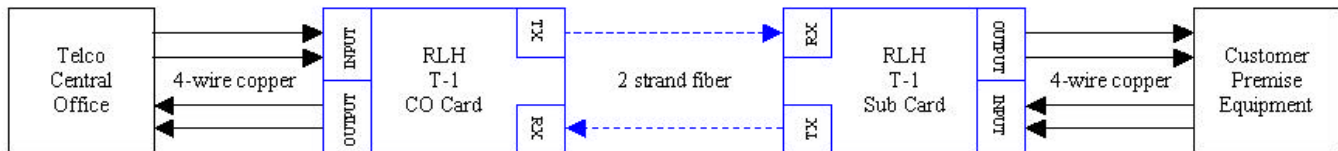
Description

The Fiber Optic Link T1 System processes incoming bipolar signals (6.5 V P-P Max) within a bandwidth of 10 kHz to 10 MHz- T-1 (1.544mbps) or (CCITT (2.048 mbps), optically transmits these signals via fiber optic cable and re-converts the signal to the original electrical signal with minimal gain or loss.

NOTE: T-1 CO Cards and Sub Cards are electrically the same. These cards are separated into CO and Sub only to aid in ordering and system setup.

T-1 CO Side Card. The T-1 CO Card provides the interface between a Telco Central Office T-1 copper 4-wire line and a two strand fiber optic cable.

T-1 Sub Side Card. The T-1 Sub Card provides the interface between the Subscriber equipment copper 4-wire line and a two strand fiber optic cable.



Circuit Diagram

Powering at the CO end. The T1 Card is typically powered by 60mA Telco sealing current on the T1 transmit and receive pairs. The card may also be powered by an isolated 24-54VDC source. The card is polarity insensitive to all electrical connections.

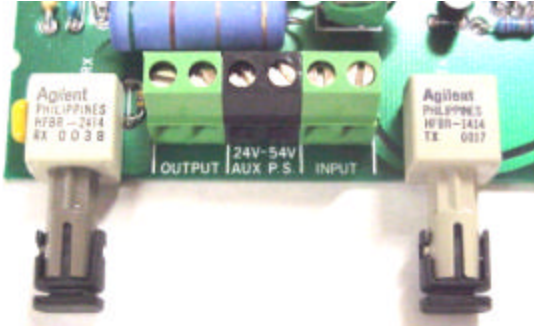
Note: The value of 24VDC must be added to the calculation of Telco DC source voltage required to drive 60mA through the T-1 System (T-1 repeaters and cable resistance).

Powering at the sub end. The Card is typically powered by a 24-54VDC source. Alternately the card can be powered via 60mA simplex onto the T-1 Send and Receive pairs by the Subscriber Equipment. The T-1 Card is polarity insensitive to all electrical connections.

Note: The power supply on the T-1Card current limits at 68 +/- 2mA.

Description (Continued)

T-1 Surge Protection. Transients appearing at the “AUX.P.S.” terminals are limited with a PTC thermistor and a metal oxide varistor. Resistors, a metal oxide varistor and a gas tube limit transients appearing between the Send and Receive pairs. Send and Receive pairs are each protected by a rectifier bridge arrangement between Tip and Ring.



Close up view of T1 Card connection terminals



T-1 Cards can be used in all RLH housings

Installation

Connect fiber optic cable. Multimode or Single-mode Fiber Optic Link Cards are equipped with two (ST Female) optical connectors. Connect fiber (ST Male) to the Transmit and Receive. The transmit terminal is marked “TX”, and the receive terminal is marked “RX”. The ST connectors on the fiber optic cable assembly will be identified end-to-end with an alpha/numeric identifier. Be sure the TX connector is connected to the RX connector on opposite end of fiber, i.e., If The #1 fiber is connected to the TX on the CO Card, the #1 fiber must be connected to the RX on the Sub Card

Short Haul Fiber Optic Link Cards have color-coded optical connectors. The Transmit is Gray and the Receive is Blue. The connectors on the plastic duplex jumpers are also color-coded (Gray/Blue). Connect Gray (Male) to Gray (Female) and Blue (Male) to Blue (Female).

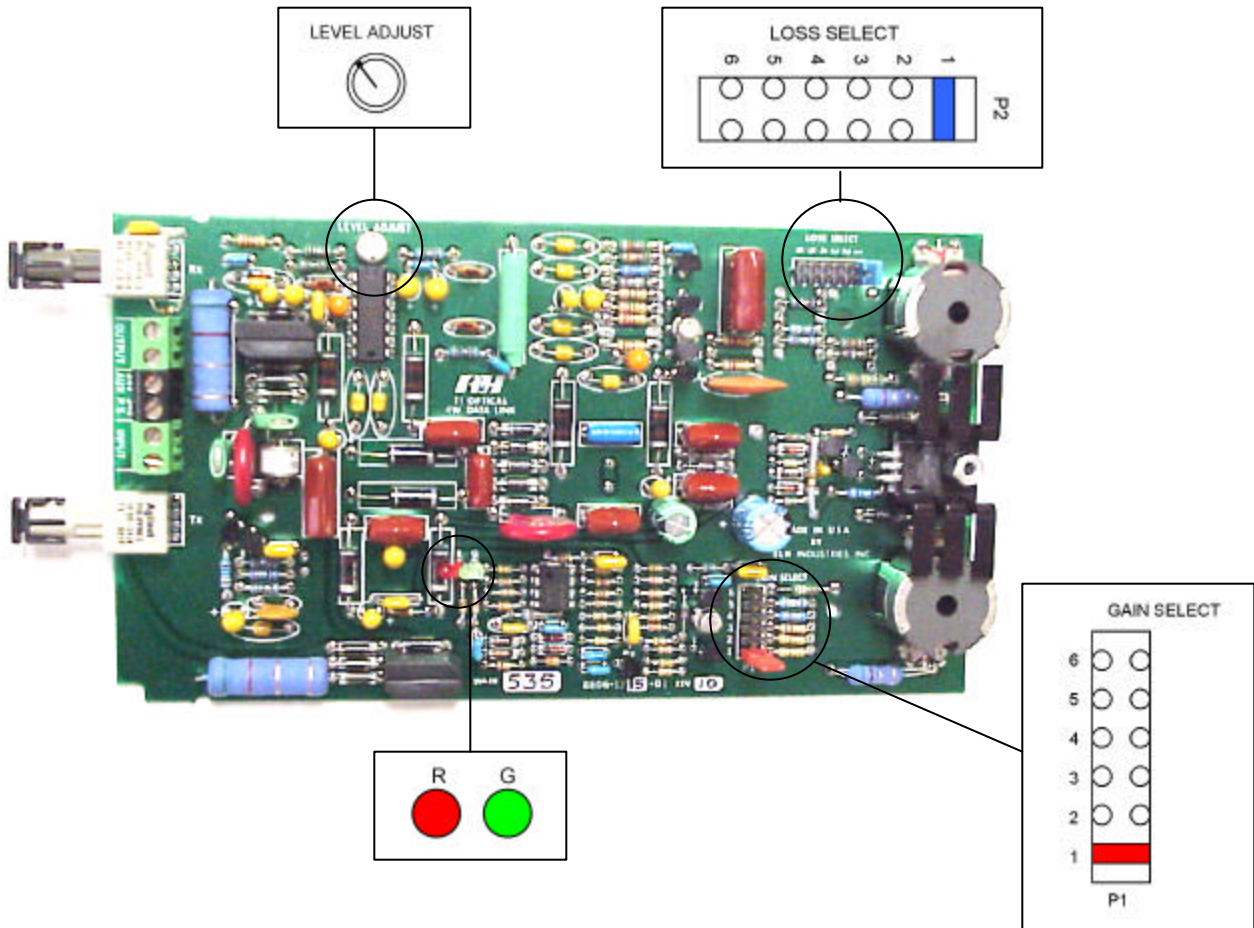
Connect T1 Send and Receive pairs. The T-1 pairs from the Telco connect to the green screw-down terminals provided on the T-1 CO Card. The Telco Receive connects to the OUTPUT terminal (signal comes out of card). The Telco Send connects to the INPUT terminal (signal goes into card).

The T-1 pairs from the Subscriber Equipment connect to the green screw-down terminals provided on the T1 Sub Card. The Subscriber Receive pair connects to the OUTPUT terminal (signal comes out of the card). The Subscriber Send pair connects to the INPUT terminal (signal goes into card).

Connect and verify power. Connect a 24-54V DC, 55-75mA power source to the black terminal on the T-1 Sub Card labeled AUX. P.S. This terminal is not polarity sensitive.

Verify T-1 Card operation for Short Haul and Multimode systems by removing the fiber optic cable connector from the T-1 card TX (Transmit) optical connector and verify that a RED light is visible at the TX connector. Single-mode systems use an invisible light.

Note: Fiber Optic Link T-1 CO Cards are designed to operate on standard T-1 lines that are current limited at 60mA. Open circuit voltage on T-1 lines can vary from 48V to 130V across send and receive pairs depending on the number of repeaters in the line. However, voltage across the Fiber Optic Link card when operating will be less than 24VDC (typically 22.5VDC when source voltage is current limited at 60mA).



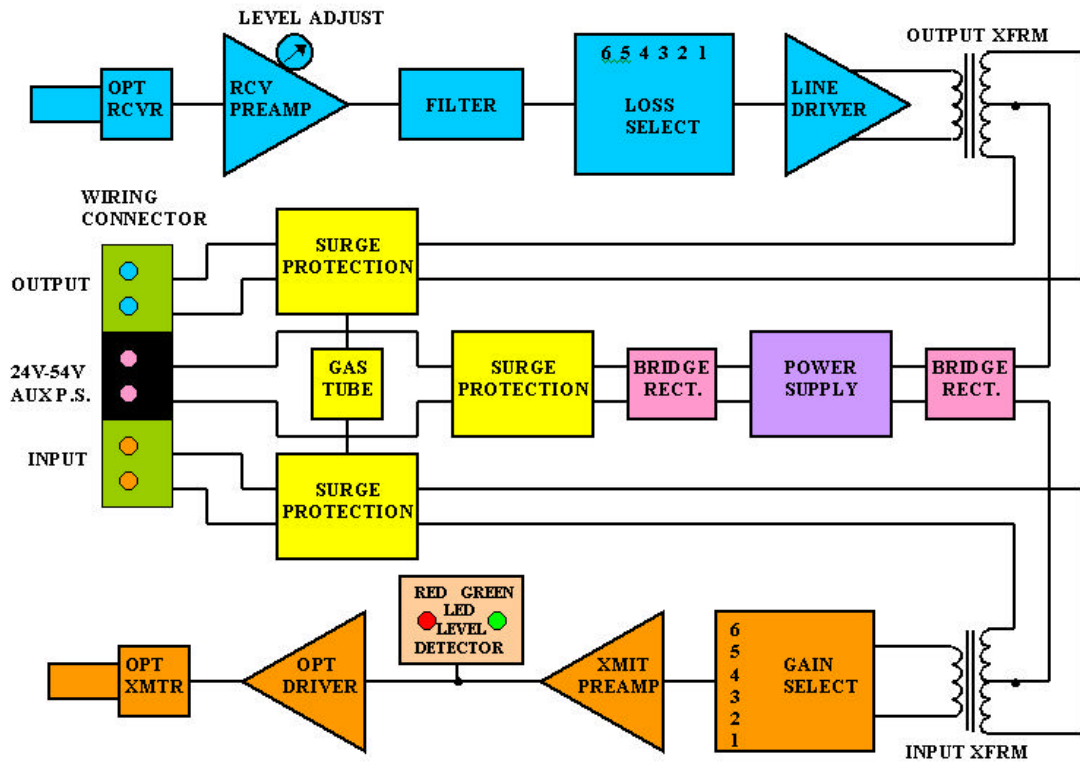
LED and adjustment settings location on PCB

Set T1 system Level. CO and Sub transmit level is set by the GAIN SELECT jumper on the T-1 CO Card by observing the Green and Red LED's to indicate the optimum setting (Figure 1). Gain is set on the CO Card in 6dB increments by jumping to the highest numbered position that will not light the Red LED, but will light the Green LED. Note: If a Red LED is lit, the Green LED will also be lit. The Red LED indicates signal overload. If the Green LED is not lit, jump to a higher number position until the Red LED is lit, then set the jumper to the next lower numbered position. After gain set on CO Card, position the LOSS SELECT jumper on the T1 Sub Card to the same position as the GAIN SELECT jumper on the CO CARD, i.e., if GAIN jumper on the CO Card is set to position 3, then LOSS jumper on the Sub Card must be set to position 3.

Level Adjust. The Level Adjust Pot amplifies the receiving optical on the PCB for canceling loss through the length of fiber optic cable connected between the CO and Sub Cards. If the signal level coming out of the Sub Card is lower than the signal going into the CO Card you can adjust the level by turning the Pot clock-wise until the signal level is equal end to end. Maximum of 5.8V P-P

Close covers. After gain adjustments, close covers on CO and Sub Units. System is now ready for operation.

T1 BLOCK DIAGRAM



Specifications

Transmission method:	Amplitude modulated light via two optical fibers Short Haul: 650nm Multimode: 820nm Single-mode: 1310nm
Maximum Fiber Length:	Short Haul: 5dB minimum: up to 66 feet Multimode: 5dB minimum: up to 2 miles (3.5 Km) Single-mode: 5dB minimum: up to 6 miles (10 Km)
Temperature Limits:	-40F to +160F (-40C to +70C) + maximum solar load
Humidity:	95% non-condensing
Insertion Loss:	0dB +/- 1 dB in each direction
Bandwidth:	10 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
Transmit Level:	Equal to input level (Output level limited at 6.5 V P-P)
Surge Protection:	CO/ Sub Cards: PTC thermistors, gas tube, rectifier bridges, resistor and varistors
Power Requirements:	CO/ Sub Cards: 24-54 VDC, 55-70mA
Powering Method:	CO Card: Line power simplex on Send and Receive pairs, or an isolated DC power source Sub Card: External DC power source, or simplex power from Subscriber Equipment.

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