

DIGITAL FIBER-OPTIC TRANSMISSION SYSTEM  
FOX-2 T-HUB  
SPECIFICATIONS

1. GENERAL

- 1.01 This section is a cover sheet for the Telco Systems Fiber Optics Corporation Digital Fiber-Optic Transmission System FOX-2 T-HUB Specifications. This section is reproduced with permission of Telco Systems Fiber Optics Corporation and is the equivalent of Telco practice 832-100-004, Issue 1.
- 1.02 Whenever this section is reissued the reason(s) for reissue will be listed in this paragraph.
- 1.03 This section contains specifications for the FOX-2 T-HUB DS-2 Fiber-Optic Transmission System.
- 1.04 If corrections are required in the attached document, use Form-3973 as described in Section 000-010-015.
- 1.05 If equipment design and/or manufacturing problems should occur, refer to Section SW 010-522-906 for procedures on filing an Engineering complaint.

2. ORDERING PROCEDURE

- 2.01 For information concerning equipment and parts availability contact Telco Systems, Order Administration Department, In Norwood, Massachusetts, at:

1-800-44-SALES

1-617-551-0300

- 2.02 To order additional copies of this practice, use TELC 365-407-864SW as the section number.

3. REPAIR/RETURN

- 3.01 For defective modules and assemblies contact the Repair and Return Department at the following number:

8:00 a.m. - 5:00 p.m. (617) 551-0300 - Ext. 2778

PROPRIETARY

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TELC-365-407-864SW

Attachment: Telco Systems Fiber Optics Corporation  
Digital Fiber-Optic Transmission System  
FOX-2 T-HUB  
Specifications

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 SPECIFICATIONS

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1. SCOPE

1.01 This section contains specifications for the FOX-2 T-HUB DS-2 Fiber-Optic Transmission System (see Figure 4-1). Included are the unit-level and the card and module operational specifications.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

2. UNIT SPECIFICATIONS

2.01 TABLE A contains the FOX-2 T-HUB specifications, including interface and power requirements, physical characteristics, and environmental operating conditions.

3. CARD AND MODULE SPECIFICATIONS

3.01 This subsection contains the specifications for the cards and modules of the FOX-2 T-HUB DS-2 Fiber-Optic Transmission System. Included are specifications on the following:

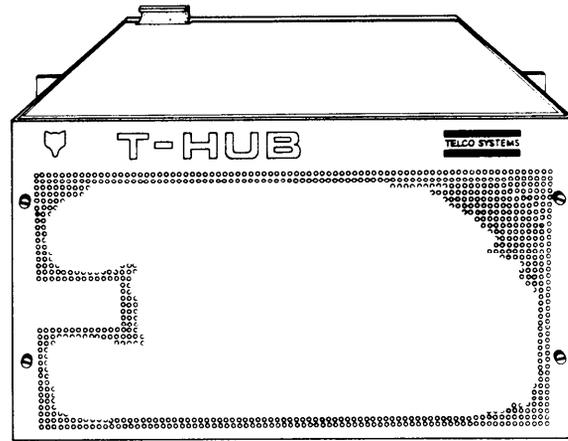


Figure 4-1. FOX-2 T-HUB Unit

LS INTER T1 (T1 Low-Speed Interface) card (TABLE B)

LS INTER T1C (T1C Low-Speed Interface) card (TABLE C)

HS COM (High-Speed Common) card (TABLE D)

WLEL (Wire Line Entrance Link) card (TABLE E)

PS (Power Supply) Module I/O (Input/Output) voltages (TABLE F)

DS-2 Optical Interface Single-Mode/Multimode LTU Cards (TABLE G)

RAC-II (Remote Alarm Card II) (TABLE H)

TABLE A. FOX-2 T-HUB DS-2 Fiber-Optic Transmission System Specifications

<b>DS-1 INTERFACE</b>	
Line Rate:	1.544 Mb/s $\pm$ 130 ppm
Line Code:	Half-width Bipolar (AMI* or B8ZS**)
Line Impedance:	100 ohms, nominal balanced
Pulse Amplitude:	$\pm$ 3.0 V $\pm$ 0.6 V at cross-connect
Jitter Generation:	Less than 0.3 time-slots rms
Cable:	ABAM, or equivalent
Maximum Span:	655 feet to cross-connect facility
<b>DS-1C INTERFACE</b>	
Line Rate:	3.152 Mb/s $\pm$ 30 ppm
Line Code:	Half-width Bipolar (AMI)*
Line Impedance:	100 ohms, nominal balanced
Pulse Amplitude:	$\pm$ 3.0 V nominal at cross-connect
Jitter Generation:	Less than 0.3 time-slots rms
Cable:	ABAM, or equivalent
Maximum Span:	655 feet to cross-connect facility
<b>DS-2 SINGLE-MODE OPTICAL INTERFACE</b>	
Number of fibers:	Two single-mode fibers per LTU card (TX/RX)
Line Rate:	12.624 Mb/s $\pm$ 33 ppm (2 x 6.312 Mb/s)
Line Code:	3B6B (vendor proprietary)
Wavelength:	1250 nm to 1320 nm center wavelength
Spectral Width:	80 nm line width
Transmit Device:	LED with single-mode fiber
Receive Device:	PIN detector
Transmitter Output Power:	Greater than or equal to -31.5 dBm
Receiver Sensitivity:	Better than -43.0 dBm at $10^{-9}$ BER
Available Power:	System Gain 11.5 dB minimum
Required Design Margin:	Equipment operating margin is 5.5 dB, which includes time and temperature variations
Optical Connector:	FC-type optical connectors (TX and RX)
Fiber:	8/125 micrometer single-mode

\* AMI (Alternate Mark Inversion)

\*\* B8ZS (Bipolar with Eight-Zero Substitution)

TABLE A. FOX-2 T-HUB DS-2 Fiber-Optic Transmission System Specifications (Cont.)

<b>DS-2 MULTIMODE OPTICAL INTERFACE</b>	
Number of fibers:	Two multimode fibers per LTU card (TX/RX)
Line Rate:	12.624 Mb/s $\pm$ 33 ppm (2 x 6.312 Mb/s)
Line Code:	3B6B (vendor proprietary)
Wavelength:	1250 nm to 1320 nm center wavelength
Spectral Width:	Not available
Transmit Device:	Edge Emitting LED with multimode fiber
Receive Device:	PIN detector
Transmitter Output Power:	Greater than or equal to -20.0 dBm
Receiver Sensitivity:	-42.0 dBm at $10^{-9}$ BER
Available Power:	System Gain 22.0 dB minimum
Required Design Margin:	Equipment operating margin is 6.0 dB, which includes time and temperature variations
Optical Connector:	FC-type optical connectors (TX and RX)
Fiber:	50/125 micrometer single-mode
<b>PRIMARY POWER</b>	
Voltage:	-21 Vdc to -28 Vdc; -42 Vdc to -56 Vdc
Power Consumption:	80 W
Thermal Dissipation:	257 BTU/hr
<b>PHYSICAL</b>	
Height:	12.2 inches (7 standard rack-mount spaces)
Width:	23.0 inches
Depth:	11.5 inches
Weight:	44.0 lb (fully loaded)
DS-1, DS-1C Interface:	Wire-wrap terminals

**ENVIRONMENTAL CONDITIONS (OPERATING)**

Condition	Min. to Max. Temperature ( $^{\circ}$ F)	Min. to Max. Temperature ( $^{\circ}$ C)	Relative Humidity % Non-Condensing
Operational:	+32 to +104	0 to +40	Up to 80%
Short Term:	+32 to +122	0 to +50	
Storage:	-40 to +140	-40 to +60	10 to 95%

Note: Ambient temperature refers to conditions 5 feet above the bottom of, and 15 inches in front of the FOX-2 T-HUB unit.

TABLE B. LS INTER T1 Card Specifications

Line Rate:	1.544 Mb/s $\pm$ 130 ppm
Line Code:	Half-width bipolar AMI or B8ZS
Impedance:	100 ohms nominal, balanced
Amplitude:	3.0 V $\pm$ 0.6 V
Cable Type:	ABAM, or equivalent
Cable Span:	0 to 655 feet to DSX-1 cross-connect facility

TABLE C. T1C LS INTER Card Specifications

Line Rate:	3.152 Mb/s $\pm$ 30 ppm
Line Code:	Half-width bipolar (AMI)
Impedance:	100 ohms nominal, balanced
Amplitude:	3.0 V nominal (zero-to-peak)
Cable Type:	ABAM, or equivalent
Cable Span:	0 to 655 feet to DSX-1C cross-connect facility

TABLE D. HS COM Card Specifications\*

Line Rate:	44.736 Mb/s $\pm$ 20 ppm
Line Code:	NRZ (Non-Return to Zero)
Format:	Bell System DS-3 Mastergroup structure

TABLE E. WLEL Card Specifications\*

Line Rate:	44.736 Mb/s $\pm$ 20 ppm
Line Code:	B3ZS (Bipolar with Three-Zero Substitution)
Impedance:	75 ohms nominal, unbalanced
Amplitude:	1.58 Vdc, nominal
Cable Type:	728B, or RG-6/U coax
Cable Span:	Up to 450 feet to DSX-3 cross-connect facility

\* Note: HS COM and WLEL circuit card specifications are relevant only when the FOX-2 T-HUB unit is converted into two 828A multiplexer units.

TABLE F. Power Supply Specifications

Input Voltage:	-42 to -56 Vdc (PSX016-1)
Input Voltage:	-21 to -28 Vdc (PSX016-2)
Output Voltages: (Full Load)	-5.6 Vdc $\pm$ 0.025 Vdc +5.4 Vdc $\pm$ 0.025 Vdc +15.3 Vdc $\pm$ 0.050 Vdc

TABLE G. DS-2 Optical Interface

Single-Mode LTU Card Specifications

Number of lines:	Two fibers per LTU card (TX/RX)
Line Rate:	12.624 Mb/s (2 x 6.312 Mb/s) $\pm$ 33 ppm
Line Code:	3B6B (vendor proprietary)
Wavelength:	1250 nm to 1320 nm center frequency
Spectral Width:	80 nm line width
Transmit Device:	LED with single-mode fiber
Receiver Device:	PIN detector
Transmitter Output:	Equal or greater than -31.5 dBm
Receiver Sensitivity:	-43 dBm at $10^{-9}$ BER
Available Power:	System Gain 11.5 dBm
Required Margin:	Equipment operating margin is 5.5 dB, includes time and temperature variations
Optical Connector:	FC-type optical connector

Multimode LTU Card Specifications

Number of lines:	Two fibers per LTU card (TX/RX)
Line Rate:	12.624 Mb/s (2 x 6.312 Mb/s) $\pm$ 33 ppm
Line Code:	3B6B (vendor proprietary)
Wavelength:	1250 nm to 1320 nm center frequency
Spectral Width:	Not Available
Transmit Device:	Edge Emitting LED with multimode fiber
Receiver Device:	PIN detector
Transmitter Output:	Equal or greater than -20.0 dBm
Receiver Sensitivity:	-42.0 dBm at $10^{-9}$ BER
Available Power:	System Gain 22.0 dBm minimum
Required Margin:	Equipment operating margin is 6.0 dB, includes time and temperature variations
Optical Connector:	FC-type optical connector

TABLE H. Optional RAC-II Card Specifications

Alarm Input Capacity:	Eight Opto-Coupled Alarm Points
Alarm Active Range:	
Absence of Input Voltage Sense:	0 Vdc $\pm$ 500 mV
Presence of Input Voltage Sense:	5 to 53.75 Vdc
Input Impedance:	2.7 kohms (design per PUB 49001)
Relay Contact Closure Outputs:	Eight
Relay Contact Closure Rating:	500 mA
Contact Closure Fusing:	1 A

Note: Contact closures may be configured to be normally energized or normally de-energized.