DIGITAL TRANSMISSION SYSTEM
828A DIGITAL MULTIPLEXER
SPECIFICATIONS

1. GENERAL

1.01 This section is a cover sheet for the Telco Systems Fiber Optics Corporation Digital Transmission System 828A Digital Multiplexer Specifications. This section is reproduced with permission of Telco Systems Fiber Optics Corporation and is the equivalent of Telco practice 828-102-004, Issue 3.

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 828A Digital Multiplexer and the card and module specifications.

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 365-407-844SW as the section number.

Attachment: Telco Systems Fiber Optics Corporation
Digital Transmission System
828A Digital Multiplexer
Specifications

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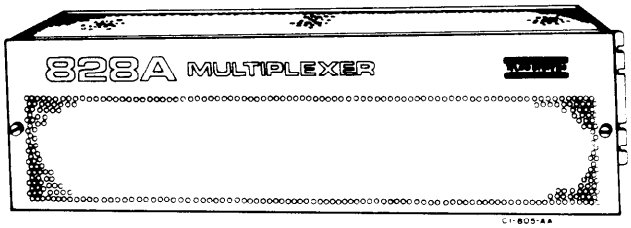

Figure 4-1. 828A Digital Multiplexer

1. SCOPE

1.01 This section contains specifications for the 828A Digital Multiplexer (see Figure 4-1), and the card and module specifications.

1.02 This section was reissued to include the specifications of the LTU Cards and RAC-II card.

2. MULTIPLEXER SPECIFICATIONS

2.01 TABLE A contains the 828A 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 828A Multiplexer. Included are specifications on the following:

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

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

LS INTER T2 (MAIN and STBY) (T2 Low-Speed Interface) card (TABLE D)

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

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

PS (Power Supply) Module Input/Output Voltages (TABLE G)

DS-2 Optical Interface Single-Mode and Multimode LTU Cards, optional (TABLE H)

RAC-II (Remote Alarm Card II) card, optional (TABLE I)

TABLE A. 828A Digital Multiplexer System Specifications

DS-1 INTERFACE	
Line Rate:	1.544 Mb/s ± 130 ppm
Line Code:	Half-width Bipolar (AMI)* or (B8ZS)**
Line Impedance:	100 ohms, nominal balanced
Pulse Amplitude:	± 3.0 V ± 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
DS-1C INTERFACE	
Line Rate:	3.152 Mb/s ± 30 ppm
Line Code:	Half-width Bipolar (AMI)*
Line Impedance:	100 ohms, nominal balanced
Pulse Amplitude:	± 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
DS-2 INTERFACE	
Line Rate:	6.312 Mb/s ± 33 ppm
Line Code:	B6ZS (Bipolar with 6-Zero Substitution)
Line Impedance:	110 ohms, nominal balanced
Pulse Amplitude:	± 0.7 V ± 0.2 V at cross-connect
Jitter Generation:	Less than 0.3 time-slots rms
Cable:	ABAM or equivalent
Maximum Span:	1000 feet to DSX-2 cross-connect facility; line build-out networks supplied for shorter spans
DS-3 INTERFACE	
Line Rate:	44.736 Mb/s ± 20 ppm (optical)
Line Code:	B3ZS (Bipolar with 3-Zero Zubstitution)
Line Impedance:	75 ohms unbalanced
Pulse Amplitude:	± 1.58 V, ± 10% at cross-connect
Jitter Generation:	Less than 0.3 time-slots rms
Cable:	728A, RG-6/U
Maximum Span:	450 feet to DSX-3 cross-connect facility; line build-out networks supplied with WLEL drivers for shorter spans

* AMI (Alternate Mark Inversion)
** B8ZS (Bipolar with 8-Zero Substitution)

TABLE A. 828A Digital Multiplexer System Specifications (Cont.)

MULTIPLEXER MAIN FRAME	
Channel Capacity:	Up to 28 lines of 1.544 Mb/s data
Multiplexed Data Rate:	44.736 Mb/s ± 20 ppm
Transmit Multiplex Timing:	Internally or externally supplied
Line Impedance:	75 ohms ± 5%, unbalanced
Reframe Time - Automatic:	T1C 17 ms T2 7 ms T3 2 ms
Signal Interface:	B3ZS
Operating Mode:	Full Duplex
PRIMARY POWER	
Voltage:	-21 Vdc to -28 Vdc; -42 Vdc to -56 Vdc
Power Consumption:	40 Watts
PHYSICAL	
Height:	6.0 inches
Width:	23.0 inches
Depth:	11.5 inches
Weight:	22.0 lb. (fully loaded)
DS-1, DS-1C, DS-2 Connectors:	Wire-wrap

ENVIRONMENTAL CONDITIONS (OPERATING)

Condition	Min. to Max. Temperature (°F)	Min. to Max. Temperature (°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	Up to 95%

Note: Ambient temperature refers to conditions 5 feet above the bottom of, and 15 inches in front of the 828A.

TABLE B. LS INTER T1 Card Specifications

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

TABLE C. LS INTER T1C Card Specifications

Line Rate:	3.152 Mb/s ± 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

* AMI (Alternate Mark Inversion)
** B8ZS (Bipolar with 8-Zero Substitution)

TABLE D. LS INTER T2 Card Specifications

Line Rate:	6.312 Mb/s ± 33 ppm
Line Code:	B6ZS (Bipolar with 6-Zero Substitution)
Impedance:	110 ohms nominal, balanced
Amplitude:	± 4.2 V ± 10%
Cable Type:	ABAM or equivalent
Cable Span:	1000 feet to DSX-2 cross-connect facility with line buildouts for shorter cable spans

TABLE E. HS COM Card Specifications

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

TABLE F. WLEL Card Specifications

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

TABLE G. Power Supply Module Specifications

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

TABLE H. 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) ± 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) ± 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 I. Remote Alarm Card (RAC II) Specifications

Alarm Input Capacity:	Eight Opto-Coupled Alarm Points
Alarm Active Range	
Lack of a Voltage Input:	0 Vdc ± 500 mV
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 normal energized or de-energized.