

FIBER OPTIC DS-2 EXTENSION (FOX-2) UNIT
SPECIFICATIONS

1. GENERAL

- 1.01 This section is a cover sheet for the Telco Systems Fiber Optics Corporation Fiber Optic DS-2 Extension (FOX-2) Unit Specifications. This section is reproduced with permission of Telco Systems Fiber Optics Corporation and is the equivalent of Telco practice 829-100-004, Issue 2.
- 1.02 Whenever this section is reissued the reason(s) for reissue will be listed in this paragraph.
- 1.03 This section presents the specifications data for the Fiber Optic DS-2 Extension (FOX-2) Unit.
- 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 Department, in Norwood, Massachusetts, at:
- 1-800-44-SALES
1-617-551-0300
- 2.02 To order additional copies of this practice, use TELC 365-407-848SW as the section number.

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TELC 365-407-848SW

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

Attachment: Telco Systems Fiber Optics Corporation

Fiber Optic DS-2 Extension (FOX-2) Unit
Specifications

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TELCO SYSTEMS FIBER OPTICS CORPORATION SECTION 829-100-004
Norwood, Massachusetts 02062 Issue 2, November 1987

FIBER OPTIC DS-2 EXTENSION (FOX-2)
SPECIFICATIONS

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1. SCOPE
1.01 This section presents the specifications data for the Fiber Optic DS-2 Extension (FOX-2). In addition this section provides individual card specifications.
1.02 This section was reissued to add new information.
2. FOX-2 SPECIFICATIONS
A. System Specifications
2.01 The Fiber Optic DS-2 Extension(FOX-2) with a system gain of -14dBm provides an extension for the DS-2 low-speed interface of 828 multiplexer units, using light transmission on a fiber optic path. The FOX-2 then interfaces the DS-2 signal to T1 or T1C interface. TABLE A lists the System Specifications of the FOX-2.
B. Mechanical Specifications
2.02 TABLE B Contains the dimensional and other mechanical specifications.
C. Environmental Specifications

2.03 Environmental Specifications are listed in TABLE C.

D. Power Specifications are listed in TABLE D.

2.04 Power Specifications are listed in TABLE D.

3. INDIVIDUAL CARD SPECIFICATION

3.01 The list below shows the tables containing the specifications for the circuit cards listed.

TABLE	CARD
E. -----	Power Supply
F. -----	Backplane
G. -----	Control MPU
H. -----	MAIN/STBY LTU
I. -----	T1 Interface
J. -----	T1C Interface
K. -----	MIC

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TABLE A. System Specifications

SPECIFICATION	PARAMETERS
---------------	------------

Optical DS-2

- Singlemode LED transmitter has output power with a worse case of -31.5 dBm.
- 1300 nm PIN diode receiver with worse case of -43.5 dBm sensitivity before connector.
- Operating wavelength 1260 to 1340nm.
- System Gain worse case is 12 dB.
- 6.0 dB should be allocated to time and temperature variations. Other losses such as connectors, splices, and cable loss margin, should be deducted to determine maximum cable length.
- A Light Terminating Unit (LTU) card interfaces transmit and receive fibers at the FOX-2 and the 828 Multiplexer.
- LTUs have FC optical connectors.

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TABLE A. System Specifications (Cont.)

SPECIFICATION	PARAMETERS																		
DS-2 Interface	<ul style="list-style-type: none"> - 6.3 Mb/s, DS-2 signal is used to modulate the 1300 nm light path at 12.6MHz in 3B6B line code. - The resulting DS-2 optical path is not intended to be compatible with DS-2 optical paths of other manufacturers. 																		
DS-1 Interface	<table> <tr> <td>Number of Lines</td><td>Up to 4 per shelf</td></tr> <tr> <td>Line Rate</td><td>1.544 Mb/s</td></tr> <tr> <td></td><td>130 ppm</td></tr> <tr> <td>Line Code</td><td>Half-width Bipolar (AMI)</td></tr> <tr> <td>Line Impedance</td><td>100 ohms, nominal balanced</td></tr> <tr> <td>Pulse Amplitude</td><td><3.0V - 0.6V</td></tr> <tr> <td>Jitter Generation</td><td>0.3 UI rms</td></tr> <tr> <td>Cable</td><td>ABAM or equivalent</td></tr> <tr> <td>Span</td><td>655 ft. to cross-connect</td></tr> </table>	Number of Lines	Up to 4 per shelf	Line Rate	1.544 Mb/s		130 ppm	Line Code	Half-width Bipolar (AMI)	Line Impedance	100 ohms, nominal balanced	Pulse Amplitude	<3.0V - 0.6V	Jitter Generation	0.3 UI rms	Cable	ABAM or equivalent	Span	655 ft. to cross-connect
Number of Lines	Up to 4 per shelf																		
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Pulse Amplitude	<3.0V - 0.6V																		
Jitter Generation	0.3 UI rms																		
Cable	ABAM or equivalent																		
Span	655 ft. to cross-connect																		
DS-1C Interface	<table> <tr> <td>Number of Lines</td><td>Up to 2 per shelf</td></tr> <tr> <td>Line Rate</td><td>3.152 Mb/s 30 ppm</td></tr> <tr> <td>Line Code</td><td>Half-width Bipolar (AMI)</td></tr> <tr> <td>Line Impedance</td><td>100 ohms, nominal balanced</td></tr> <tr> <td>Pulse Amplitude</td><td>3.0V nominal</td></tr> <tr> <td>Cable</td><td>ABAM or equivalent</td></tr> <tr> <td>Span</td><td>655 ft. to cross-connect</td></tr> </table>	Number of Lines	Up to 2 per shelf	Line Rate	3.152 Mb/s 30 ppm	Line Code	Half-width Bipolar (AMI)	Line Impedance	100 ohms, nominal balanced	Pulse Amplitude	3.0V nominal	Cable	ABAM or equivalent	Span	655 ft. to cross-connect				
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Line Impedance	100 ohms, nominal balanced																		
Pulse Amplitude	3.0V nominal																		
Cable	ABAM or equivalent																		
Span	655 ft. to cross-connect																		
Local Alarms	<ul style="list-style-type: none"> - Major, Minor, and BAY alarms can be interfaced to local office alarms from the 9 pin D type connector on the FOX-2 Connector Panel. 																		

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TABLE B. Mechanical Specifications

SPECIFICATION	PARAMETERS
Case	<ul style="list-style-type: none"> - The case is designed to be wall mounted in two sections, the wall mount plate and the equipment case. - The equipment case is made from mild steel, and hangs on fixing lugs of the wall mounting plate, and is secured to the wall mount plate with bolts. - The case has two doors. The left door houses the access to the connector panel and power input. The main door houses the circuit card cage. This main door has two keyed locks. - The circuit card cage has three shelves. The top one houses the Power Supply card and MPU card. The middle shelf is the LTU card shelf and the bottom is for the LS Interface T1 or TIC card. - A grounded full size green banana Jack connector is located at lower right front of cage, for grounded wrist strap connection. - The cage is equipped with relocatable plastic protectors for the fiber optic pigtails. The entrance of fiber optic pigtails may be at the top right or the bottom right of the case. A plastic sleeve protects the fiber entrance.
Case Dimensions	<ul style="list-style-type: none"> - Depth is 161 mm or approximated 6 1/4" - Height is 600 mm or approximately 23 1/2" - Width is 402 mm or approximately 15 3/4" - Weight is approximately 35 lb
Indicators	<ul style="list-style-type: none"> - Green Power On LED indicator on front of main door of FOX-2. - Red Unit Fault LED indicator on front of main door of FOX-2

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TABLE C. Environmental Specifications

SPECIFICATION	PARAMETERS
Operating Temperature Range	+0 degrees C. to +50 degrees C. (+32 degrees F to +122 degrees F.)
Ambient Humidity	<ul style="list-style-type: none"> - 20% to 55% Non-condensing Relative Humidity - Short Term: 20% to 80% Non-condensing Relative Humidity
Storage Temperature and Humidity	<ul style="list-style-type: none"> - Temperature: -40 degrees C. to 60 degrees C. (-40 degrees F. to +140 degrees F.) - Relative Humidity: 10% through 95%
Altitude	<ul style="list-style-type: none"> - The FOX-2 will operate from 200 ft. below sea level to 10,000 ft above sea level.

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TABLE C. Environmental Specifications (Cont.)

SPECIFICATION	PARAMETERS								
Electromagnetic Compatibility:	<ul style="list-style-type: none"> - The electromagnetic requirements of Bell TR. EOP 000063 and FCC part 15, sub part J, are met. 								
Frequency (MHz)	<table> <tr> <th>Measurement Distance in meters</th><th>Field Strength (uV/meter)</th></tr> <tr> <td>30 - 88</td><td>30</td></tr> <tr> <td>88 - 216</td><td>50</td></tr> <tr> <td>216 - 1000</td><td>70</td></tr> </table>	Measurement Distance in meters	Field Strength (uV/meter)	30 - 88	30	88 - 216	50	216 - 1000	70
Measurement Distance in meters	Field Strength (uV/meter)								
30 - 88	30								
88 - 216	50								
216 - 1000	70								

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TABLE D. Power Specifications

SPECIFICATION	PARAMETERS
Primary Power	- 22 watts max. at 117 Vac., at 60 Hz input to the Power Supply card.
Secondary Power	- +15.0 Vdc - +5.0 Vdc - -5.2 Vdc
Voltage Range	The unloaded voltage variations is within .02 Vdc. The loaded variation is within 4%.
Incorrect Voltage Alarm	Produced an out of voltage specification alarm for any secondary voltage that is between 5% and 10% over or under voltage.

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TABLE E. Individual Card Specifications
CCA150G1 Power Supply Card

SPECIFICATION	PARAMETERS
AC Input Connector	- Located at top of connector panel area a fused connector accepts the ac input cable. A separate cable passes 117 Vac from Connector Panel Connector to PS card. - AC Power does not connect to the backplane of the unit.
Voltages	
Primary	- Accepts only 117 Vac input.
Secondary	- Conditions to +5 Vdc, +15 Vdc, and

- Outputs
 - 5.2 Vdc.
 - -5.2 Vdc +5%
 - +5 Vdc +3%
 - +15 Vdc +5%
- Power Supply Circuit
 - Circuit is a switching type power conditioner constructed from discrete components on the Power Supply card.
- Fault Detector
 - Has an over or under voltage detector that activates for a 5% or 10% deviation in secondary voltages.
- MPU Communication
 - MPU card can communicate status and alarms with the Power Supply card.

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TABLE E. Individual Card Specifications
CCA150G1 Power Supply Card (Cont.)

SPECIFICATION	PARAMETERS
LED Indicators on card face	<ul style="list-style-type: none"> - Green Run Indicator - Red Fault Indicator
Test Jacks	<ul style="list-style-type: none"> - Common (zero Reference - -5.2 Vdc - +5 Vdc - +15 Vdc
Fault Test Jack	<p>O/P FAIL</p> <ul style="list-style-type: none"> - When shorted simulates any secondary voltage out of specification condition to alarm circuit.
Local Command Selector Switch	<ul style="list-style-type: none"> - 0-9 rotary selector can select

local command

- Activation is made with Loopback Command Enable toggle switch. Switch up in normal operating position, switch down activates the command.
- Two Commands :
 - 1 = Loopback DS-2 signal on LS Interface card at backplane interface. Optical recovered signal is looped back to the LTU transmitter on each LTU card.
 - 8 = Clears loopback
- Software controlled by the MPU card, after reading the status of the loopback selector and the enable switch.

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TABLE E. Individual Card Specifications
CCA150G1 Power Supply Card (CONT.)

SPECIFICATION	PARAMETERS
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Future Inputs

- Eight opto-isolated inputs are located on the Power Supply card. These are connected to a 15 pin D type connector located on the FOX-2 Connector Panel connector for future use.

FOX-2 Cover
Unit Fault
Power On
LEDs

- Cover LEDs are driven by drivers on the Power Supply card.

LED Control

All LEDs are controlled by software on the MPU card.

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TABLE F. Individual Card Specifications
CCA --- GI Backplane and Connector Panel

SPECIFICATION	PARAMETERS
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Connectors

- CHAN 1 T1 or T1C 15 pin interface
- CHAN 2 T1 or T1C 15 pin interface
- CHAN 3 T1 15 pin interface
- CHAN 4 T1 15 pin interface
- Future inputs 15 pin interface
- MAJOR, MINOR, and BAY local equipment alarm (9 pin) interface
- Fused ac connector to accept the three wire 117 Vac input cable. (This connector is not on the backplane but is on the connector panel).

There are six card slot connectors on the backplane, in three shelves.

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TABLE G. Individual Card Specifications
CCA002G5 Microprocessor Card

SPECIFICATION	PARAMETERS
---------------	------------

LED Indicators on face of card

- 7 Red LEDs from Top to Bottom.

- MANUAL
- MULT T1 IN
- MAJOR
- MINOR
- AC01
- TMS
- FAULT

Switches on Face of card

- S1 RESET Button
- S2 MAIN AUTO STBY path selector
- S5 ACO Switch

Local Alarm Output

- Relay isolated contacts
- MAJOR traffic affecting alarm
- MINOR none traffic affecting alarm
- Interface through a 9 pin D type backplane connector on the connector panel

Configuration DIP Switches

- S3 and S4 are microprocessor configuration switches and are not accessible without removing the MPU

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TABLE H. Individual Card Specifications
CCA148GI MAIN Line Terminal Unit LTU Card
CCA149GI STBY Line Terminal Unit LTU Card

SPECIFICATION PARAMETERS

Transmitter - 1300 nm single-mode LED w/singlemode pigtail.
 - 80 nm line width.
 - Interface with NTT-FC style connector.
 - -31.5 dBm worse case optical power output.
 - Line Rate 2 x 6.312 Mb/s
 - Line Code 3B6B

Receiver - PIN optical diode
 - -43.5 dBm worse case minimum sensitivity

Available Power
 - System gain 12.0 dBm worse case minimum.
 - Equipment operating margin is 6.0 dB for time and temperature variations.

LED Indicators - Yellow EXTENDED REMOTE FAIL
 - Green ON LINE
 - Yellow FO RX INPUT FAIL
 - Red FAULT
 - Yellow REMOTE FAIL

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TABLE H. Individual Card Specifications (Cont.)

CCA148G1 MAIN Line Terminal Unit LTU Card
CCA149G1 STBY Line Terminal Unit LTU Card

SPECIFICATION	PARAMETERS
LED Control	- Software on MPU card controls LED illumination, with the following exception; the EXTENDED REMOTE FAIL lamp can be jumper selected for hardware control by the spare overhead bit.
Fault Test Jacks	<ul style="list-style-type: none"> - LOSS OF LOCK - FO TX I/P FAIL - FO TX O/P FAIL - FO RX FAULT - FO I/P FAULT <p>- When shorted, produces signals that can be monitored by the MPU card. This simulates hardware failures for testing purposes.</p>
Configuration Jumpers	<ul style="list-style-type: none"> - LK1/LK2 - LK3/LK4 - LK5/LK6/LK7 - LK8/LK9 - LK10/LK11 - LK12/LK13

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TABLE I. Individual Card Specifications
CCA050G1 T1 Interface Card
CCA124G1 T1 Interface Card

SPECIFICATION	PARAMETERS
LS T1 Interface	<ul style="list-style-type: none"> -1.544 Mb/s data rate. -100 ohm resistive balanced input/output impedance. Will drive up to 655 feet of cable.
Backplane Signals	
LS Interface	<ul style="list-style-type: none"> - Bipolar T1 to backplane and connector. - Electrical connector 15 pin D-type and wire wrap. - Four bipolar T1 signals interfaced via 15 pin D type connectors CHAN 1 through CHAN 4, located on the FOX-2 Connector panel.

- LED Indicators - Yellow REMOTE
 - Yellow INPUT
 - Red FAULT
- LED Control - Under MPU card software control
- Fault Test - RX FAULT MAIN
 - RX FAULT STBY
 - TX FAULT MAIN
 - TX FAULT STBY
- Jacks
- Simulate hardware faults on signals being reported to the MPU. This simulation is for test purposes.

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TABLE J. Individual Card Specifications
CCA006G1 TIC Interface Card

SPECIFICATION	PARAMETERS
LS TIC Interface	<ul style="list-style-type: none"> - 3.152 Mb/s data rate. - 100 ohm resistive balanced input/output impedance. - Will drive up to 655-feet of cable.
Backplane Signals	
LS Interface	<ul style="list-style-type: none"> - Bipolar TIC to backplane and connector. - Electrical connector 15 pin D-type and wire wrap. - Two bipolar TIC signals interfaced via CHAN 1 and CHAN 2 connectors on the FOX-2 Connector Panel.
HS Interface	<ul style="list-style-type: none"> - NRZ DS-2 signal to and from LTU card. - DS-2 clock from LTU card.
LED Indicators	<ul style="list-style-type: none"> - Yellow REMOTE - Yellow INPUT - Red FAULT
LED Control	<ul style="list-style-type: none"> - Under MPU card software control
Fault Test	<ul style="list-style-type: none"> - RX FAULT MAIN - RX FAULT STBY - TX FAULT MAIN - TX FAULT STBY
Jacks	<ul style="list-style-type: none"> - Simulate hardware faults on signals being reported to the MPU. This simulation is for test purposes.

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TABLE K. Individual Card Specifications
CCA058GlE Maintenance Interface Card (MIC)

SPECIFICATION	PARAMETERS
CCA058GlE Function	<ul style="list-style-type: none"> - To control FOX-2 during T1 or TIC Interface card replacement, or MPU card replacement. Test T1 or TIC cards in FOX-2 without traffic interruption.
LED Indicators	<ul style="list-style-type: none"> - Green ON LINE - Yellow TEST LED - Red FAULT LED
Switches	<ul style="list-style-type: none"> - Level Select Switch - Normal/Test Switch - MPU Replace Switch - Channel Select Switch
Test Jacks	<ul style="list-style-type: none"> - RX Out Jack - TX In Jack
1155M	