Installation Guide

Digi C/X and EPC/X Systems

C/X-FL Fiber Optic Link Option

90027200 Rev C

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Approvals and Notices

Federal Communications Commission (FCC) Statement

Radio Frequency Interference (RFI) (FCC 15.105)

This equipment has been tested and found to comply with the limits for Class A digital devices pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and the receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Labeling Requirements (FCC 15.19)

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by Digi may void the user's authority to operate this equipment.

Cables (FCC 15.27)

Shielded cables *must* be used to remain within the Class A limitations.

Industry Canada Compliance Statement

This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union EMC Directive

This product has been tested and found to comply with the following European Union standards:

- EN 55022 Class A
- EN 50082-1
- prEN 50082-2

Safety

This product complies with the following safety standards:

- UL 1950
- CSA 22.2 No. 950
- EN 60950

Introduction

The Digi C/X-FL option is a full duplex fiber optic data channel used to link Digi concentrators (such as the C/CON-8, C/CON-16 and EPC/CON-16) to Digi C/X or EPC/X host adapters or to other concentrators. The C/X-FL option is designed to replace the twisted-pair cable currently used for the high-speed synchronous data link to concentrators. When used in conjunction with Digi's EPC/X system, the C/X-FL option supports synchronous data rates of 1.2M bps or 10M bps over distances of up to 2,000 meters (1.2 miles) when using -4dB/M duplex 62.5µ/125µ graded index glass fiber cable. For shorter distances (up to 30 meters), less expensive plastic cable can be used.

The C/X-FL option converts the EIA-422 synchronous data (separate data and clock signals) from Digi C/X products to Manchester format (in which the data and clock signals are combined) for optical transmission. Another C/X-FL at the opposite end of the fiber-optic cable converts the Manchester-format data back to EIA-422 synchronous format.

The C/X-FL option requires a single +5 volt dc power source which can be supplied either by the C/X product via the EIA-422 cable, or by an optional external power supply which plugs into a standard AC circuit (see *Fault Tolerance*, on the following page).

Important! As shipped, the C/X-FL option is supported *only* by EPC/CON-16, C/CON-8, and later models of C/CON-16 concentrators (which have a plastic case). Older C/CON-16 concentrators (metal case) require special cables and EPROMs, which may be obtained from Digi Technical Support (see page 12). Also, C/X-FL boxes connected to older host adapters (shipped with metal concentrators) require external power supplies.

Important! The C/X-FL supports only two data rates: 1.2M bps and 10M bps, and is therefore not suited for use with synchronous modems which cannot be locked-in to one of these data rates.

Fault Tolerance

EPC/CON-16, C/CON-8 and newer C/CON-16 concentrators are equipped with special fault tolerance circuitry. If one of a string of concentrators fails or is turned off, signals are passed through the inactive concentrator via relays, so the other concentrators may continue to function normally.

In order to preserve the fault tolerant characteristics of the concentrators when used with the C/X-FL option, *external power supplies must be used with C/X-FL boxes connected to the concentrators* (otherwise when a concentrator is powered off, there will be no power for the fiber optic link either).

C/X-FL boxes connected to the host adapter do not require external power supplies, except when connected to very old host adapters, as noted on the previous page.

Installation

The C/X-FL option consists of two interface assemblies and two EIA-422 synchronous cables. The interface assemblies are identical, but the cables are different. One cable is designed to connect an interface box to the "Host Adapter" port on the concentrator, and the other connects an interface assembly either to one of the synchronous ports on the host adapter or to the "Remote" port on a concentrator.

Connecting a Concentrator to a Host Adapter

1. Follow the instructions in your C/X or EPC/X system *Installation Guide* to install your host adapter.

2. Connect one of the C/X-FL interface boxes to a host adapter synchronous line using the "Host Adapter" cable. This cable has a male DB-15 connector at one end and a male DB-9 connector at the other end. Plug the DB-15 end into the host adapter synchronous line connector and the DB-9 end into the C/X-FL interface box.

3. Connect the other C/X-FL interface box to a concentrator using the "Concentrator" cable. This cable has a female DB-15 connector at one end and a male DB-9 at the other end. Plug the DB-15 end into the "Host Adapter" port of the concentrator and the DB-9 end into the C/X-FL interface assembly.

4. Install a duplex optical fiber cable between the two C/X-FL interface boxes so that the "TX" jack of one interface box is connected to the "RX" jack of the other, and vice versa. The C/X-FL interface box is equipped with industry-standard "ST" type connectors.

Figure 1   C/X System Incorporating the C/X-FL Option (Domestic)
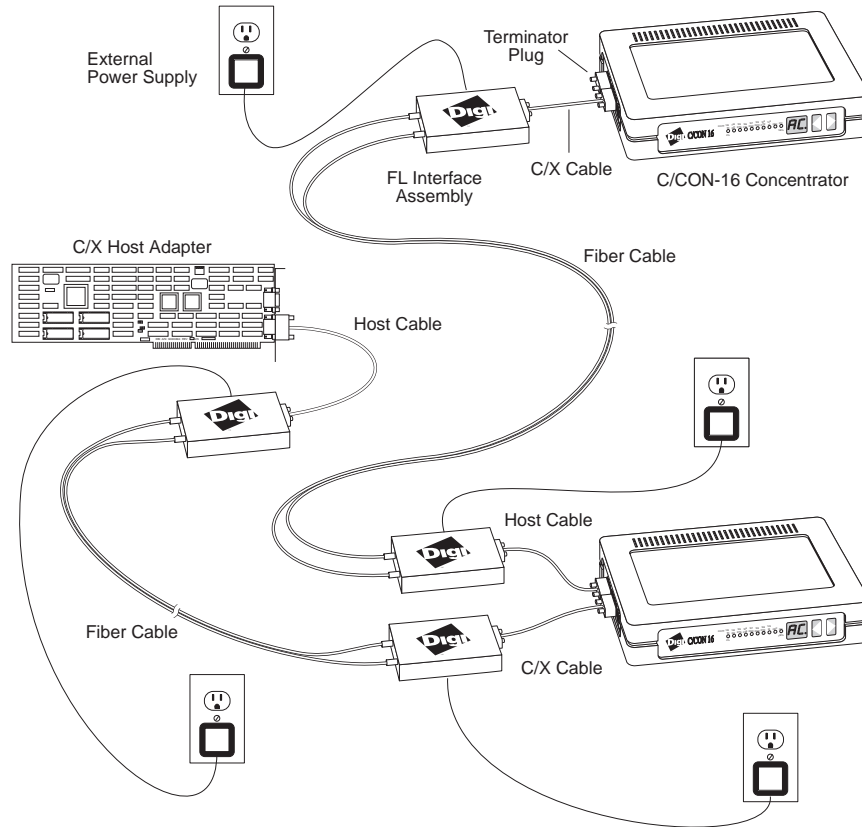
Important!   Be sure to label the ends of the optical fiber cable so that correct connections can be made.

Figure 2 C/X System Incorporating the C/X-FL Option (International)
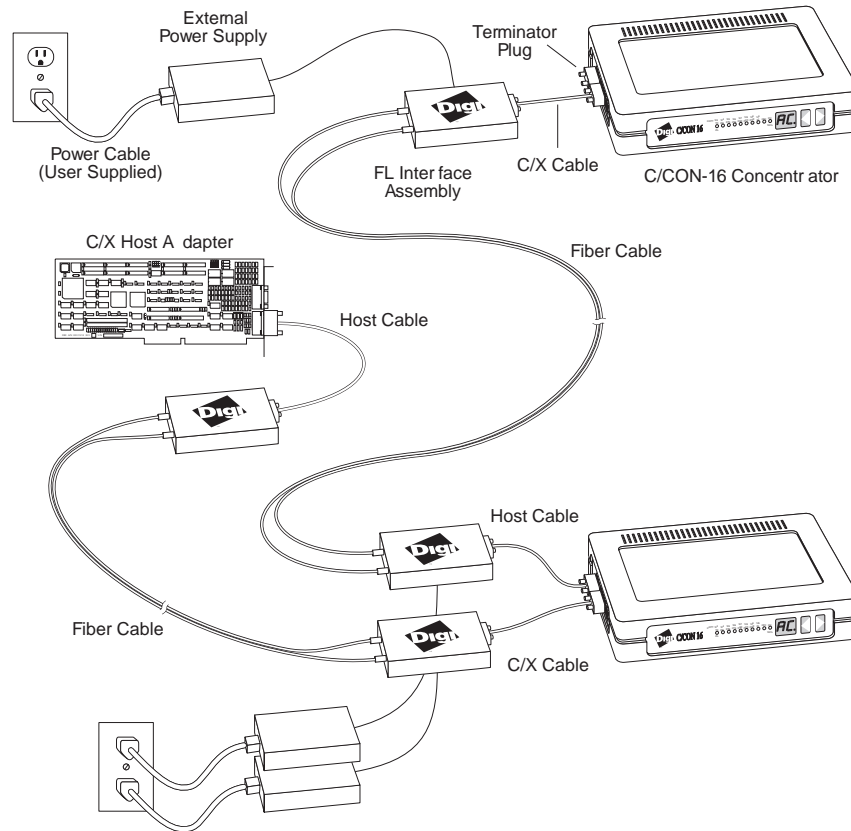
Important! Be sure to label the ends of the optical fiber cable so that correct connections can be made.

Note: The international power supply is shipped without an AC power cable. This must be supplied by the user. The cable should have a female IEC 320-C13 connector on the C/X-FL end; the other end should have a connector that mates with the AC power source.

Important! Care must be taken to avoid contamination of the ends of the fiber cable. If contaminated, they should be cleaned using only 99.99% pure isopropyl alcohol, or blown clean with pressurized dry air from an aerosol can.

Alcohol may be applied with a cotton swab or a lint-free wipe (such as KimWipes).

Fiber cable ends are highly polished, and can be easily contaminated by lint or cleaning fluid residue.

Digi recommends that fiber cables be installed or cleaned only by a qualified fiber cable installer.

Connecting Multiple Concentrators

The C/X-FL option may also be used for daisy-chaining multiple concentrators over long distances. While wire-cabled concentrators cannot be more than 1,000 feet from the host adapter without using modems, using the C/X-FL option permits daisy-chains of up to 16,000 meters (9.6 miles) total length (8 concentrators placed at 2,000 meter intervals).

To interconnect two or more concentrators with the C/X-FL option, follow the procedure (above) for connecting a concentrator to a host adapter, except in Step 2, connect the DB-15 end of the cable to the "Remote" port of the lower-numbered concentrator (the one closer to the host adapter).

Technical Information

Connectors and Pin-Outs

Host/CX (DB-9 female)

Pin	Signal	Signal Description
1	+5V in	+5V (input)
2	RxD (-)	Received Data (-)
3	RxD (+)	Received Data (+)
4	RxC (-)	Received Data Clock (-)
5	RxC (+)	Received Data Clock (+)
6	TxD (-)	Transmitted Data (-)
7	TxD (+)	Transmitted Data (+)
8	TxC (-)	Transmitted Data Clock (-)
9	TxC (+)	Transmitted Data Clock (+)
Shell	GND	Ground

Fiber-Optic Connectors

AT&T "ST" type optical fiber connector.

Power Connector

Center pin = Common (-)

Outer ring = +5 volts at .6 amps

Cables

EIA-422 Synchronous Serial Cables

Two synchronous cables are provided for connecting the C/X FL option to the host adapter and concentrators. The wiring for these cables is shown below.

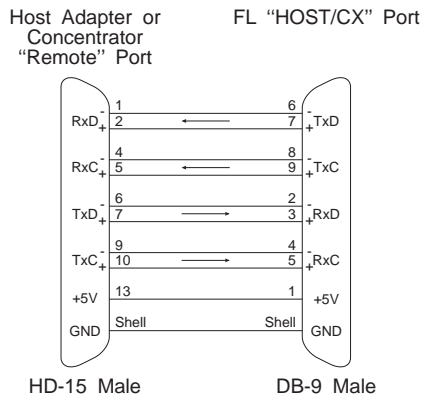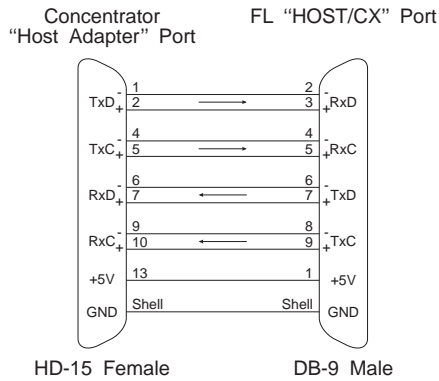**Figure 3**   **Host Cable Wiring Diagram**

Figure 4   **C/X Cable Wiring Diagram**

Optical Fiber Cables

-4dB/M duplex 62.5µ/125µ graded index glass fiber cable. For shorter distances (up to 30 meters), less expensive plastic cable can be used. The cables should be terminated in AT&T "ST" type connectors.

Power Supply

Domestic

Input: 115 V AC at 60 Hz
Output: 5 V DC @ 0.6 Amps
Dimensions: 3.2" x 2.2" x 1.9"
Digi P/N: 10000795

International

Input: 90-264 V AC, at 47-63 Hz
Output: 5 V DC @ 1.0 Amps
Dimensions: 2.9" x 1.9" x 1.6"
Digi P/N: 10000928

Note:

Units sold in North America are shipped with a standard power cord. Units sold outside of North America are shipped with no power cord. If the power cord needs to be replaced, or if you need to purchase an original power cord, use only a cord that meets the following specifications:

Type: SJT or SVT flexible power cord, compatible with an IEC320 appliance inlet.

Safety Approvals:
      The cord must bear the mark of the agency in your country (i.e. UL, CSA, VDE, SEMKO, etc.)

Temperature Rating:
      75°C minimum

Voltage Rating:
      125 Volts minimum (North America)

Current Rating:
      6 Amps minimum

Conductor Size:
      3 x 18 AWG or 3 x 0.75 mm, or larger

For power cord selection in Germany, use only a H05VV-F, <HAR>, VDE, PVC, 3 x 0.75mm power cord.

Für gebrauch in Deutschland muß ein Netzkabel des typs H05VV-F, <HAR>, größe, 3 x 0.75mm verwendet werden.

Specifications

Power Requirements

+5 Volts DC ±5%   .6 Amps typical

Optical Power

Transmitter:	-20 dBm min. (0 dBm = 1000μW)
Receiver:	-32 dBm min.
Optical budget:	12 dB min.

Environmental

Ambient Temperature	10° C to 55° C
Relative Humidity	5% to 90%

Mechanical

Length	4.9 inches
Width	2.8 inches
Height	.95 inches
Weight	.7 pounds

Digi Support Services

The Digi Bulletin Board System

Digi provides an electronic bulletin board service (BBS) for our customers. This bulletin board provides general and technical information about Digi's products.

The Digi BBS allows users to download software drivers as soon as they become available. There is also a feature to allow users with problems or questions about Digi products to leave messages to Digi Technical Support.

Using the Digi BBS is easy. Simply dial **(612) 912-4800**. In Europe, dial **+49 221 9205211**; in Asia, dial **+65 735 2460**.

The recommended modem communications parameters are 8 bits, no parity and one stop bit (**8 N 1**). Other settings may also work.

Download protocols include Zmodem, Xmodem, Ymodem, Kermit and others.

Internet FTP Server

Digi has set up an Anonymous FTP server for those with access to the Internet network. The address is **ftp.dgii.com**. Log in as **anonymous**, and enter your E-mail address when asked for a password. Drivers and installation tips are located in the **/drivers** directory. A text file, **download.doc**, gives information on uncompressing the files after downloading. Tip: Be sure to enter "**bin**" before downloading, to ensure binary transfer of files.

World Wide Web Server

Product information, manuals, new product announcements, programs, application stories and more can be obtained through the World Wide Web. Our address is **http://www.dgii.com**.

DigiFACTs FaxBack Server

Manuals and technical information can also be obtained by FAX. To use the FaxBack server, simply call (612) 912-4990 on a touch tone phone.

Information About Your System

Serial number of your Digi product: _____

Make, model and clock speed of your computer: _____

_____

How much RAM does your computer have? _____

Hard disk controller: Type: _____ Memory addressed at: _____

I/O port used: _____ IRQ: _____

LAN card: Type: _____ Memory addressed at: _____

I/O port used: _____ IRQ: _____

Other: Type: _____ Memory addressed at: _____

I/O port used: _____ IRQ: _____

Operating system: _____ Version: _____

Digi device driver version: _____

Technical Support

At Digi, we are proud of our products, and support them. Our dealers and distributors are fully trained on our product line, so that they can help you on a technical level should assistance be needed.

Your first level of support is your Digi dealer, the place where you purchased your Digi product. Your dealer has the training to help you with any installation questions or difficulties you might have.

If you still experience difficulties (after contacting your first level of support), Digi has a staff of Technical Support Specialists that can assist you. They can be reached at **(612) 912-3456**. In Europe, call **+49 221 920520**, and in Asia, call **+65 732 1318**. FAX numbers are: (612) 912-4958 (USA), +49 221 9205210 (Europe) and +65 732 1312 (Asia).

When you call Digi Technical Support, please call from a position where you can operate your system. Also, please fill out the form on the preceding page before calling, so your Technical Support representative can have a clear picture of your system and any potential conflicts between devices.

Digi Technical Support can also be reached via Internet E-mail. Please send correspondences to **`support@dgii.com`**, and include your voice and FAX phone numbers.

Customer Service

Digi also has a staff of Customer Service representatives to help you with software and documentation update requests, as well as Returned Merchandise Authorizations (RMAs) in case you need to return your Digi product for repair (see page *16*). They may be reached at **(612) 912-3456**. Digi Customer Service may be contacted by FAX at (612) 912-4959.

Digi Customer Service can also be reached via Internet E-mail. Please send correspondences to **`cust_serv@dgii.com`**, and include your voice and FAX phone numbers.

Return Procedures

All Digi products have a five-year parts and labor warranty, and we are ultimately responsible for any defective parts, according to the limits specified in the warranty. However, many of the reported problems are due to factors other than defects in the product itself. To save you time and possibly additional cost, Digi asks that you *first* try to resolve any difficulties by contacting our Technical Support representatives at **(612) 912-3456.**

Important!

Be sure to have the serial number of your Digi product at hand before calling Technical Support.

Returns should be directed to the dealer or distributor from whom you purchased the product. If you need to return your Digi product for repair, it is first necessary to obtain an RMA (Returned Merchandise Authorization) number from Digi, by speaking to a Digi Customer Service representative. Authorized returns should be shipped to Digi International, 10000 West 76th Street, Eden Prairie, MN 55344. The RMA number should appear on the shipping carton, on or near the address label.

Note:

Products received without an RMA number clearly marked on the outside of the package will be returned, unopened, to the sender