



FIBER[®]
D R I V E R

EM316T1

EM316E1

Fiber Driver Modem

User's Guide

Registration Card

Your name: Mr./Ms _____

Organization: _____ Dept. _____

Your title at organization: _____

Telephone: _____ Fax: _____

Organization's full address: _____

Country: _____

Date of purchase (Month/Day/Year): _____

Serial number:

Product was purchased from:

Reseller's name: _____

Telephone: _____ Fax: _____

Reseller's full address _____

Answers to the following questions help us to support your product:

1. Where and how will the product primarily be used?

Home Office Travel Company Business Home Business Personal Use

2. How many employees work at installation site?

1 employee 2-9 10-49 50-99 100-499 500-999 1000+

3. What network medium/media does your organization use ?

Fiber-optics Thick coax Ethernet Thin coax Ethernet
 10BASE-T UTP/STP 100BASE-TX 100BASE-T4 100VGAnyLAN
 Others _____

4. What category best describes your company?

Aerospace Engineering Education Finance Hospital
 Legal Insurance/Real Estate Manufacturing
 Retail/Chain store/Wholesale Government
 Transportation/Utilities/Communication VAR System house/company
 Other _____

5. Would you recommend your Fiber Driver product to a friend?

Yes No Don't know yet





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1 INTRODUCTION

About this Manual

Before unpacking please refer to section 2 (Hardware Installation)

This manual is a guide to the installation and operation of the EM316E1/T1 Fiber Modem.

Product description describes the product, its functions, features, protocol supported, minimum requirements, and typical applications.

Installation guides you through the setup of the EM316E1/T1 to your network.

Customer support provides information on return policy and customer support information.

Glossary provides definition to terms used in this manual.

Product Description

The EM316T1 and the EM316E1 modules of the Fiber Driver Family are Fiber Modems designed to extend the distance and transmission reliability of T1 (1.544Mbps) or E1 (2.048Mbps) traffic. These units convert the electrical signals to optical signals and transmit them over distances of up to 4km on multimode fiber, or distances of up to 100km on singlemode fiber. The EM316T1 and EM316E1 are transparent to the framing format, and support AMI or B8ZS (T1) and HDB3 (E1) line codes respectively. They include an internal elastic buffer to remove jitter from transmit data. Six LED indicators help monitoring and trouble-shooting, and a management agent is incorporated on the module to enable remote in-band and out-of-band control and management in conjunction with the Fiber Driver SNMP management card.

The EM316E1/T1 single fiber modules use unique technology that provides the ability to combine TX and RX signals onto a single fiber strand. This effectively doubles the available fiber in a network and eliminates the need for additional fiber connections. An identical unit is required on the other end, using either standard APC (Angled PC) patch cords finish or a 3M VAR APC finish. The standard APC finish provides a <-60dB back reflection, whereas the 3M VAR exceeds -70dB. Both APC finishes are polished to an 8° angle and minimize back reflection by forcing the reflected rays into the cladding.

The Fiber Driver family provides conversion solutions with greater distances and better manageability than any other products on the market. Multimode to Singlemode fiber conversion modules offers link distances from 0 km to 100 km.

Features

- Modules can be Inserted / Removed without powering off the chassis
- Extensive Network Management Support when used with EM316NM
- Provide Fiber Link for T1(ANSI T1.403) or E1 (G.703) Applications
- Built-in Elastic Buffer to Remove Jitter
- LED Indicators to help Trouble-Shooting
- Support AMI/B8ZS/HDB3 Line Codes
- Up to 100km Transmission on Singlemode or 4km on Multimode Fiber
- AC 110-220 volts or -48 DC power
- Supports Local & Remote Loopback Test

*For dB budget see: <ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

Requirements for Managed Module

EM316NM Management Firmware version 3.43 or later

For firmware released version go to:

<ftp://ftp.fiberdriver.com/pub/software/em316nm>

For firmware beta version go to:

<ftp://ftp.fiberdriver.com/pub/software/beta/em316nm>

MegaVision Network Management version 1.17 or later

Connectivity

Connectors Used

Fiber: ST, or SC-APC (for single fiber)

UTP: RJ48-MDI

Coax: BNC (2 connectors: 1 for TX, 1 for RX)

Cable Requirement

Fiber: ST-ST fiber cable, or SC-APC fiber cable (for single fiber)

UTP: Category 5

Coax: RG58/U

Port Description

Input: E1 (BNC) or T1 (UTP-RJ48)

Output: Fiber Modem, Multi-Mode: 1310nm, 0-2km

Single Mode: 1310nm, 0-25km

Single Mode: 1310nm, 25-50km

Single Mode: 1550nm, 50-100km

Connector Pin-out

Female RJ-48 (MDI)

1 RRING

2 RTIP

3 Unused

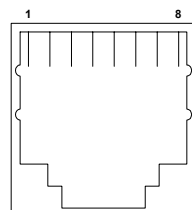
4 TRING

5 TTIP

6 Unused

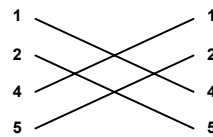
7 Unused

8 Unused



RJ48 Connector Pin-Out

Figure 1

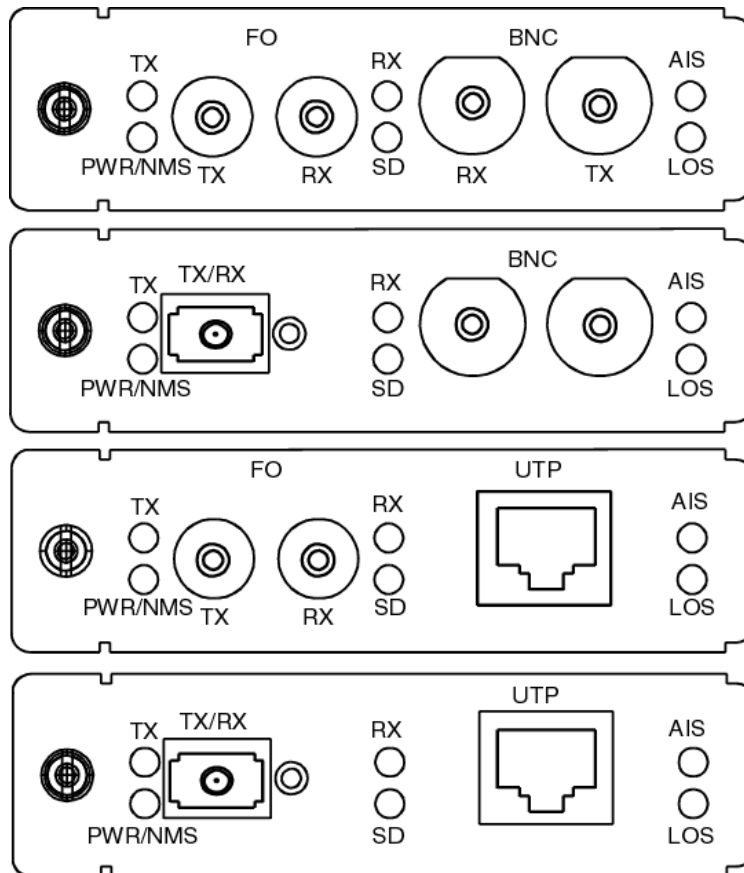


Crossed Cable Pin-Out

Figure 2

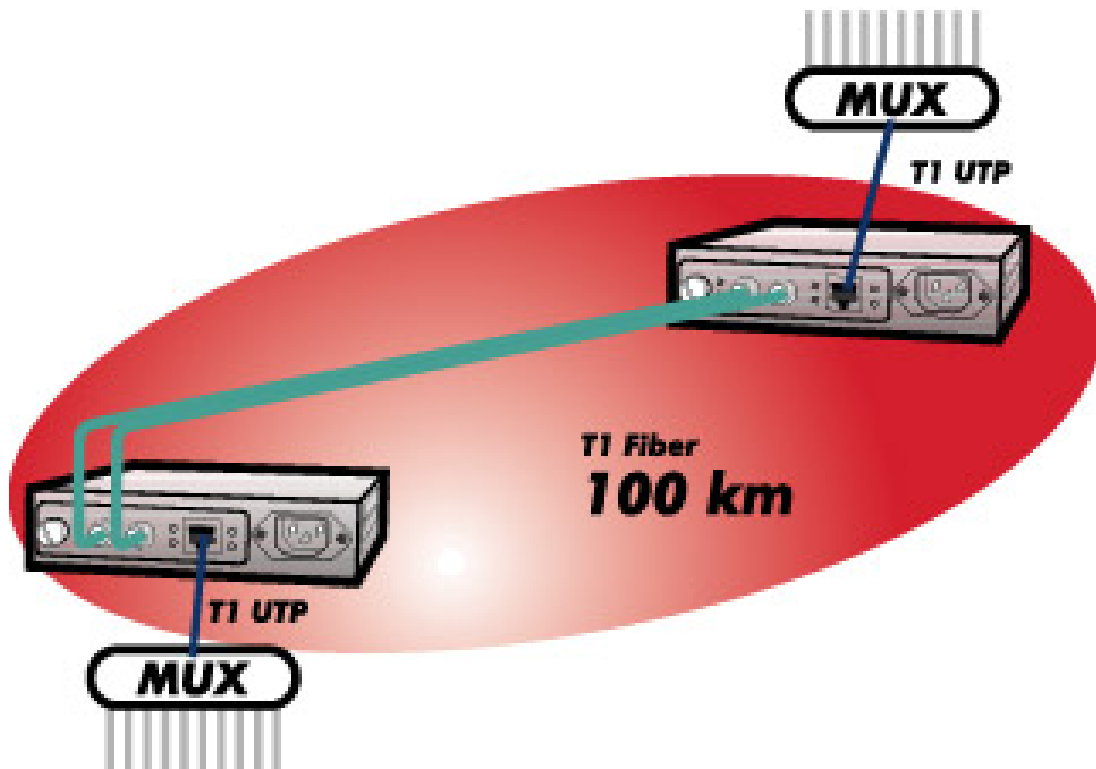
Display Information (LED Definition)

- PWR/NMS: illuminates when unit is powered (green color), flashes (green color) when remote or local loop back is enabled by management. The remote loop back feature provides a quick check of the basic functionality of both modems and both fiber optic cable paths. It will send a signal that causes the remote EM316E1/T1 fiber modem to loop its received data and send it back out as its transmitted optical signal, this will cause the loop back indicator to flash (green color)
- TX: flashes when Fiber TX is active, (OFF through all zeros transmission)
- RX: flashes when Fiber RX is active
- AIS: Alarm Indication Signal illuminates when unframed all-ones condition is detected, using the detection criteria of less than 9 zeroes out of 8129 bit periods.
- LOS: Loss of Signal illuminates when 175 consecutive zeroes have been received. LOS return low when the ones density reaches 12.5% (based upon 175 bit periods starting with a one & containing less than 100 consecutive zeroes).
- SD: illuminates when fiber signal is detected



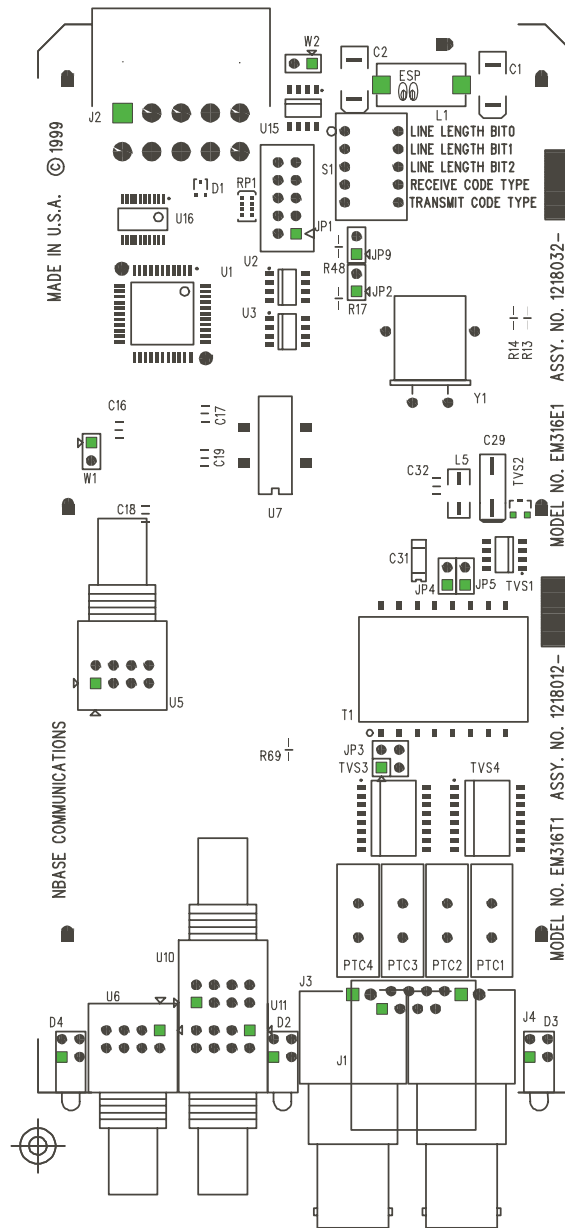
Typical Applications

EM316E1/T1 (Fiber Modem)



Configuration

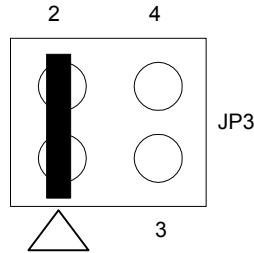
Jumper Settings: (Factory Default)



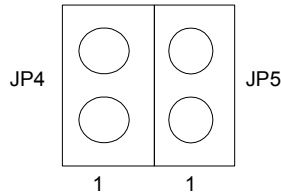
DO NOT CHANGE THE JUMPER SETTINGS BELOW		
JUMPER	SETTINGS	RESULTS
JP2	OPEN	Factory Use Only
JP9	OPEN	Factory Use Only
W1	OPEN	Factory Use Only
Note: * Jumper settings with asterisk (*) are factory default		

EM316E1 Jumper Settings for E1 120Ω Application :

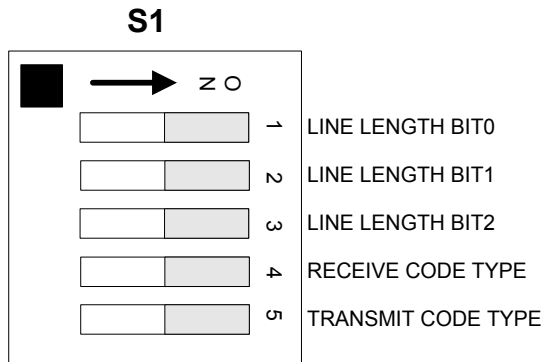
- 1) Install jumpers between JP3 pins 1 and 2,



- 2) No jumpers on JP4 and JP5 open, (all pins are open)

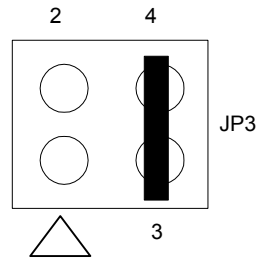


- 3) Set all switches on S1 to ON.
(BIT2=ON, BIT1=ON, BIT0=ON), for E1 and choose HDB3 as encoder & decoder testing mode

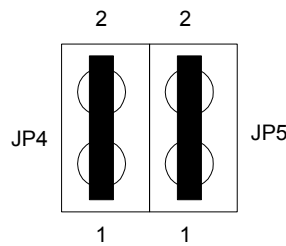


EM316E1 Jumper Settings for E1 75Ω Application :

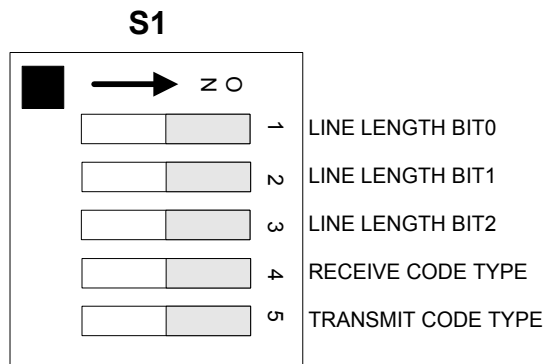
- 1) Install jumpers between JP3 pins 3 and 4,



- 2) Install jumpers between JP4 pins 1 and 2, JP5 pins 1 and 2

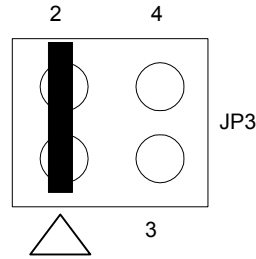


- 3) Set all switches on S1 to ON.
(BIT2=ON, BIT1=ON, BIT0=ON), for E1 and choose HDB3 as encoder & decoder testing mode

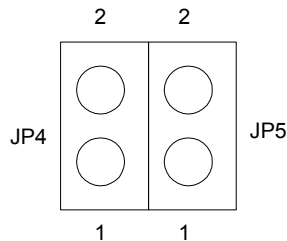


EM316T1 Jumper Settings for T1 100Ω Application :

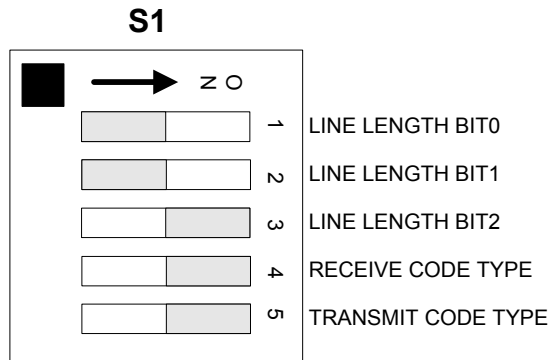
- 1.) Install jumpers between JP3 pins 1 and 2,



- 2.) No jumpers on JP4 and JP5 open, (all pins are open, no headers, not used)



- 3) Set RECEIVED CODE and TRANSMIT CODE on S1 to ON.
(Choose B8ZS as encoder & decoder testing mode)



- 4) Set LINE LENGTH (BIT0, BIT1, BIT2) according to the table below to match copper cable length (default settings: BIT2=ON, BIT1=OFF, BIT0=OFF, 0-133 feet)

BIT2	BIT1	BIT0	Copper cable length
ON	OFF	OFF	0 - 133 feet
OFF	ON	ON	133 - 266 feet
OFF	ON	OFF	266 - 399 feet
OFF	OFF	ON	399 - 533 feet
OFF	OFF	OFF	533 - 655 feet

Theory of Operation

Data encoding used on the EM316E1/T1 Fiber Modem consists of converting the incoming AMI B8ZS or HDB3 to a format suitable for fiber optic communication. A proprietary coding scheme is used which combines the input clock and data into a composite signal that is then transmitted over the fiber. At the receiver, this composite signal is then separated back into their respective formats.

This coding technique provides a composite data pulse for each incoming data bit. This assures that the original timing information for each bit is transferred and can be recovered. Decoding long zero runs in the AMI code does not rely on timing interpolation between the transfer of AMI ones. Each incoming logic one data bit produces a pulse having a fixed width of approximately 2/3 the bit rate and a logic zero data bit produces a pulse width of approximately 1/3 the bit rate.

The leading edge of all data bits is synchronous to the input and output data clock. Since the composite fiber data stream utilizes this pulse width scheme, no synchronizing headers are required which results in faster recovery from loss of signal data errors and guaranteeing true data and timing transparency.

2 HARDWARE INSTALLATION

PREPARATION

STEP 1 Follow all Safety Regulations

- 1 Eliminate static electricity in the workplace by grounding operators, equipment, and devices (components and computer boards). Grounding prevents static charge buildup and electrostatic potential differences. Transporting products in special electrostatic shielding packages avert electrical field damage.
- 2 An effective workplace should be outfitted with the following items:
 - a) ESD protective clothing/smocks: Street clothing must not come in contact with components or computer boards since the various materials in clothing can generate high static charges. ESD protective smocks, manufactured with conductive fibers, are recommended.
 - b) Electrostatic shielding containers or totes: These containers (bags, boxes, etc.) are made of specially formulated materials, which protect sensitive devices during transport and storage.
 - c) Antistatic or dissipative carriers: These provide ESD protection during component movement in the manufacturing process. It must be noted that antistatic materials alone will not provide complete protection. They must be used in conjunction with other methods such as totes or electrostatic shielding bags.
 - d) Dissipative tablemat: The mat should provide a controlled discharge of static voltages and must be grounded. The surface resistance is designed such that sliding a computer board or component across its surface will not generate more than 100 V.
 - e) Personal grounding: A wrist strap or ESD cuff is kept in constant contact with bare skin and has a cable for attaching it to the ESD ground. The purpose of the wrist strap is to drain off the operator's static charge. The wrist strap cord has a current-limiting resistor for personnel safety. Wrist straps must be tested frequently to ensure that they are undamaged and operating correctly. When a wrist strap is impractical, special heel straps or shoes can be used. These items are effective only when used in conjunction with a dissipative floor.

- f) ESD protective floor or mat: The mat must be grounded through a current-limiting resistor. The floor or mat dissipates the static charge of personnel approaching the workbench. Special conductive tile or floor treatment can be used when mats are not practical or cause a safety hazard. Chairs should be conductive or grounded with a drag chain to the flooring.

STEP 2 Determine the best location for the chassis.

Affix the chassis to a 19" or 23" rack using the enclosed rack mount ears, or place the unit on a secure, flat surface. Ensure that the unit is within reach of the necessary connections (i.e. power outlet, Ethernet connections, and, if the chassis will be monitored via serial port, and either a PC, UNIX workstation, or modem).

STEP 3 Make sure there is enough space to pull and connect both the electrical and optical cables without stressing them beyond the manufacturer's limitation (bend radius minimum).

STEP 4 Plug in the chassis

Connect the power cord (s) to the chassis and an outlet. Turn the power switch (es) to ON position. The wide-ranging power supply adjusts to any outlet.

STEP 5 Unpacking the unit

Verify that no visible damage has been caused to the outer box. Remove all material from the packing box and confirm receipt of the following:

Fiber Driver module unit
User's manual (this manual in printed format or on a CD)

In the unlikely event that anything is missing, contact your authorized dealer or representative. If it becomes necessary to return the unit, repackage the unit in its original box.

UNIT INSTALLATION

STEP 1 Remove required amount of blank panels from the NC316BU-xx.

NOTE: Per FCC regulations, either a panel or a module should **always** cover chassis slots.

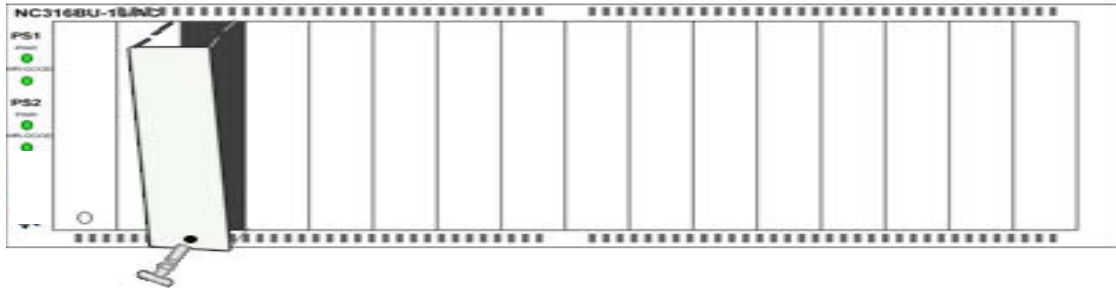


FIGURE 1.1 Take out the required amount of blank panels.

STEP 2 Align the edges of the EM316 module to the rail inside the chassis, see pictures below.

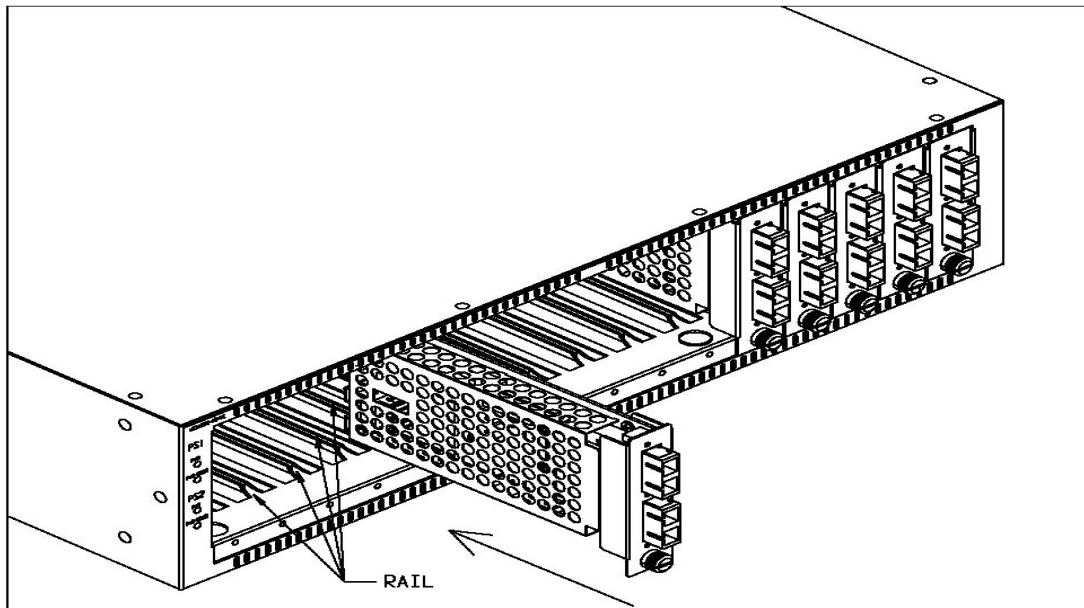


FIGURE 1.2 Align the edges of the EM316 to the rail inside the chassis and then insert the unit.

STEP 3 Insert the module into the NC316BU-xx unit

NOTE: To avoid damaging any components on the module, handle it by the edges, using your thumb to push it securely inside the chassis. Do not use excessive force, but make sure the module is fully inserted in the chassis. When the module is correctly inserted, the **PWR LED should illuminate**.

STEP 4 Secure the module to the unit, using the screws on the front panel.

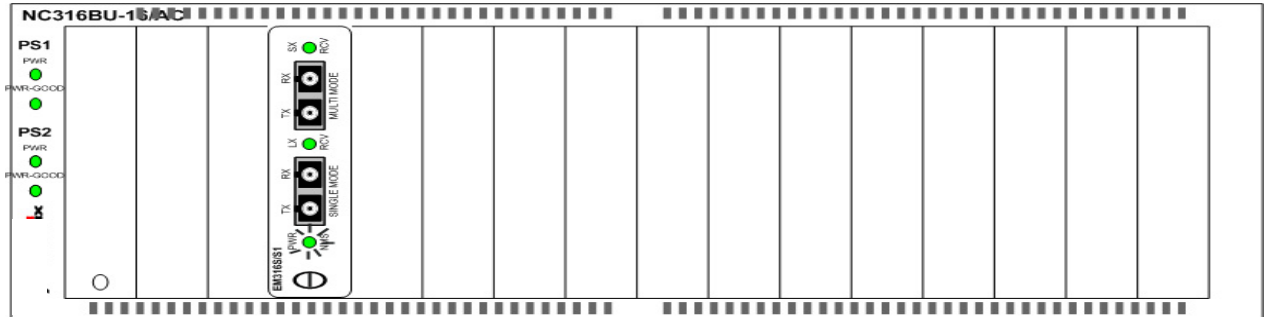


FIGURE 1.3 When the module is correctly inserted, the PWR LED should illuminate.

WARNING! Fiber optic equipment can emit laser or infrared light that might injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

3 TROUBLESHOOTING

The Fiber Driver series are highly reliable units. If there are any operating problems, the fault probably lies in some other aspect of the configuration. However, if after following the troubleshooting steps below (in order), you find that the unit is still not functioning correctly, please contact your local representative.

Review all link LEDs to ensure that those ports you believe should be functioning are properly attached to a cable.

Verify the correct fiber optic cables are being used, i.e. multi-mode or single mode.

Review all link LEDs to ensure that those ports you believe should be functioning are properly configured.

If the suspect ports are not configured properly, re-configure the port through SNMP management or the Administrative Interface.

Ensure that the equipment attached to this module is configured properly.

Verify that the output power of the fiber optic port(s) is within manufacturer's specification for output power, for more information please see the link below:

<ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

Verify that the dB loss of the Fiber cable you are connecting to is within the dB budget for this module, for more information please see the link below:

<ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

4 TECHNICAL SPECIFICATIONS

Electrical

5VDC @ 2 Amps Max

Hot Swappable

Operating Temperature Range

0°C - +50 °C (32°F – 122°F)

Storage temp

-10°C - +60°C (14°F – 140°F)

Relative Humidity

85% maximum non-condensing

Emissions Compliance

FCC Part 15, Subpart B, 1999 Class A

CE Mark

EN 50081-1: 1992

EN 50082-1: 1997

EN 55024: 1998

EN 55022: 1998

AS/NZS 3548: 1995

Physical Dimensions

1" high x 3" wide x 7" deep (2.54cm x 7.62cm x 12.78cm)

Weight

9.6 oz (0.36 kg)

Color

Black

5 CUSTOMER SUPPORT

Contact Information

If you have any questions, please do not hesitate to contact us at:

Americas Support

MRV (East Coast USA)
295 Foster Street
Littleton, MA 01460-2016
Tech Support: (800) 338-5316
Tech Support: (978) 952-4700
E-mail: support@fiberdriver.com
Fax: (978) 952-4880
URL: <http://www.fiberdriver.com>

MRV (West Coast USA)
20415 Nordhoff St.
Chatsworth, CA 91311
Tel. (800) 338-5316
Tel. (818) 773-0900

International Support

MRV International
Business Park Moerfelden
Waldeckerstrasse 13
64546 Moerfelden – Walldorf
Germany
Tel. (49) 6105/2070
Fax (49) 6105/207-100

Manual Information

The most recent version of this manual may be found on our ftp site:

<ftp://ftp.fiberdriver.com/pub/doc/manuals/>

5 GLOSSARY

Complete definition of networking terms (jargon) used in this manual, may be found on our ftp site:

<ftp://ftp.fiberdriver.com/pub/doc/Glossary.pdf>

6 ORDERING INFORMATION

Please visit us at <http://www.fiberdriver.com> for the latest updates on our products.

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Fiber Driver Inquiries: info@fiberdriver.com

Marketing: marketing@fiberdriver.com

Repair Services: rma@fiberdriver.com

*Note: For dB budget see: <ftp://ftp.fiberdriver.com/pub/doc/spec/fiberdriver>

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