

Edge Access



9145EMP Network Interface Device Hardware User's Manual

NOTICE

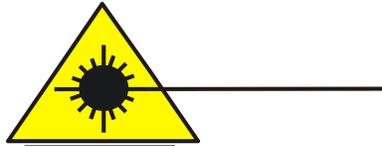
Canoga Perkins has prepared this manual for use by customers and Canoga Perkins personnel as a guide for the proper installation, operation and/or maintenance of Canoga Perkins equipment. The drawings, specifications and information contained in this document are the property of Canoga Perkins and any unauthorized use or disclosure of such drawings, specifications and information is prohibited.

Canoga Perkins reserves the right to change or update the contents of this manual and to change the specifications of its products at any time without prior notification. Every effort has been made to keep the information in this document current and accurate as of the date of publication or revision. However, no guarantee is given or implied that the document is error free or that it is accurate with regard to any specification.

CANOGA PERKINS CORPORATION

20600 Prairie Street
Chatsworth, California 91311-6008
Business Phone: (818) 718-6300
(Monday through Friday 7 a.m. - 5 p.m. Pacific Time)
FAX: (818) 718-6312 (24 hrs.)
Web Site: www.canoga.com
E-mail: fiber@canoga.com
Copyright © 2010 Canoga Perkins Corporation
All Rights Reserved
EdgeAccess®
9145EMP NID Hardware User's Manual
Model Number 9145EMP
Part Number 6913800
Rev A 04/2010

EdgeAccess and **Canoga Perkins** are registered trademarks of Canoga Perkins Corp. To find Technical Advisories and Product Release Notes, go to the Canoga Perkins web site at <http://www.canoga.com>.



CAUTION!

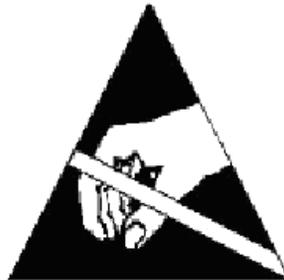
This product may contain a laser diode emitter operating at a wavelength of 1300 nm - 1600 nm. Use of optical instruments (for example: collimating optics) with this product may increase eye hazard. Use of controls or adjustments or performing procedures other than those specified herein may result in hazardous radiation exposure.

Under normal conditions, the radiation levels emitted by this product are under the Class 1 limits in 21 CFR Chapter 1, Subchapter J.

ATTENTION!

Ce produit peut contenir un émetteur de diode de laser fonctionnant à une longueur d'onde 1300 de nm - nm 1600. Utilisation des instruments optiques (par exemple: la collimation du système optique) avec ce produit peut augmenter le danger. L'utilisation des commandes ou des ajustements ou les procédures d'exécution autre que ceux indiquées ci-dessus peut avoir comme conséquence l'exposition de la radiation dangereuse.

Dans des conditions normales, les niveaux de rayonnement émis par ce produit sont sous les limites de la classe 1 en chapitre 1, Subchapter J de 21 CFR.



NOTICE!

This device contains static sensitive components. It should be handled only with proper Electrostatic Discharge (ESD) grounding procedures.

AVIS!

Ce dispositif contient les composants sensibles statiques. Il devrait être manipulé seulement avec la Décharge Electrostatique (DES) appropriée procédures.

General Safety Considerations

Installation

The 9145EMP is suitable for installation in Network telecommunication facilities and locations where the National Electric Code (NEC) applies.

Cabling

The 9145EMP has been designed and tested and has passed all the pertinent sections of GR-1089 and GR-63 for Type 2 and Type 4 equipment. This equipment does not have direct electrical connection to outside plant equipment.

The Copper (RJ45) ports of the 9145EMP are not intended for direct connection to "Outside Plant" metallic conductors and shall be isolated (by channel banks or office repeaters) from any connections to network or terminal equipment that lie outside of the same building. The telecommunication interface connections are considered to be, and meet the requirements of, SELV circuits (not TNV).

Power

WARNING: The 9145EMP with redundant power supplies must have both power supply cords disconnected before servicing.

Wiring methods used for the connection of the equipment to the AC or DC MAINS SUPPLY shall be in accordance with the National Electrical Code, ANSI/NFPA 70, and the Canadian Electrical Code, Part I, CSA C22.1.

The 9145EMP AC and DC units do not incorporate a disconnect device. The plug on the power supply cord is intended to serve as the disconnect device. It is also recommended that the AC socket-outlet shall be installed near the equipment and shall be easily accessible.

The 9145EMP DC has a nominal operating DC voltage of -48 VDC and passes the minimal steady state DC operating voltage of -40 VDC in accordance with GR-1089 Issue 4 which references American National Standards Institute (ANSI) T1.315, Table 1. Additionally, Canoga Perkins design allows for a minimal steady state of -36VDC.

The 9145EMP DC model is configured for a DC-I, Isolated DC return.

Fuses

The 9145EMP is equipped with internal fuses. The AC model is fused at 2A and the 48VDC model at 3.0A. Although not required, an external fuse may be used to isolate the unit in a shared fuse distribution panel. In that case, the unit should be fused with a 3A slow blow fuse or a 5A fast acting fuse for 48VDC input voltages.

Surge Protection

The AC powered 9145EMP does not contain an internal Surge Protective Device. An external Surge Protective Device (SPD) should be used at the AC input of the network equipment according to facilities procedures and as defined by the National Electric Code (NEC).

Grounding

The 9145EMP AC & DC models are suitable for installation as part of the Common Bonding Network (CBN).

The 9145EMP AC and DC are provided with a safety ground connection which is capable of conducting any fault current likely to be imposed such as fault current from sources within the chassis. For the DC model use an approved 18ga insulated wire connected to the terminal block's middle conductor. The plus and minus 48VDC conductors should be a minimum of 20ga.

The AC will be grounded via the ground conductor of the power cord and must be connected to an earthed mains socket-outlet.

An electrical conducting path should exist between the 9145EMP chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. Electrical continuity should be provided by using thread-forming type mounting screws that remove any paint or non-conductive coatings and establish a metal-to-metal contact. Any paint or other nonconductive coatings should be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces should be cleaned and an antioxidant applied before installation.

Lightning Protection

The intra-building ports of the 9145EMP are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly **MUST NOT** be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

To protect the port against intra-building lightning surges, the RJ45 ports of 9145EMP are suitable for connection to shielded intra-building cabling grounded at both ends.

ESD

The 9145EMP has been tested and passes the ESD requirements of Test level 4 for air and contact discharges. However to protect the exposed components from electrostatic damage when removing or replacing the small form-factor pluggable (SFP) optical modules requires the proper use of static mitigation procedures such as properly wearing a wrist strap.

Operation Temperature

The 9145EMP is designed and Nationally Recognized Test Laboratory (NRTL) tested and verified to operate between 0°C to 50°C, and type tested for short term emergency ambient temperature of -5°C to 55°C.

Fans

The 9145EMP models equipped with fans are constructed with a mid-front to mid-rear (EC class F2-R2) airflow scheme, i.e., it draws air from the front and exhausts to the rear.

The 9145EMP models equipped with redundant fans are designed to function normally over the entire long-term operating temperature range; in the unlikely event of a single fan failure, the 9145EMP will continue to perform normally over the long-term operation temperature range until a replacement can be installed.

Fan replacement cannot be performed in the field. Call Canoga Perkins for an RMA number to arrange a repair.

Emissions and Immunity

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

The authority to operate this equipment is conditioned by the requirements that no modifications will be made to the equipment unless the changes or modifications are expressly approved by the Canoga Perkins Corporation.

To Users of Digital Apparatus in Canada: This Class A digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Aux utilisateurs des appareils numérique au Canada: Cet appareil numérique de la classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

Special Accessories

The 9145EMP does not require any special accessories to achieve compliance for emission and immunity criteria.

Double Pole/Neutral Fusing

On the 9145EMP a fuse may be in place in the neutral path on the AC power supply. After operation of the fuse, parts of the equipment that remain energized might represent a hazard during servicing.

Waste Electrical and Electronic Equipment (WEEE)



Product Disposal Information

Do not dispose of this product in unsorted municipal waste. This product is recyclable, and should be recycled according to your local standards. For more information, contact Canoga Perkins technical support.

Contents

1	Introduction	1
1.1	Product Description	1
1.2	9145EMP Specifications	2
1.2.1	Physical Characteristics	2
1.2.2	Environmental Characteristics	2
1.2.3	Power Requirements	2
1.2.4	Regulatory Compliance	2
1.3	Mounting Options	2
1.3.1	Rack Mounting	3
1.3.2	Wall Mounting	3
2	Functional Description	5
2.1	Base Unit	5
2.2	Hardware Configuration	7
2.2.1	Front Panel	7
2.2.2	Rear Panel	8
2.2.3	Service Data Ports	8
2.3	Management Ports	9
2.3.1	EIA-232 Console Port	9
2.3.2	Ethernet Management Port	9
2.4	Port Default Settings	10

2.5	Power Connectors	10
2.5.1	Power Requirements	10
2.5.2	Single AC Power Base Unit	10
2.5.3	Redundant AC Power Base Unit	11
2.5.4	Single DC Power Base Unit	11
2.5.5	Redundant DC Power Base Unit	11
2.5.6	AC/DC Power Base Unit	12
2.6	LED Indicators	12
2.6.1	Management Section LEDs	13
2.6.2	Data Interface Section LEDs.....	14
3	Installation	17
3.1	9145EMP Installation Procedures	17
3.2	Unpacking	17
3.3	Mounting Options	18
3.3.1	Rack Mounting	18
3.3.2	Wall Mounting	22
3.3.3	Horizontal Flat Surface Mounting	23
3.4	Installing the SFP Modules	24
3.5	Connecting the Electrical Power	24
3.5.1	AC Power	24
3.5.2	DC Power	25
3.5.3	Grounding	26
3.5.4	Connecting the Fiber Optic and UTP Ethernet Cables	27

4	Operation	29
4.1	Power-Up and Front Panel Functions	29
4.1.1	Power and Status LEDES	29
4.2	Interface Management	30
4.2.1	Setting Up the VT-100 Terminal	30
5	Troubleshooting	31
5.1	Optical Power Loss	31
5.2	Fault Conditions	31
5.3	Running Diagnostics	31
5.3.1	PING Testing	31
5.4	Loopback Diagnostics	32
6	Maintenance	33
6.1	General Maintenance	33
6.2	Check Optical Power Levels	33
6.2.1	Measuring Transmitter Output Power	33
6.2.2	Measuring Receiver Input Power	34
6.2.3	Calculating Fiber Link Attenuation	35

Chapter 1

Introduction

1.1 Product Description

The 9145EMP (Figure 1-1) is the Canoga Perkins second generation Network Interface Device (NID) that can be used by a Service Provider (SP) to provide layer 1 and layer 2 termination of Ethernet services. The 9145EMP encompasses features and functions needed by SPs to deliver Metro Ethernet Forum (MEF) compliant Ethernet services with end-to-end Quality of Service (QoS) guarantees and Operation, Administration, Maintenance and Provisioning (OAM&P) capabilities.



Figure 1-1 9145EMP Ethernet Network Interface Device

1.2 9145EMP Specifications

1.2.1 Physical Characteristics

- **Dimensions:** 1.75" H x 8.25" W x 11.5" D (44.5 x 209.5 x 292 mm)
- **Weight:** 5.5 lb (2.49 Kg), depending on model

1.2.2 Environmental Characteristics

- **Operating Temperature:** 0° to 50° C
- **Operating Humidity:** 0 to 90% Relative Humidity (non-condensing)

1.2.3 Power Requirements

- 100 VAC to 240 VAC (auto-ranging), 50/60 Hz, 0.5 Amps
- 48VDC (36 to 72VDC), 1 Amp

1.2.4 Regulatory Compliance

- EN60825-1 (laser safety)
- CE Mark
- EMC Directive (EN55022 Class A, EN 55024, EN 61000-3-2/-3-3)
- ETL, cETL & LVD (U.S. UL60950, CAN/CSA C22.2 No. 60950, EN/IEC 60950)
- FCC Part 15B Class A (U.S.), ICES-003 (CAN), VCCI Class A (Japan), C-Tick (AS/NZS 3548 - Australia)
- NEBS Level 3

1.3 Mounting Options

- 19-Inch or 23-Inch rack mount (single unit or two units side by side in a 1U)
- Wall Mount (face down or to either side)
- Table Top

See Chapter 3, Installation, for installation procedures.

1.3.1 Rack Mounting

The customer is required to order the brackets required (Figure 1-2) for their particular rack installation.

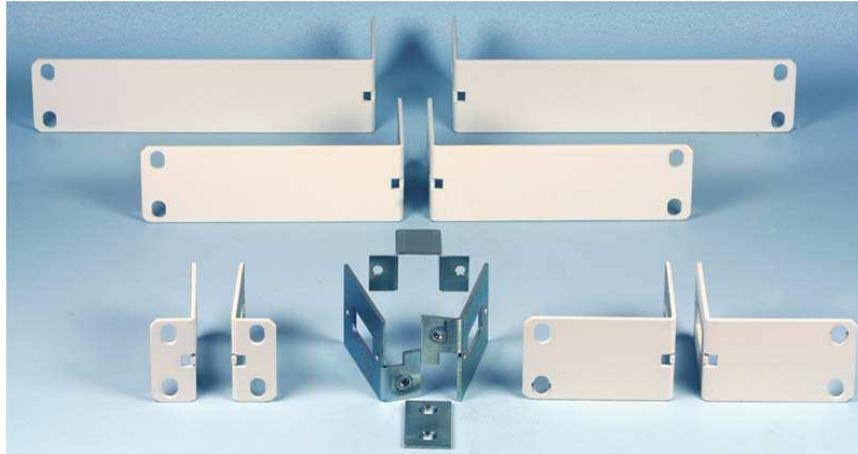


Figure 1-2 9145EMP Mounting Brackets

1.3.2 Wall Mounting

Canoga Perkins includes a mounting template in the shipping container (Figure 1-3) to assist the customer in mounting the 9145EMP on a wall.

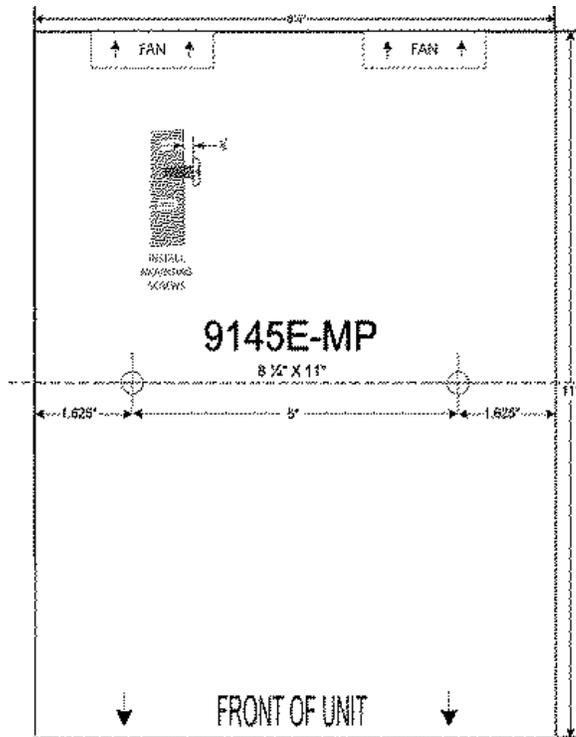


Figure 1-3 Wall Mounting Template

Chapter 2

Functional Description

2.1 Base Unit

The 9145EMP is designed with front-panel data and management ports and rear-panel power and ground connectors. This design allows for a multitude of power options. The 9145EMP model numbers and configurations are described in Table 2-1. SFP model numbers are described in Table 2-2. All models accommodate feature enhancements through firmware upgrades.

Table 2-1 9145EMP Model Numbers and Configuration

Model Number	Extended Description
9145EMP-761-0-0	9145E Multiport, Four UTP/SFP User Ports, Two SFP Network Ports, Local Ethernet UTP Management Port, Single AC Power Supply, Integral Fans
9145EMP-761-1-0	9145E Multiport, Four UTP/SFP User Ports, Two SFP Network Ports, Local Ethernet UTP Management Port, Single 48VDC Power Supply, Integral Fans
9145EMP-761-2-0	9145E Multiport, Four UTP/SFP User Ports, Two SFP Network Ports, Local Ethernet UTP Management Port, Redundant AC Power Supply, Integral Fans
9145EMP-761-3-0	9145E Multiport, Four UTP/SFP User Ports, Two SFP Network Ports, Local Ethernet UTP Management Port, Redundant 48VDC Power Supply, Integral Fans
9145EMP-761-4-0	9145E Multiport, Four UTP/SFP User Ports, Two SFP Network Ports, Local Ethernet UTP Management Port, Redundant AC/48VDC Power Supply, Integral Fans

Table 2-2 SFP Model Numbers

Model Number	Description	Extended Description
SFP1-0045	850 MM, 7 DB	1063-2125 MB
SFP1-12051	1310 MM, 10 DB	125-155 MB
SFP1-2155	1310, 8 DB	125-2500 MB
SFP1-2225	1310, 10 DB	1063-1250 MB
SFP1-2305	1310, 13 DB	125-155 MB
SFP1-2445	1310, 21 DB	1063-2125 MB
SFP1-2605	1310, 29 DB	125-155 MB

Table 2-2 SFP Model Numbers

Model Number	Description	Extended Description
SFP1-2725	1310, 17 DB	106 -1250 MB
SFP1-3445	1550, 21 DB	1063-2125 MB
SFP1-3605	1550, 29 DB	125-155 MB
SFP1-4304	BIDI	1310 TX, 20KM, 155MB
SFP1-4324		1310 TX, 20KM, 1.25GB
SFP1-4404		1310 TX, 40KM, 155MB
SFP1-4424		1310 TX, 40KM, 1.25GB
SFP1-5304		1550 TX, 20KM, 155MB
SFP1-5324		1550 TX, 20KM, 1.25GB
SFP1-5404		1550 TX, 40KM, 155MB
SFP1-5424		1550 TX, 40KM, 1.25GB
SFP1-7425		1490nm Tx, 1310nm Rx 40KM, 1.25GB
SFP1-6425		1310nm Tx, 1490nm Rx 40KM, 1.25GB
SFP1-7325		1490nm Tx, 1310nm Rx 20KM, 1.25GB
SFP1-6325		1310nm Tx, 1490nm Rx 20KM, 1.25GB
SFP1-7125		1490nm Tx, 1310nm Rx 10KM, 1.25GB
SFP1-6125		1310nm Tx, 1490nm Rx 10KM, 1.25GB
SFP2-4765	CWDM : 80 km, 125-2500	1470 nm
SFP2-4965		1490 nm
SFP2-4965		1490 nm
SFP2-5165		1510 nm
SFP2-5365		1530 nm
SFP2-5565		1550 nm
SFP2-5765		1570 nm
SFP2-5965		1590 nm
SFP2-6165		1610 nm

2.2 Hardware Configuration

The 9145EMP port and connector options are shown in Figure 2-1.

2.2.1 Front Panel

The following ports are available on the 9145EMP front panel (Figure 2-1).

- One EIA-232 console port with DE-9 female connector
- One Ethernet Management Port with UTP connector
- Four User Ports (for service data), with both SFP and UTP connectors
- Two Network Ports (for service data), with SFP connectors only

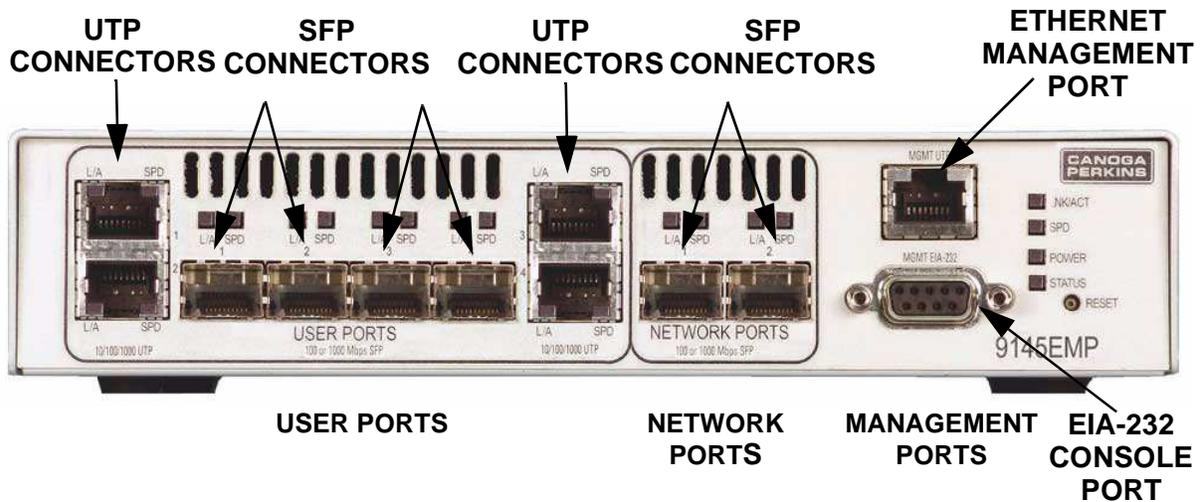


Figure 2-1 9145EMP Ports

2.2.2 Rear Panel

Customers will also have a selection of power options to choose from (Figure 2-2). Five options are offered:

1. Single AC Power
2. Redundant AC Power
3. Single DC Power
4. Redundant DC Power
5. Redundant AC and DC mix



Figure 2-2 9145EMP Rear Panel

The 9145EMP accommodates all five power options.

2.3 Service Data Ports

The User Ports (Figure 2-1) provide both fixed UTP and SFP connectors, while the Network Ports provide SFP connectors. The user can configure the 9145EMP through software to allow for either the UTP or SFP connector within each User Port to be active. Both User Port connectors can not be active simultaneously.

- UTP connectors are IEEE 802.3 compliant for 10/100/1000BASE-T.
- UTP connectors support MDI and MDIX connections.
- UTP connectors support both full-duplex and half-duplex operation in 10/100/1000 Mbps mode.
- SFP connectors support full-duplex operation at 100/1000 Mbps.

2.4 Management Ports

2.4.1 EIA-232 Console Port

The console port of the 9145EMP is used for communication between the 9145EMP and a VT100 terminal or emulator. The console port is a DE-9 female connector with a DCE pin-out, which can be directly connected to a terminal with a straight through cable (Figure 2-3).

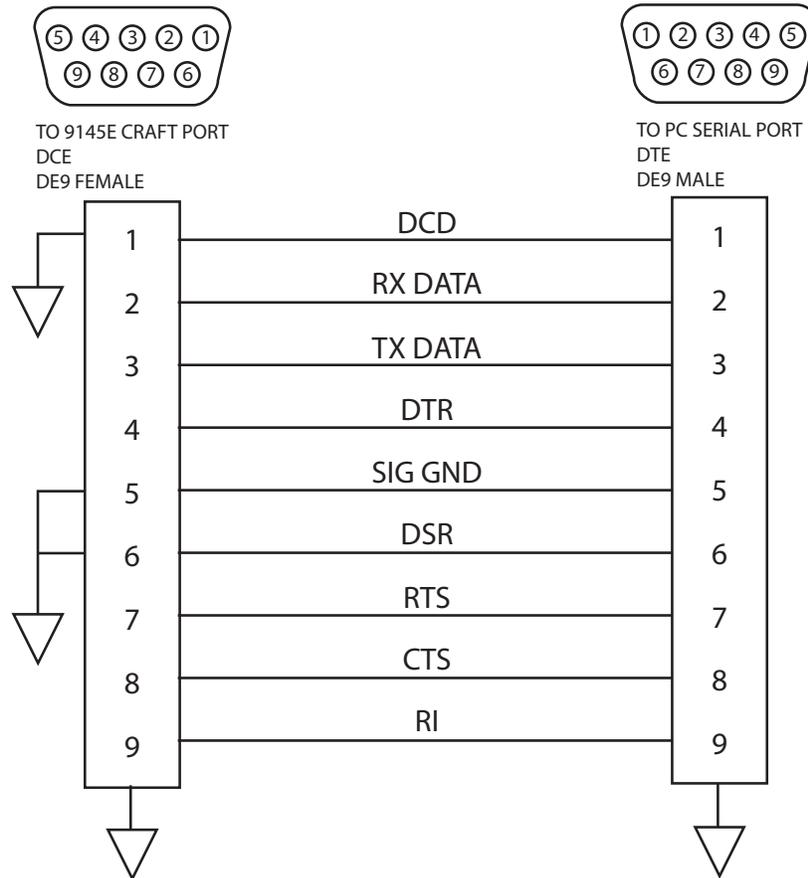


Figure 2-3 EIA-232 Console Port Pinouts

2.4.2 Ethernet Management Port

The Ethernet Management port is used for local management of the 9145EMP. The 9145EMP has a management interface with an RJ45 UTP connector. The management port can sense and automatically cross-over the Tx and Rx pairs.

The UTP port is IEEE 802.3 compliant for 10BASE-T and 100BASE-TX and supports the following modes of operation:

- 10 Auto
- 100 Auto

2.5 Port Default Settings

Table 2-3 represents the default settings for each of the ports. The term active connector refers to the connector, either UTP or SFP, that is currently enabled. For example, if a particular 9145EMP model has a User Port with both UTP and SFP connectors present, by default the UTP is the Active Connector (it can currently transmit and receive data), while the SFP is the Inactive Connector (that is, it currently cannot transmit or receive data).

Table 2-3 Default Port Settings

	UTP	SFP w/ 100 Mbps Optics	SFP w/ 1000 Mbps Optics	SFP w/ Multispeed Optics (100 to 1000)
User Ports	Auto	100 FD	1000 FD	1000 FD
Network Ports	N/A	100 FD	1000 FD	1000 FD
OOB Ports	Auto	N/A	N/A	N/A

NOTE: Cells in yellow denote connectors that are active by default.

2.6 Power Connectors

The 9145EMP will accommodate both single and redundant AC and DC powering options, along with mixed AC and DC power.

2.6.1 Power Requirements

100 VAC to 240 VAC (auto-ranging), 50/60 Hz, 0.5 Amps (9145EMP only)

36 VDC to 72 VDC, 1.0 Amps

18 VDC to 36 VDC, 2.0 Amps

2.6.2 Single AC Power Base Unit

The Single AC powered 9145EMP base unit (Figure 2-4) has an IEC 320 power connector on the rear panel. An appropriate AC power cord is supplied with the unit.



Figure 2-4 Single AC Power

2.6.3 Redundant AC Power Base Unit

The Redundant AC powered 9145EMP base unit (Figure 2-5) has two power connectors on the rear panel. Appropriate AC power cords are supplied with the unit.



Figure 2-5 Redundant AC Power

2.6.4 Single DC Power Base Unit

The Single DC powered 9145EMP base unit (Figure 2-6) has a three terminal receptacle on the rear panel. A DC terminal block is supplied with the unit.



Figure 2-6 Single DC Power

2.6.5 Redundant DC Power Base Unit

The Redundant DC powered 9145EMP base unit (Figure 2-7) has two three terminal receptacles on the rear-panel. Two DC terminal blocks are supplied with the unit.

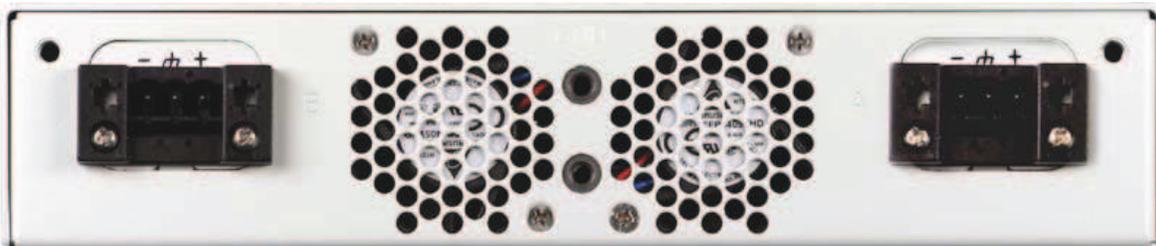


Figure 2-7 Redundant DC Power

2.6.6 AC/DC Power Base Unit

The AC/DC powered 9145EMP base unit (Figure 2-8) has two power interfaces on the rear-panel, one that supports DC power input and one that supports an AC power input. An appropriate AC power cord and a DC terminal block are supplied with the unit.

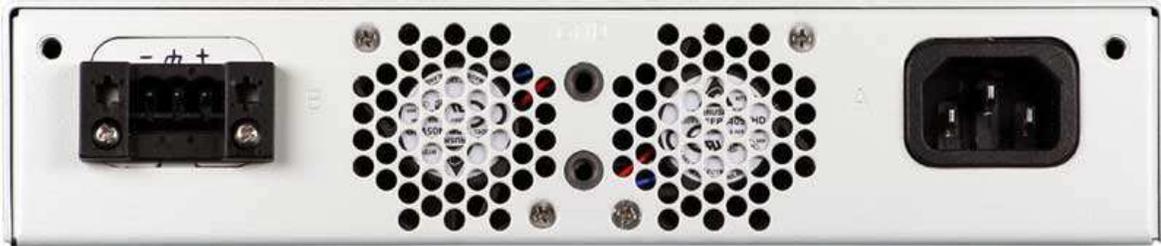


Figure 2-8 AC/DC Power

2.7 LED Indicators

The following paragraphs describe the functions of the LED indicators (Figure 2-9) on the 9145EMP base unit.

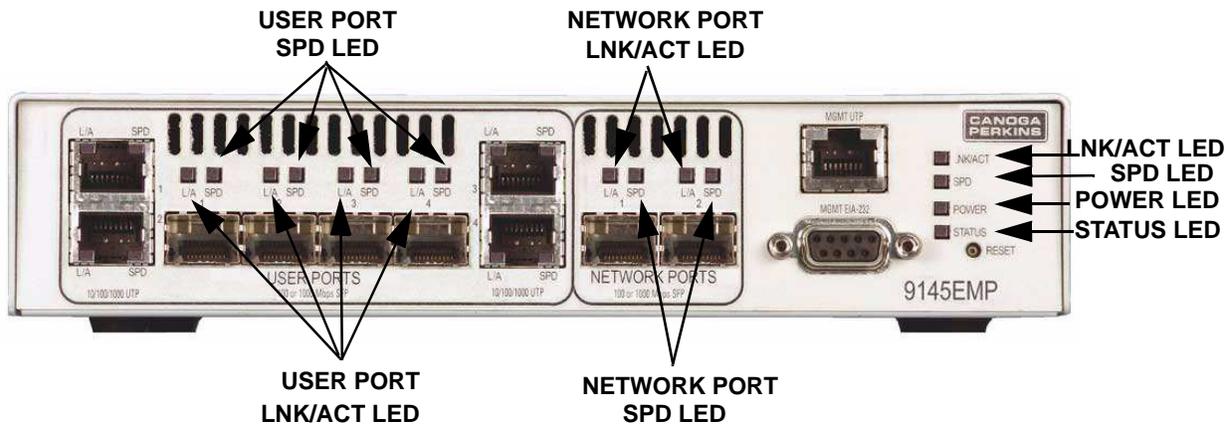


Figure 2-9 LED Indicators

2.7.1 Management Section LEDs

The Link/Activity (LNK/ACT) front panel LED, located to the right of the MGMT UTP Port, indicates the presence of transmit or receive activity. The Speed (SPD) front panel LED, located directly below the LINK/ACT LED, indicates the speed of the transmissions.

Table 2-4 Ethernet Management, Status, and Power LED Indicators

LED Name	State	Condition
Speed (SPD)	Off	10 Mbps
		Auto negotiate or no link
		Port disabled
	Amber	100 Mbps
		System is booting
Slow Blinking Green*	Port enabled but no link	
Link/Activity (ACT)	Off	No link
		No transmit or receive activity
	Green	Link on with full duplex
	Blinking Green	Transmission or receiving activity with full duplex
	Amber	System is booting
		Link on with half duplex
Blinking Amber	Transmission or receiving activity with half duplex	
* Slow blinking green means the LED toggles between Off and Green approximately once per second.		
Status	Off	No power
	Green	Normal operation
	Amber	System self-test in progress
	Blinking Amber	System is booting
	Red	Major alarms including link loss at any User or Network port
Blinking Red	Critical alarms requiring immediate user intervention, e.g., the failure of one of the redundant power supplies, temperature or voltage out of range alarms, or a fan failure	
Power (PWR)	Off	Power is off
	Green	Power is on
	Amber	One power supply failed in a redundant power supply configuration
	Red	One of the board supply voltages has exceeded a threshold value

2.7.2 Data Interface Section LEDs

Table 2-5 describes the LED indicators for the SPD and ACT LEDs of User Ports. Table 2-6 describes the LED indicators for Network Ports. Indications apply to both the SFP and UTP LEDs.

Table 2-5 User Port LED Indicators

LED Name	State	Condition
Speed (SPD)	Off	10 Mbps (UTP connectors only)
		Auto negotiate
		Port disabled
	Green	1000 Mbps
	Amber	100 Mbps
		System Test
	Slow Blinking Green*	Port enabled but no link
	Red	Remote fault (SFP connectors only)
Blinking Red	Invalid/unsupported SFP installed (SFP connectors only)	
Activity (ACT)	Off	No link
		No transmit or receive activity
		Port disabled
	Green	Link up with full duplex
	Blinking Green	Transmit or receive activity in full duplex
	Amber	System test
		Link up with half duplex
	Blinking Amber	Transmit or receive activity in half duplex
		Link down but transmitting OAM packets in unidirectional mode (UTP connectors only)
Blinking Red	Link down but transmitting OAM packets in unidirectional mode (SFP connectors only)	

* Slow blinking green means the LED toggles between Off and Green approximately once per second.

Table 2-6 Network Port LED Indicators

LED Name	State	Condition
Speed (SPD)	Off	Port Disabled
		Autonegotiate
	Green	1000 Mbps
	Amber	100 Mbps
		System Test
	Slow Blinking Green*	Port Enabled But No Link
	Red	Remote Fault
	Blinking Red	Invalid/unsupported SFP installed
Activity (ACT)	Off	No link
		No transmit or receive activity
		Port disabled
	Green	Link up with full duplex
	Blinking Green	Transmit or receive activity in full duplex
	Amber	System test
		Link up with half duplex
	Blinking Amber	Transmit or receive activity in half duplex
Blinking Red	Link down but transmitting OAM packets in unidirectional mode	

* Slow blinking green means the LED toggles between Off and Green approximately once per second.

Chapter 3

Installation

3.1 9145EMP Installation Procedures

This section describes how to unpack, install, and set up the 9145EMP. Before setting up the 9145EMP, make sure a 9 pin EIA-232 cable is available to connect the 9145EMP's console port to a VT100 type terminal or PC for setup and configuration.

Keep the shipping container and all packing materials until the unit is installed and fully operational. In the event that the unit needs to be returned, contact Canoga Perkins Customer Service for a Return Authorization Number (RMA) and instructions for return shipment.

CAUTION: Follow electrostatic discharge (ESD) safety precautions when handling Canoga Perkins products, as with all electronic devices with static sensitive components.

3.2 Unpacking

Open the shipping container, remove the accessories tray, and remove the accessories from the tray (Figure 3-1). Lift the 9145EMP out of the shipping container and remove the foam end caps from the unit. Return all packing materials to the shipping container and put it in a safe place in the event the unit needs to be returned.

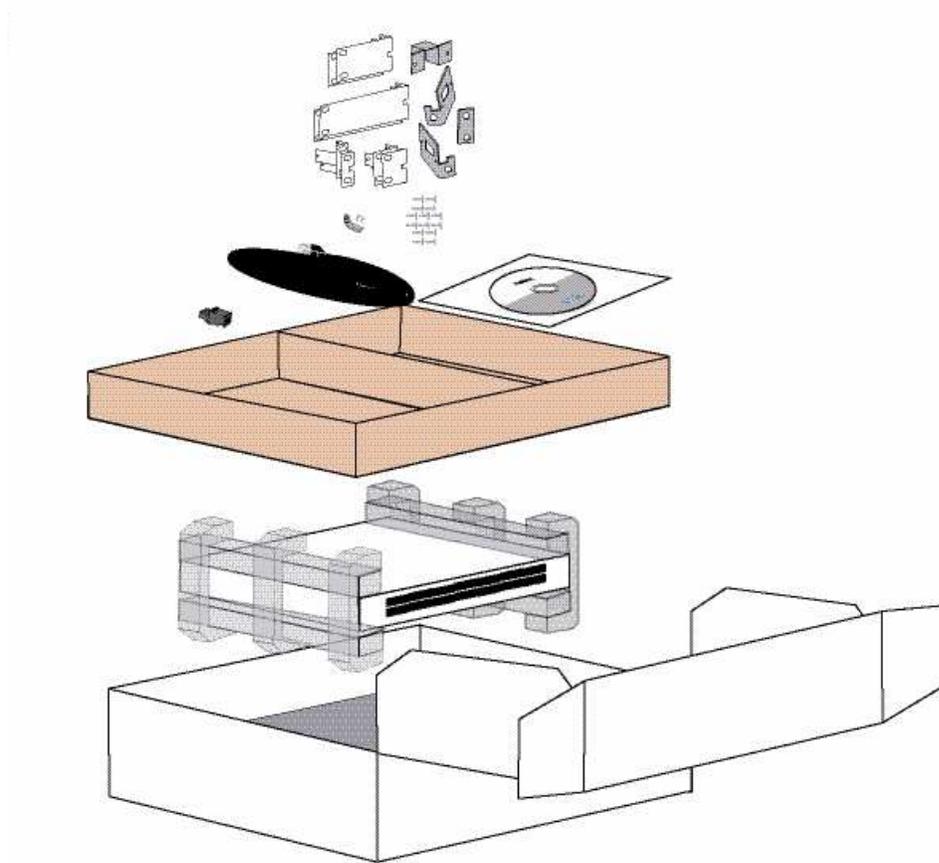


Figure 3-1 Unpacking the 9145EMP

3.3 Mounting Options

The 9145EMP can be rack mounted, wall mounted, or placed on any horizontal flat surface such as a shelf or table.

3.3.1 Rack Mounting

One 9145EMP can be mounted in either a 19" rack or a 23" rack, and two 9145EMPs can be mounted side by side in either a 19" rack or a 23" rack. Rack mounting kits (Table 3-1) are available for each of the four rack mounting possibilities. Each rack mount kit contains the brackets necessary for installing the 9145EMP (Figure 3-2), as well as the mounting hardware required to attach the brackets to the unit(s). Rack mount screws are provided by the rack manufacturer.

Table 3-1 Rack Mount Kits

Rack Mount Kit	Part Number	Component	Part Number	Qty
Rack Mount Bracket Kit, 19" Single Unit	1802-2016	Bracket, rack mount,single, 19"	6213614-119	2
		Screw, flat head,8-32 x 0.25"	80680041	4
Rack Mount Bracket Kit, 23" Single Unit	1802-2017	Bracket, rack mount,single, 23"	6213614-123	2
		Screw, flat head,8-32 x 0.25"	80680041	4
Rack Mount Bracket Kit, 19" Dual Unit	1802-2019	Bracket, rack mount,dual, 19"	6213614-219	2
		Screw, flat head,8-32 x 0.25"	80680041	4
		Bracket, rack mount, center	6213615	2
		Strap, rack mount, center	6213616	1
		Bracket, rack mount, dual, rear	6213617	1
		Screw, flat head, 8-32 x 0.25", SS, Phillips	80680041	4
		Screw, pan head, 8-32 x 0.25", SS, Phillips	80880041	4
Rack Mount Bracket Kit, 23" Dual Unit	1802-2021	Bracket, rack mount,dual, 23"	6213614-223	2
		Bracket, rack mount, center	6213615	2
		Strap, rack mount, center	6213616	1
		Bracket, rack mount, dual, rear	6213617	1
		Screw, flat head, 8-32 x 0.25", SS, Phillips	80680041	4
		Screw, pan head, 8-32 x 0.25", SS, Phillips	80880041	4

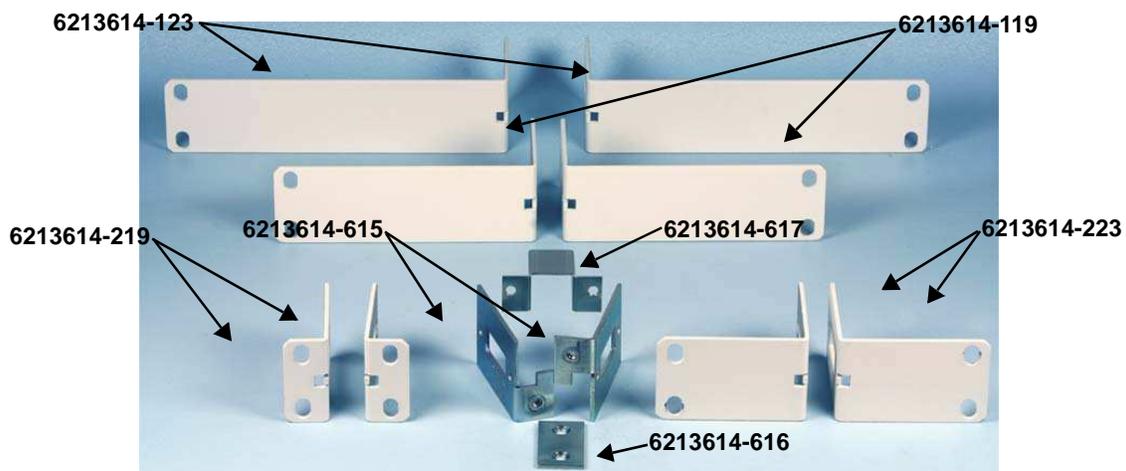


Figure 3-2 9145EMP Rack Mounting Brackets

Mounting One 9145EMP in a 19" or 23" Rack - To rack mount one 9145EMP, perform the following steps:

1. Install the 19" Single Unit or 23" Single Unit Rack Mount Bracket Kit. The Rack Mount Kit includes two mounting brackets, and the screws required to attach the brackets to the 9145EMP. The brackets attach to the two threaded holes on each side of the 9145EMP, toward the front (Figure 3-3) using the flat head screws provided. Torque the flat head screws to 14.5 – 15.5 in-lb.



Figure 3-3 Install Rack Mount Kit

2. Place unit with brackets attached in place on the mounting rack.
3. Install two screws through each bracket into the threaded holes on the mounting rack (Figure 3-4). Torque the screws to the rack manufacturer's specifications.

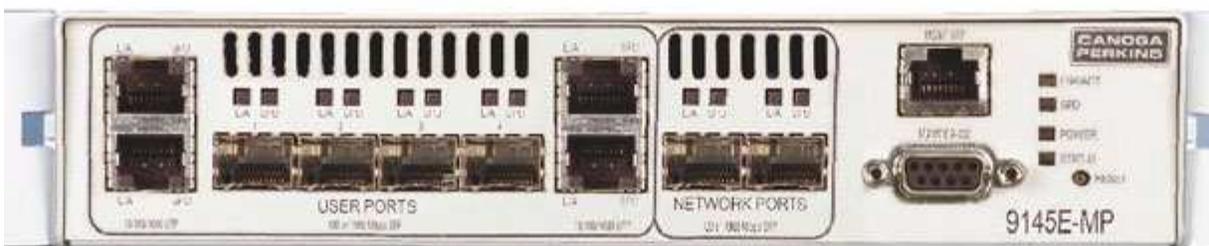


Figure 3-4 Mounting 9145EMP on Rack

Mounting Two 9145EMPs, Side by Side, in a 19" or 23" Rack - To rack mount two 9145EMPs, perform the following steps:

1. Install the 19" Dual Unit or 23" Dual Unit Rack Mount Bracket Kit. The Rack Mount Kit includes two rack mount brackets, two center brackets, a strap, a rear bracket, and the screws required to attach the brackets to the 9145EMPs. The mounting brackets attach to the two threaded holes on the outside of each 9145EMP, toward the front (Figure 3-3). The two center brackets attach to the two threaded holes on the inside of each 9145EMP, and the strap mounts over the front of each center bracket (Figure 3-5). The rear center bracket is attached to the threaded holes at the top inside corner of the back of each 9145EMP (Figure 3-6).

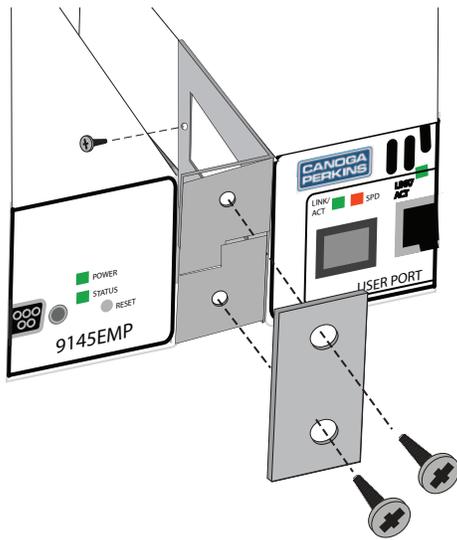


Figure 3-5 Install Center Brackets and Strap

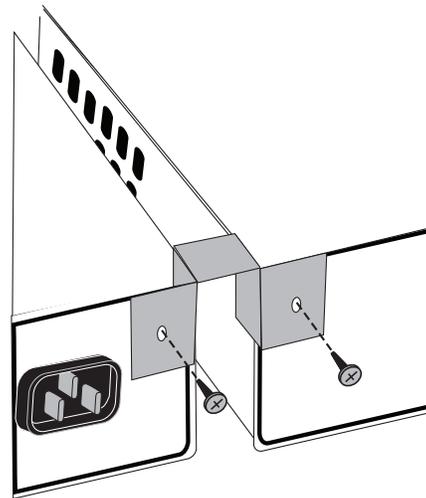


Figure 3-6 Install Rear Center Bracket

2. Place unit with brackets attached in place on the desired mounting rack.
3. Install two screws through each bracket into the threaded holes of the mounting rack (Figure 3-7). Torque the screws to the rack manufacturer's specifications.

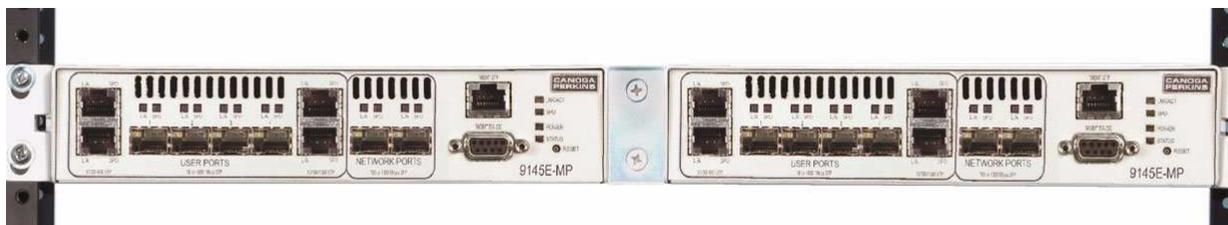


Figure 3-7 Mounting Two 9145EMPs on Rack

3.3.2 Wall Mounting

CAUTION: Fasteners used for wall mounting of the 9145EMP are required to withstand a force of three times the weight of the 9145EMP, applied in any direction. Failure to meet these requirements could result in damage to the equipment.

The bottom panel of the 9145EMP is designed with keyhole cutouts to accommodate wall mounting. A template is provided with the Quick-Start Guide so that the installer can precisely fasten mounting screws onto a wall. Two number 8 screws and wall anchors, which are not provided by Canoga Perkins, are used for wall mounting. The keyholes are designed so that the 9145EMP unit can be mounted in three positions: with front panel facing the floor, to the right or to the left (Figure 3-8).



Figure 3-8 Wall Mounting Cutout Locations

Assure that there is enough unobstructed space around the perimeter of the 9145EMP to allow for adequate airflow and servicing. Install the 9145EMP on a wall as follows:

1. Tape the template (Figure 3-9) to the wall, ensuring that the edge of the template corresponding to the direction you wish to mount the unit is parallel to the floor and ceiling.
2. Drill a hole through the center of each hole position marker on the template.
3. Remove the template from the wall
4. Install a screw anchor in each drilled hole, then install a #8 screw into each anchor. Leave the screws protruding from the wall approximately 1/8".
5. Place the keyholes of the 9145EMP over the screws, then slide the unit down to lock it into position on the screws.

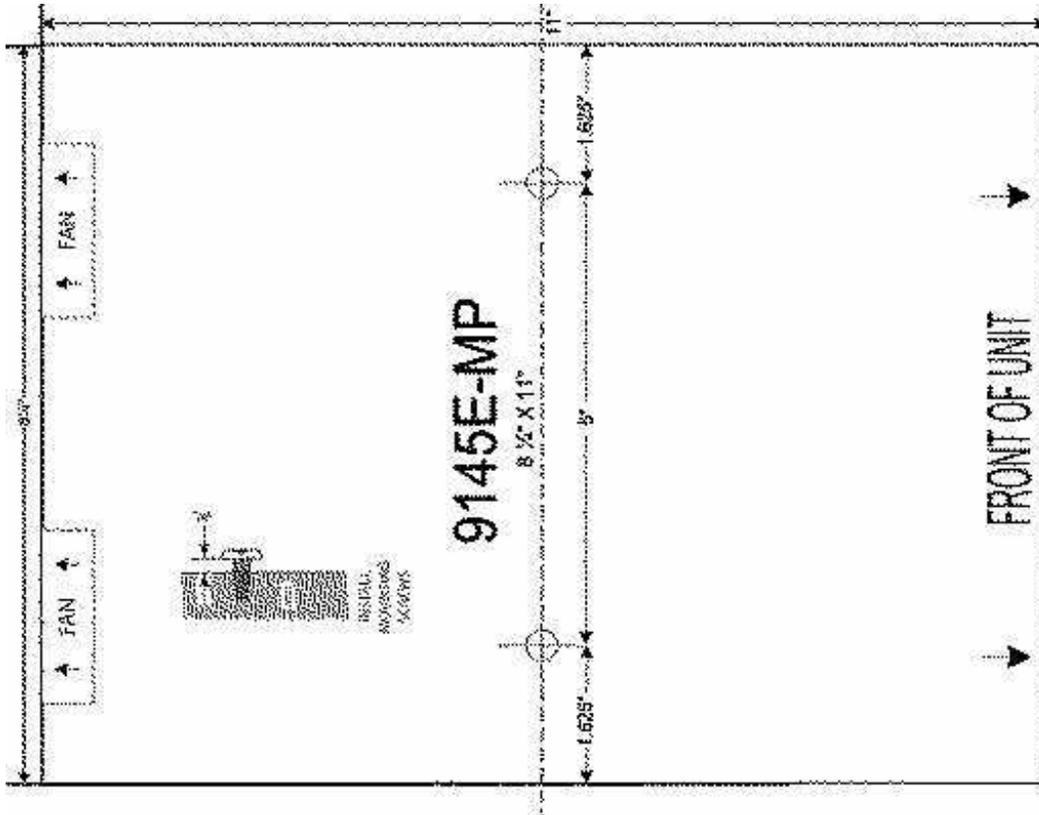


Figure 3-9 9145EMP Wall Mount Template

3.3.3 Horizontal Flat Surface Mounting

The 9145EMP requires at least one inch of unobstructed space around the perimeter for ventilation. Canoga Perkins recommends a space of 3 to 5 inches be left unobstructed to allow for SFP module access, cable access and power connections. To install the 9145EMP on a flat surface, place the 9145EMP on a secure flat surface such as a table, a shelf, or a desk within reach of the power and fiber optic cables. Connect the power and fiber optic cables to the 9145EMP as required.

3.4 Installing the SFP Modules

1. Determine which SFP Module(s) is/are required for the User and Network Ports by referencing the SFP Product Data Sheet.
2. Insert a module into each available port and push firmly to seat module (Figure 3-10).
3. Raise latch to lock module in place.



Figure 3-10 SFP Modules

3.5 Connecting the Electrical Power

NOTE: When power is applied, all LED indicators will light amber.

3.5.1 AC Power

NOTE: Country specific power cords are available locally for installations outside of North America.

The 9145EMP uses a standard IEC320 AC Power Connector. Plug the AC power cord into the socket at the rear of the 9145EMP and plug the other end of the AC power cord into a convenient AC outlet.

3.5.2 DC Power

CAUTION: *The 48VDC 9145EMP is only intended to be used in a restricted access location in accordance with Articles 110-16, -17, and -18 of the National Electric Code ANSI/NFPA 70.*

NOTE: The DC Power Terminal Block is removable for ease of installation and replacement. It is recommended the Terminal Block be removed when connecting power to avoid accidentally crossed or shorted power leads from damaging the 9145EMP or your DC power source.

The 9145EMP is shipped with a compatible DC Power terminal block. Connect DC power to the 9145EMP as follows (Figure 3-11):

NOTE: The 9145EMP supports both Positive and Negative grounded DC power.

1. Loosen the terminal screws for +, -, and GND
2. Slide the wires one at a time (green = GND, red = +, black = -) into the square openings in the bottom of the terminal block.
3. Tighten the terminal screws as wires are installed.
4. Use an ohmmeter to verify that power leads are not shorted to GND.
5. Connect the + and - wires to the power source.
6. Insert the terminal block into the DC power receptacle at the rear of the 9145EMP.



Figure 3-11 Connect DC Power

3.5.3 Grounding

A grounding lug kit is included in the 9145EMP accessory tray. Connect a 6AWG grounding cable to the 9145EMP as follows (Figure 3-12):

1. Strip approximately $\frac{3}{4}$ -inch of insulation from the end of the grounding cable.
2. Twist the exposed wires together and trim the ends off evenly.
3. Insert exposed wire into the grounding lug until it bottoms out inside the barrel.
4. Position the crimping tool over the center of the grounding lug, with the lug in the crimping tool's proper crimp pocket.
5. Squeeze handles firmly until grounding wire is secured within the grounding lug.
6. Insulate the grounding connection as required.
7. Align the screw holes in the grounding lug with the mounting holes at the center of the back of the 9145EMP.
8. Install the two screws included with the grounding lug kit. Torque screws to 14.5 – 15.5 in-lb.



Figure 3-12 Install Grounding Lug

3.5.4 Connecting the Fiber Optic and UTP Ethernet Cables

3.5.4.1 Optical Fiber Cable Installation

NOTE: To avoid damaging the fiber end-surface or connector, use extreme care when installing or removing cables.

Connect the Optical Fiber cables to the SFP modules as follows:

1. Plug in the optical cables with proper Tx to Rx or Rx to Tx orientation.
2. Ensure connector locks in place.
3. Label each cable with the signal direction (TX or RX).

3.5.4.2 UTP Cable Installation

Connect the UTP cables to the RJ45 connectors as follows:

1. Plug the UTP Cable into the RJ45 connector.
2. Be sure the locking tab is properly seated.

Chapter 4

Operation

4.1 Power-Up and Front Panel Functions

The LEDs on the front panel indicate the system and port status of the 9145EMP (Figure 4-1). During power-up, all LEDs on the 9145EMP will light amber. When power-up has been completed, the LEDs will display status as described in the following paragraphs. Additional information about fault conditions appears in the System Alarms and System Status and Configuration screens (see the 9145EMP NID Software User's Manual).

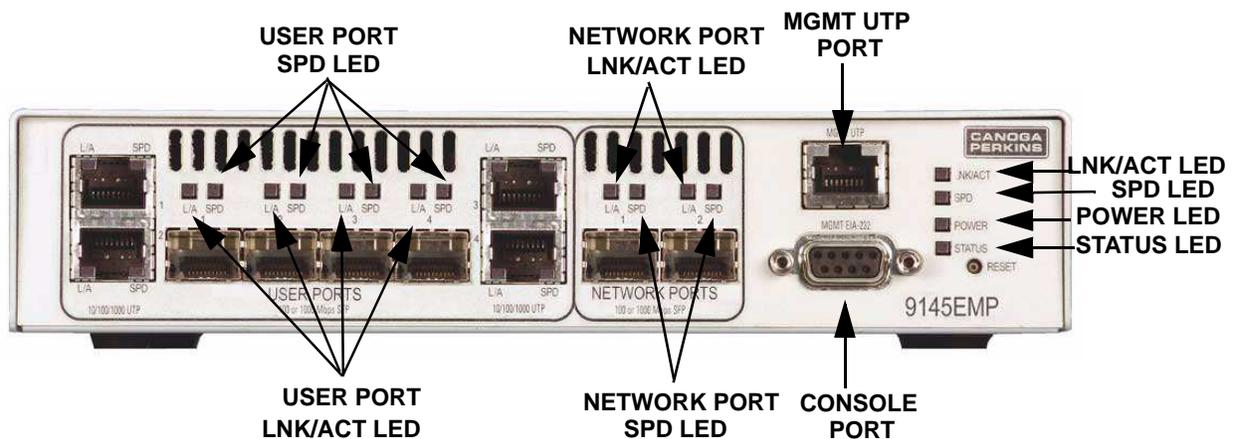


Figure 4-1 9145EMP Status Indicators

4.1.1 Power and Status LEDs

The power and status LEDs, located to the right of the console port (Figure 4-1), indicate condition and state of the 9145EMP.

Table 2-4 describes the significance of LED conditions. Table 2-5 describes the LED indicators for the SPD and ACT LEDs of User Ports. Table 2-6 describes the LED indicators for Network Ports.

4.2 Interface Management

The 9145EMP is managed locally through the console port and remotely either through the Management UTP port or inband via the Network Ports. The console port is connected to a VT-100 terminal, through an emulation program, through the RS-232 serial port using a DE-9 cable. UTP is an out-of-band 10/100 Mbps port supporting Telnet, SSH, and SNMP V1/V2C/V3 that is used for network management.

4.2.1 Setting Up the VT-100 Terminal

When using the console port, you can use the HyperTerminal Emulation program that is included with Microsoft Windows operating systems. The Telnet session is only available after the management TCP/IP configuration is completed.

NOTE: The Microsoft Vista operating system does not include HyperTerminal. If your terminal interface computer uses Windows Vista, you will need to use a separate terminal emulation program.

The following steps describe how to set up HyperTerminal on your PC.

1. Select **Start>All Programs>Accessories>Communications>HyperTerminal**. The New Connection - HyperTerminal window will open.
2. Enter a name for the connection to the system in the Name box, select an icon to identify this connection on your desktop, and click **OK**. The Connect To window will open.
3. Select **COM** from the Connect using drop down menu, and click **OK**. The Com1 Properties window will open.
4. At the COM 1 Properties window, on the Port Settings tab, select the following from the appropriate dropdown menus, then Click **Apply**:
 - **Bits per second:** 9600 bps
 - **Data bits:** 8
 - **Parity:** None
 - **Stop bits:** 1
 - **Flow control:** None
5. Click **OK**. HyperTerminal connects to the system and VT100 terminal emulation starts.
6. In the Hyperterminal window, select the Properties button from the tool bar, select the Settings tab, select VT100 from the Emulation drop down menu, and click **OK**.
 - The default username is admin.
 - The default password is admin (case sensitive).

Chapter 5

Troubleshooting

This chapter covers identifying fault conditions and determining corrective action.

The front panel LEDs provide both normal and fault information. For a description of all LED functions and indicators, see Table 2-4, Table 2-5, and Table 2-6.

5.1 Optical Power Loss

Whenever there is a significant signal loss, the Rx indicator turns off. Check cable integrity, and remove and inspect the cable connectors, being careful not to damage the fiber end-face surface or the connector housing. Clean all optical connectors before reinstalling them.

5.2 Fault Conditions

The 9145EMP front panel and interface module LEDs show fault conditions. Additional information about fault conditions appears on the System Alarms Log. Use the System Alarms Screen to view alarms and faults on the 9145EMP. (For more details, see the 9145EMP NID Software User's Manual.)

5.3 Running Diagnostics

When you set up a new connection, you can verify the link connectivity using PING prior to sending data.

5.3.1 PING Testing

You can verify network connectivity with another IP device within the subnet by sending a PING to the IP address for that device. For PING testing instructions, see the 9145EMP NID Software User's Manual.

5.4 Loopback Diagnostics

Use Loopbacks to diagnose a fault on the optical link. Loopbacks can be set at any port; once a port is in loopback mode, data is looped at the physical level through the particular port. When performing loopback diagnostics, the 9145EMP uses a unique MAC address, designated as the Loop Test MAC Address, which is displayed on the Loopback Setup Screen (see the 9145EMP NID Software User's Manual). When in loopback mode, the 9145EMP filters and discards all service frames. Only packets with the predefined Loop Test MAC Address are looped back.

The 9145EMP is configurable to swap the origination and destination MAC Addresses and to recalculate the looped frame's CRC. Test packets are returned to the source according to the selected options.

To display current loopback status, configure address swapping and CRC recalculation options, see the 9145EMP NID Software User's Manual.

Chapter 6

Maintenance

6.1 General Maintenance

Well maintained components and clearly identified cables help assure optimum system operation. Damaged fiber optic cables and dirty connectors are a common source of signal loss or attenuation. Fiber optics are especially susceptible to contamination. Inspect, clean, and test all components to maintain optimum performance. Inspect the surface of the fiber optic ferrules and clean as required.

CAUTION: *To avoid damage and signal loss, do not over-tighten or force-fit optical connectors.*

6.2 Check Optical Power Levels

NOTE: For accurate results, warm up each unit for at least 30 minutes before checking power levels. Ensure the Transmit laser is turned on when the unit is powered up.

To ensure proper performance levels, measure Transmitter Output Power, Receiver Input Power, and attenuation for all fiber links. Each 9145EMP is shipped with a document that lists the output power for each optical transceiver.

6.2.1 Measuring Transmitter Output Power

To measure the output power, follow these steps (see Figure 6-1):

1. Inspect and clean connectors on a fiber optic test cable with a known loss, then connect it to the Tx connector on the 9145EMP.
2. Set the optical power meter to the proper wavelength.
3. Connect the other end of the optic test cable to the optical power meter, wait two or three minutes for the power reading to stabilize, and read the output power.
4. Add the test cable loss, then record the power level and compare it to the value on the performance sheet that was included for that transceiver. Measurement tolerance is +/- 0.5 dBm.

5. If the reading is low, repeat the measurement with a different test cable. If the power level is still not within range, call Canoga Perkins Technical Support.

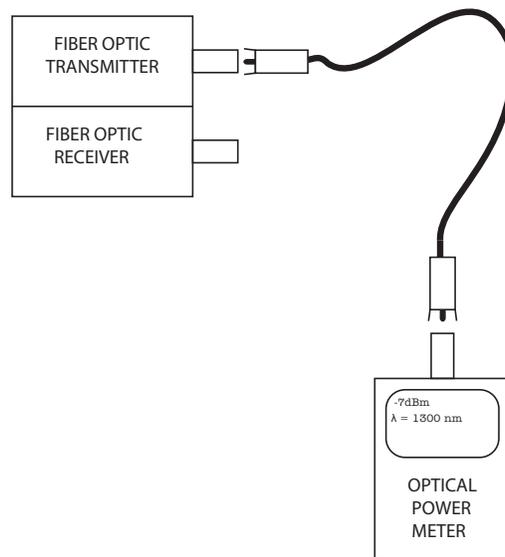


Figure 6-1. Measuring Transmitter Output Power

6.2.2 Measuring Receiver Input Power

To measure receiver input power, follow these steps:

1. Connect the transmit fiber to the transmit side of the equipment at the local site.
2. Connect a calibrated optical power meter to the end of the transmit fiber at the remote site.
3. Measure and record the optical power on the transmit fiber at the remote site. This is the receiver input power for the transmit fiber from the local site.
4. Connect the transmit fiber to the transmit side of the equipment at the remote site.
5. Connect a calibrated optical power meter to the end of the transmit fiber at the local site.
6. Measure and record the optical power on the transmit fiber at the local site. This is the receiver input power for the transmit fiber from the remote site.
7. Compare the receiver input power with the sensitivity level listed on the optical specifications sheet, located in the Client Support Area of the Canoga Perkins web site. The power level must be within the sensitivity range listed on the data sheet. If not, contact Canoga Perkins Technical Support.
8. Compare the receiver input power to the receiver's saturation (overdrive) level shown on the optical specifications sheet, located in the Client Support Area of the Canoga Perkins web site. The power level must be lower than the saturation level. If not, contact Canoga Perkins Technical Support.

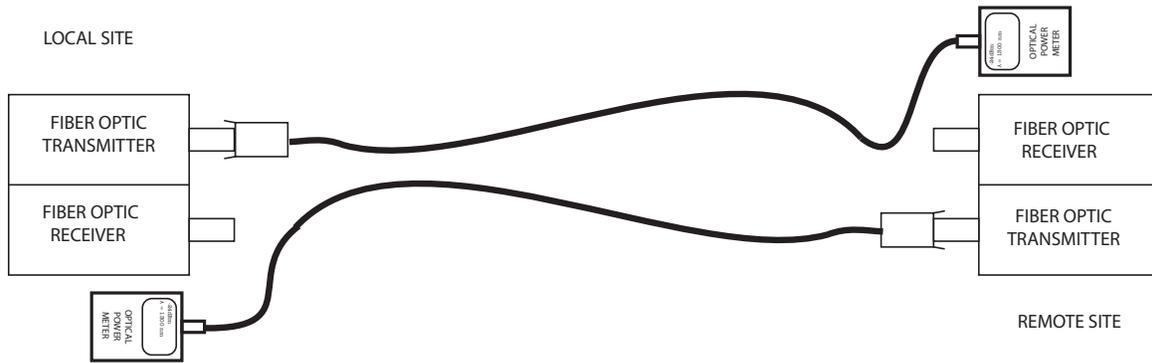


Figure 6-2. Measuring Receiver Input Power

6.2.3 Calculating Fiber Link Attenuation

Link attenuation measurement identifies potential problems with links that are on the threshold of receiver sensitivity. Measure optical fiber links at the shortest wavelength of operation, as it is the limiting factor in the loss budget. Use a power meter calibrated for the laser source, then factor in approximately 1 dB for the connector loss from the patch cables between the 9145EMP and the local device. (Each fiber connection can generate 0.5 dB of additional loss.)

NOTE: If you cannot determine the Rx sensitivity, contact Canoga Perkins Technical Support for assistance.

Follow these steps to calculate fiber link attenuation:

1. Determine transmitter output power as described in paragraph 6.2.1 above.
2. Determine receiver input power as described in paragraph 6.2.2 above.
3. Subtract receiver input power from transmitter output power. The result is the fiber link attenuation.

Transmit Output Power	-7.0 dBm
Receiver Input Power	-28.2 dBm
Fiber Link Attenuation	<u>21.2 dB</u>

CANOGA PERKINS CORPORATION



20600 Prairie Street
Chatsworth, California 91311-6008 USA
Phone: (818) 718-6300 FAX: (818) 718-6312
Web Site: www.canoga.com
Email: fiber@canoga.com