Installation Guide for the Model EN516 Ethernet Hub

NETGEAR

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M-EN516NA-1
September 2000

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To contact customer support or to purchase additional copies of this document and publications for other NETGEAR products, you can contact NETGEAR at the following numbers:

Phone

Australia: 1800-787-638
Austria: 00800-06384327 (00800-0-NETGEAR)
Denmark: 808-82179
Canada: 1-888-NETGEAR
Finland: 0800-111-036
France: 0800-77-17-53
Germany: 00800-06384327 (00800-0-NETGEAR)
Hong Kong: 001-800-1233-4566
Japan: 0120-66-5402
Korea: 00308-11-0319
Netherlands: 0800-023-0981
New Zealand: 00800-1233-4566
Norway: 800-12041
Singapore: 001-800-1233-4566
Sweden: 0200-298-298
Switzerland: 00800-0638-4327 (00800-0-NETGEAR)
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World Wide Web

NETGEAR maintains a World Wide Web Home Page that you can access at the universal resource locator (URL) http://www.NETGEAR.com. A direct connection to the Internet and a Web browser such as Mosaic or Netscape are required.

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Chapter 1
Introduction

Congratulations on your purchase of the NETGEAR™ Model EN516 Ethernet Hub. The Model EN516 hub is part of the NETGEAR 500 Series product family, which delivers standards-based, plug-and-play networking solutions for small businesses, home offices, and low-density workgroups of larger companies.

This guide describes how to install and use the hub and includes physical configuration guidelines for stacking hubs, connecting Ethernet stations, and making network connections.

This guide is intended for individuals who have the following background and experience:

- Working knowledge of Ethernet
- Familiarity with 10BASE-T specifications

Features

Featuring a compact design, the Model EN516 hub offers all the features of a standard equipment rack-mount hub at a significantly lower cost.

These features include:

- Sixteen IEEE 802.3-compliant 10BASE-T ports, providing effective information exchange, resource sharing, and a client/server or peer-to-peer applications solution with simple unshielded twisted pair (UTP) wiring
- Attachment unit interface (AUI) or coaxial BNC backbone support for connecting to an existing Ethernet segment or external transceiver, or for network expansion
- Normal/Uplink push button for simplifying network extension and connecting with other hubs

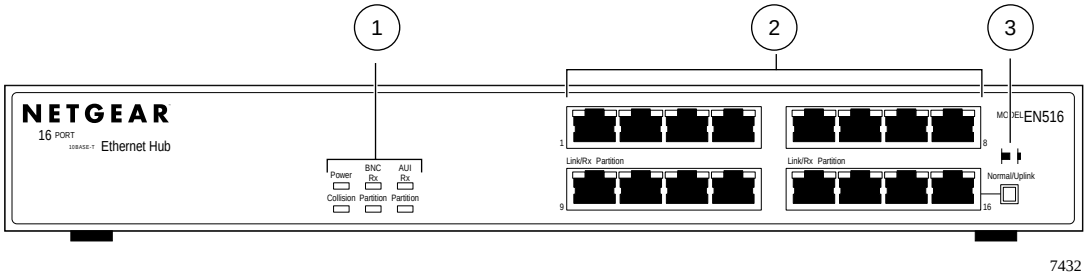
- Built-in 100-240 V switching power supply, eliminating the need for bulky wall transformers
- Thirty-eight front panel light emitting diode (LED) indicators, providing real-time status of the individual ports and overall hub status
- Plug-and-play with no software to configure
- Hub functions such as packet retiming, collision detection, preamble regeneration, and fragment extension
- Automatic partitioning and reconnection of a port that has excessive collisions or is jabbering
- Automatic polarity detection for recognizing and correcting incorrect polarity on the receive pair
- Ability to expand the network size by connecting multiple hubs together using twisted pair or coaxial cabling
- Compact design, enabling easy tabletop or rack-mounting installation
- Limited five-year warranty on the unit and one-year warranty on the power supply

Chapter 2
Physical Description

This chapter describes the hardware features of the Model EN516 hub. The discussion of the physical components of the hub is divided into two sections, “Front Panel” and “Rear Panel.” Use the key at the bottom of each illustration to identify the associated component.

Front Panel

The front panel contains LEDs, 16 RJ-45 10BASE-T port connectors, and a Normal/Uplink push button (Figure 2-1).



Key:
1 = LEDs (Power, BNC Rx, AUI Rx, Collision, BNC Partition, and AUI Partition)
2 = RJ-45 ports with Link/Rx and Partition LEDs on each port
3 = Normal/Uplink push button

Figure 2-1. Front panel of the Model EN516 hub

LED Indicators

There are six LEDs on the front panel of the hub and two on each port connector that allow you to identify:

- Status of the hub AC power supply
- Operational status of the hub
- Collision occurrence on an Ethernet segment indicating activity level
- Partitioning of a port as a result of excessive collision occurrence
- Data utilization of the Ethernet segment in a standalone hub or a stack of hubs
- Link and receive activity status for all ports in the hub

Table 2-1 describes each LED on the front panel of the hub.

Table 2-1. LED descriptions

Label	Color	Activity	Description
Power	Green	On	Power is supplied to the hub.
BNC Rx	Green	Blinking	There is incoming data on the BNC port.
AUI Rx	Green	Blinking	There is incoming data on the AUI port.
Collision	Yellow	Blinking	There is data collision on the network. Note that occasional collisions are normal.
BNC Partition	Yellow	On	The BNC port is being partitioned because of excessive collisions, or when the BNC port is not connected.
AUI Partition	Yellow	On	The AUI port is being partitioned because of excessive collisions.
Link/Rx (located on top left corner of each RJ-45 port)	Green	On	The link between this port and the other connecting port is good.
		Blinking	There is incoming data on the port.
Partition (located on top right corner of each RJ-45 port)	Yellow	On	The port is being partitioned because of excessive collisions.

RJ-45 Ports

The front panel of the Model EN516 hub provides 16 RJ-45 10BASE-T ports. Two LEDs, the Link/Rx LED and the Partition LED, are positioned at the top corners of each RJ-45 connector. Both LEDs are described in Table 2-1.

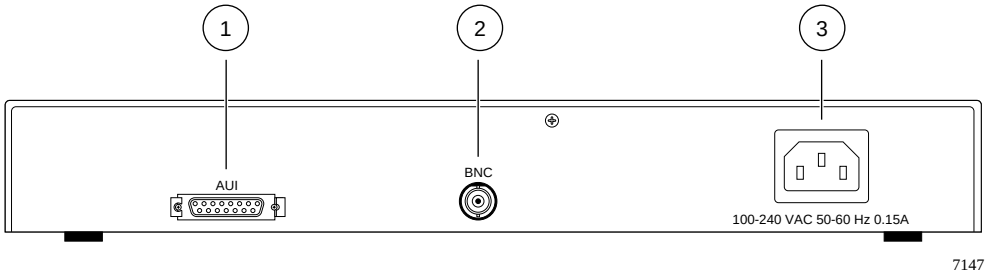
Normal/Uplink Push Button

The Normal/Uplink push button on the Model EN516 hub allows you to select Normal (MDI-X) or Uplink (MDI) wiring for port 16, eliminating the need to use a crossover cable to connect similarly wired devices. Port 16 is configured for Normal wiring when the push button is in the out position. When the push button is pressed in, Port 16 is configured for Uplink wiring.

Ports 1 to 15 on the hub cannot be configured for Uplink wiring. If you are using one of these ports to connect to a Normal port in another hub, you must use an RJ-45 crossover cable to connect the two ports. See Figure B-2 for crossover cable information.

Rear Panel

The rear panel of the Model EN516 hub (refer to Figure 2-2) provides two ports, the AUI port and the BNC port. You can use the AUI port with the appropriate transceiver to connect the hub to a backbone network using thin coaxial cable, thick coaxial cable, fiber optic cable, or 10BASE-T wiring. You can use the BNC port to connect to a backbone network or other PCs using thin coaxial cable. The rear panel also includes an AC power receptacle. The hub accepts between 100 and 240 V AC, 50/60 Hz.



Key:
1 = AUI port
2 = BNC port
3 = AC power receptacle

Figure 2-2. Rear panel of the Model EN516 hub

Chapter 3
Installation

This chapter provides information on:

- Preparing the site
- Package contents
- Required tools
- Installing the hub
- Connecting the hub
- Completing and verifying the installation

Preparing the Site

Before you begin installing the Model EN516 hub, prepare the installation site. Make sure the operating environment meets the physical requirements of the hub. The ambient temperature must be between 0°C and 40°C. The maximum relative humidity must not exceed 90%.

You can install the hub on a flat surface, such as a tabletop or shelf, or within a standard 19-inch rack. You should ensure that the front and rear panel of all units to be connected are easily accessible for connecting cables and power and for monitoring the LED indicators.

Package Contents

The package should contain the following items:

- Model EN516 hub
- This manual

- AC power cord
- Rack mount kit
- Four rubber pads for installation on a flat surface
- One BNC T-connector
- One BNC terminator
- Warranty and Owner Registration Card

Caution: Use the appropriate power cord as required by your national electrical codes and ordinances.

Call your dealer if there are any wrong, missing, or damaged parts. Keep the carton, including the original packing materials. Use them to repack the hub if there is a need to return it for repair.

Be sure to complete the Owner Registration Card and return it to NETGEAR to qualify for product updates and product warranty registration.

Required Tools

To install the hub on a flat surface, you do not need any special tools. However, to install the hub in a rack, you need the following tools:

- #1 Phillips screwdriver to attach mounting brackets
- #2 Phillips screwdriver to tighten mounting screws

Installing the Hub

To install the Model EN516 hub, follow these steps:

1. **Unpack the hub.**
2. **Choose a location near the devices to be connected and close to an electrical outlet.**
3. **Follow the instructions for installing the hub on a flat surface or in a rack.**

Installing the Hub on a Flat Surface

To install the hub on a flat surface such as a tabletop or shelf, follow these steps:

1. **Install self-adhesive pads on the bottom of the hub.**

   Peel off the protective backing from the rubber pads and apply one at each marked location on the bottom of the hub.

2. **Set the hub on a tabletop or shelf so that it has at least 2 inches (5 cm) of space on all sides.**

   Restricted air flow could cause overheating.

3. **Install any PCs, additional hubs, or other devices in your stack.**

   For information on connecting the hub, refer to “Connecting the Hub” on page 3-4.

Installing the Hub in a Rack

To install the hub in a rack, follow these steps:

1. **Attach the mounting brackets (supplied in the rack mounting kit) to the sides of the hub using the screws provided.**

   Hold a mounting bracket against each side of the hub, as shown in Figure 3-1, and align the countersunk screw holes in the bracket with the bracket mounting holes in the hub. Use a #1 Phillips screwdriver to tighten the screws to secure each bracket.

2. **Attach the hub (with the mounting bracket) to the rack using two pan-head screws with nylon washers.**

   Use a #2 Phillips screwdriver and tighten the screws to secure the hub to the rack.

3. **Install any PCs, additional hubs, or other devices in your stack.**

   For information on connecting the hub, refer to “Connecting the Hub” on page 3-4.

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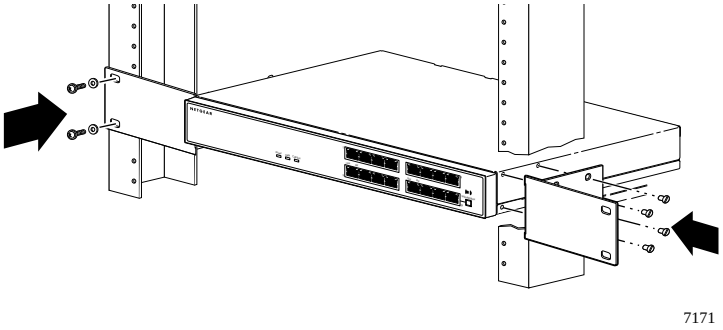


Figure 3-1. Installing mounting brackets to the hub and to a rack

Connecting the Hub

This section discusses connecting to the hub, cascading to multiple hubs, and connecting to other NETGEAR products. For instructions on connecting to the ports or connecting to other NETGEAR products, refer to the following sections:

- “Connecting to the RJ-45 Ports” on this page
- “Connecting to the BNC Port” on page 3-7
- “Connecting to the AUI Port” on page 3-9
- “Connecting to Other NETGEAR Products” on page 3-10

Connecting to the RJ-45 Ports

You can connect PCs, Apple Macintosh computers, UNIX workstations, and any device equipped with a 10BASE-T Ethernet interface to the RJ-45 ports on the Model EN516 hub using twisted pair Ethernet cables.

The twisted pair cable extended from an RJ-45 port (or UTP port) is called a twisted pair segment and can be up to 100 m in length. The UTP ports, with the exception of port 16, are MDI-X (or Normal) ports. To connect any of the Normal ports to a PC, a server, or another device with an MDI (or Uplink) port, you can simply use a regular UTP cable. To connect any of the Uplink ports to another Uplink port, use an RJ-45 crossover cable.

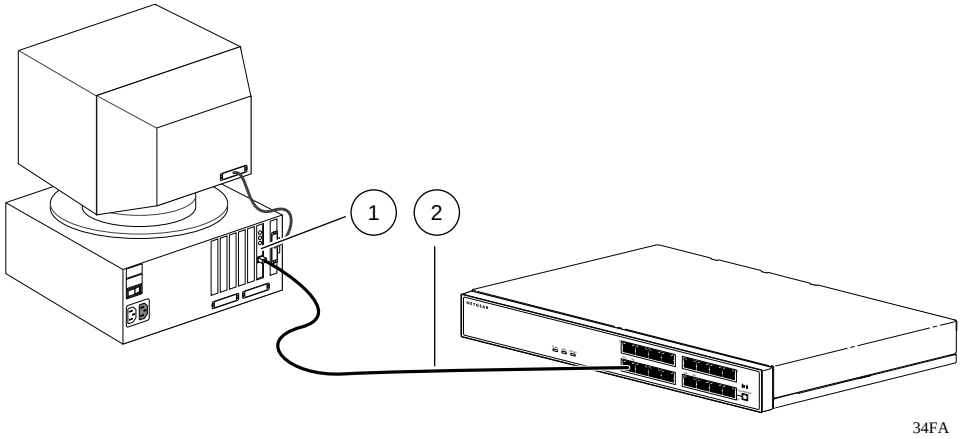
Port 16 is switchable between Normal (MDI-X) and Uplink (MDI) positions and should be configured according to the following guidelines:

- Set the Normal/Uplink push button to the Normal position and use a straight-through cable if the remote end of the cable is connected to an MDI-wired device such as a PC.
- Set the Normal/Uplink push button to the Uplink position and use a straight-through cable if the remote end of the cable is connected to an MDI-X device such as a 10 Mbps or 100 Mbps hub or repeater.

For further cabling guidelines, refer to Appendix B, “Cabling Specifications.”

Refer to the following illustrations for connecting to the RJ-45 ports and proceed to “Completing and Verifying the Installation” on page 3-11.

Figure 3-2 illustrates a workstation connected to an RJ-45 port on the Model EN516 hub.

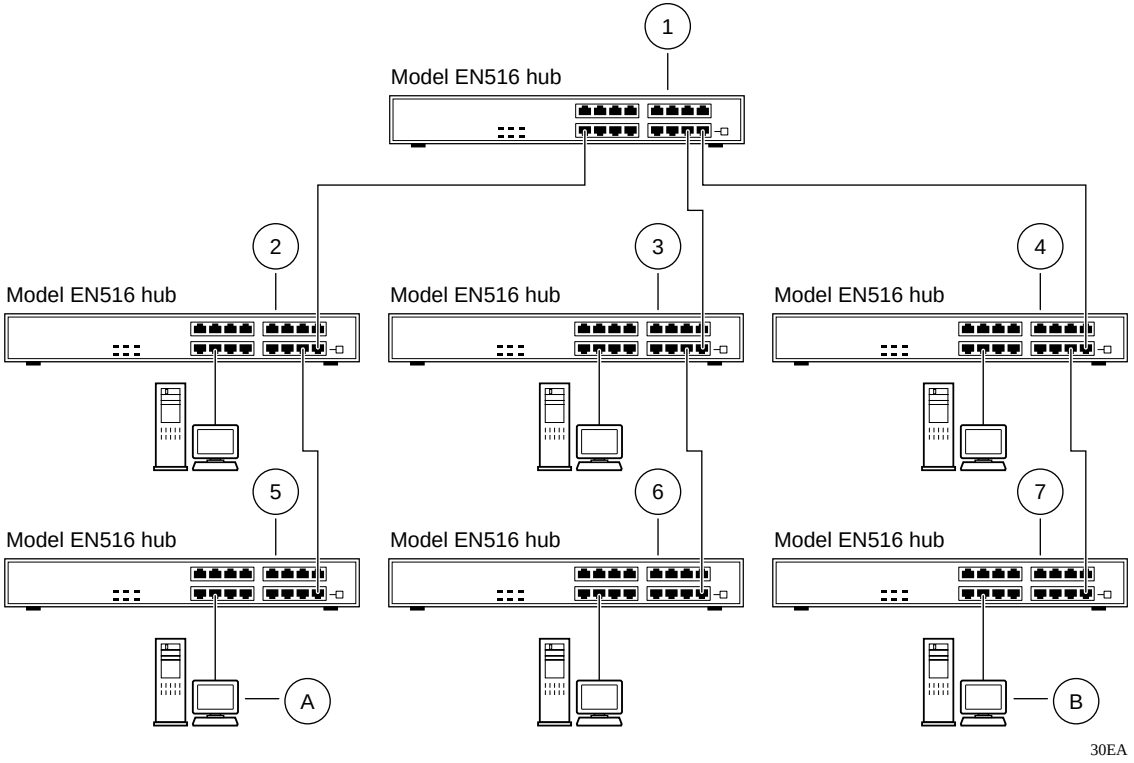


Key:
1 = Network adapter card with RJ-45 connector
2 = UTP cable to Model EN516 hub

Figure 3-2. Connecting a workstation to an RJ-45 port on the Model EN516 hub

Note: Ethernet specifications limit segments to 328 feet (100 m) in length.

Cascading refers to connecting hubs together to increase the number of ports, or the number of users supported on the network. The RJ-45, BNC, or AUI ports can be used to cascade hubs together. Figure 3-3 illustrates multiple hubs cascaded in a hierarchical star.

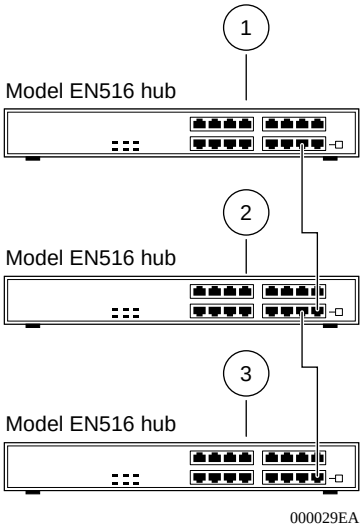


Key:
1 = Model EN516 hub with the Normal/Uplink push button set to Normal position
2 through 7 = Model EN516 hub with the Normal/Uplink push button set to Uplink position

Figure 3-3. Cascading multiple hubs in a hierarchical star through the RJ-45 ports

Note: Ethernet specifications limit the number of hubs in any communication path to five hubs, as shown in Figure 3-3. For example, when PC "A" communicates with PC "B," the communication path goes from hub 5 to hub 7, passing through hubs 2, 1, and 4.

Figure 3-4 illustrates multiple hubs cascaded in a daisy-chain style.



Key:
1 = Model EN516 hub with Normal/Uplink push button set to Normal position
2 and 3 = Model EN516 hub with Normal/Uplink push button set to Uplink position

Figure 3-4. Cascading multiple hubs daisy-chain style through the RJ-45 ports

Note: Each twisted pair cable between two hubs is counted as one network segment. When cascading hubs daisy-chain style through the twisted pair cable, stay within Ethernet specifications and make sure the total hub count does not exceed five hubs.

Connecting to the BNC Port

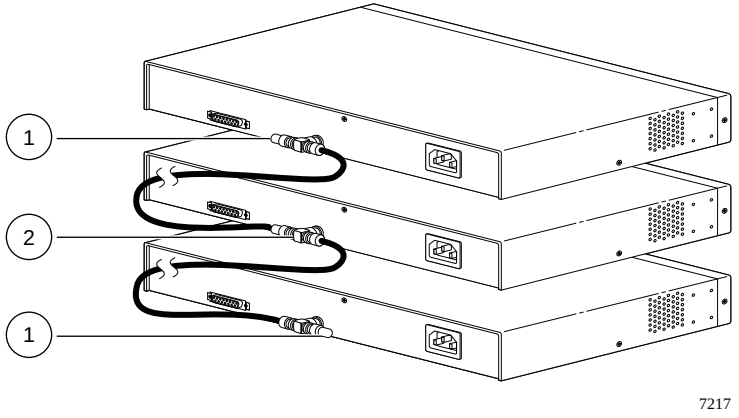
The BNC port at the rear panel of the Model EN516 hub is used for connecting to a thin coaxial segment. You can connect servers, workstations, or other devices to the BNC port or several Model EN516 hubs as shown in Figure 3-5. By using the BNC port for cascading, you treat each connected hub as just another node on the coaxial segment.

When using the BNC interface, follow these steps:

1. **Insert the BNC T-connector on the BNC port of the Model EN516 hub.**
2. **Connect the coaxial cable that leads from a device on the network to one of the self-locking ends of the BNC T-connector.**

3. **Connect the coaxial cable from another device to the remaining end of the self-locking BNC T-connector. If there are no more devices to be connected, terminate the connection with the 50 Ω terminator that is provided with the product.**
4. **Proceed to "Completing and Verifying the Installation" on page 3-11.**

Figure 3-5 illustrates three hubs cascaded through the BNC connector. The separation marks in the coaxial cable between the two top hubs illustrate the incorporation of other devices and show that interconnection is not limited to hubs.



Key:
1 = 50 Ω terminators
2 = BNC T-connector

Figure 3-5. Cascading hubs through the BNC port

Note: Ethernet specifications limit a BNC segment to 30 stations, specify a minimum of 0.5 m between any two stations, and limit segments to 600 feet (185 m) in length.

For further information about using coaxial cables, refer to Appendix B, "Cabling Specifications."

Connecting to the AUI Port

The AUI port at the rear panel of the Model EN516 hub is normally used for connecting a thick coaxial segment.

When using the AUI port, refer to Figure 3-6 and follow these steps:

1. **Connect the AUI port on the hub to an external coaxial transceiver through an AUI transceiver cable.**

   With the right type of transceiver, you could use the AUI port to connect to most types of network media, including 10BASE-T twisted pair, thin coaxial, thick coaxial, and 10BASE-FL fiber optic cables.

2. **Disable the signal quality error (SQE) test function for each external transceiver connected to the AUI port.**

   Refer to your transceiver documentation for information about disabling the SQE test function.

Note: If the SQE test function is not disabled, the port is automatically partitioned.

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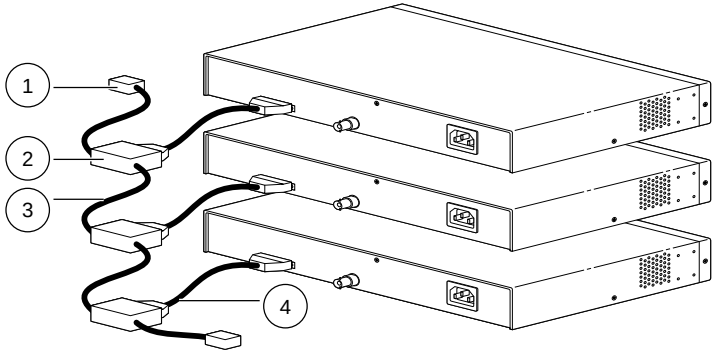
3. **Proceed to "Completing and Verifying the Installation" on page 3-11.**



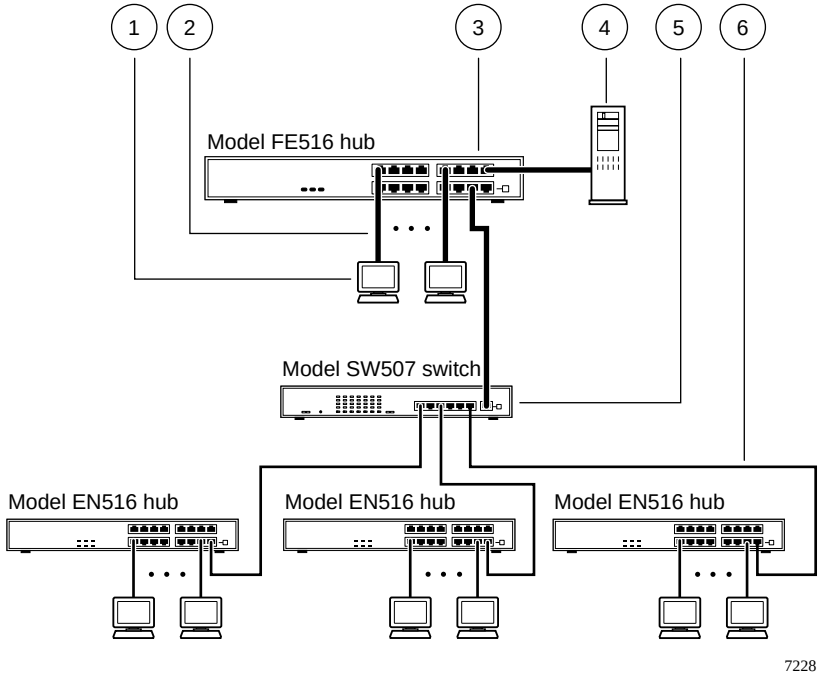
Key:
1 = Cable termination device
2 = 10BASE-5 transceiver
3 = Thick coaxial cable
4 = Transceiver cable (AUI cable)

Figure 3-6. Cascading hubs through the AUI port

Note: Ethernet specifications limit segments to 100 stations and 1,640 feet (500 m) in length, and specify that the AUI cable between the hub and the transceiver is limited to 164 feet (50 m).

Connecting to Other NETGEAR Products

You can extend your network by connecting to an Ethernet switch, such as the NETGEAR Model SW507 Ethernet Switch. Figure 3-7 illustrates power users on a 100 Mbps network using the NETGEAR Model FE516 Fast Ethernet Hub and connecting to the 10 Mbps network through a Model SW507 switch.



Key:

1 = Workstations
2 = 100 Mbps connection
3 = NETGEAR Model FE516 Fast
4 = Server
5 = NETGEAR Model SW507 Ethernet switch
6 = 10 Mbps connection Ethernet hub

Figure 3-7. Connecting multiple NETGEAR products

Completing and Verifying the Installation

To complete the installation, connect the power cord first to the power entry receptacle on the hub rear panel and then to the power outlet on the wall. When power has been applied to the hub, the following conditions should exist:

- Green Power LED on the front panel is on.
- Yellow BNC Partition LED is on if the BNC port is not connected.
- Green Link/Rx LED on each connected port is on.

If there are any problems, refer to Chapter 4, “Troubleshooting.”

Chapter 4
Troubleshooting

This chapter provides information about troubleshooting the Model EN516 hub.

Front Panel LEDs

The Model EN516 hub provides 38 front panel LEDs for monitoring individual ports and hub status. The power LED indicates when power is supplied to the hub.

The following sections describe the LEDs that are used for monitoring the Model EN516 hub.

Collision LED

The yellow Collision LED indicator blinks when there is data collision on the network. Data collision is normal on Ethernet networks and occurs when two or more devices transmit data on the network simultaneously. The devices that caused the collision automatically back off and then retry transmission at different intervals until the transmission succeeds.

Excessive collisions can result for several reasons. Some factors that can contribute to excessive collisions are:

- The network is extremely busy.
- Defective devices are connected on the network that cannot detect network traffic or collisions.
- Wrong cables are being used.

  Many home telephone cables can cause a collision condition because the cable is not constructed with twisted pair wires and cannot be used in place of UTP cables.
- Wrong cables are being used for connecting MDI (or Uplink) and MDI-X (or Normal) wired devices.

- Defective connectors are being used.

For further information on pin assignment and cable specifications, refer to Appendix B, “Cabling Specifications,” and Appendix C, “Connector Pin Assignments.”

Link/Rx LED for the RJ-45 Ports

The green Link/Rx LED on each RJ-45 port turns on when a link is established successfully between the hub and a PC or other device. It is off when there is no data link and/or the cable is not connected. If the Link/Rx LED is not on after cabling has been installed, check for a bad cable, cable pairs that are not correctly wired, or loose connectors. Also check to see whether or not there is power for both the hub and the Ethernet transceiver on the connected PC or other device.

The green Link/Rx LED indicator blinks when there is data reception on the port.

AUI Rx LED and BNC Rx LED for the AUI and BNC Ports

The green AUI Rx LED and BNC Rx LED blink when there is data reception on the AUI or BNC port.

Partition LED for the RJ-45 Ports

The yellow Partition LED on each of the RJ-45 ports turns on when the port is being partitioned after 32 continuous collisions are detected on the connected segment. After the first good packet without a collision is received, the yellow Partition LED on the RJ-45 port turns off, and the port is reconnected.

Partition LED for the BNC Port

The yellow Partition LED indicator turns on when the BNC port has been partitioned after 32 continuous collisions are detected on the BNC port. After the first good packet without a collision is received, the yellow Partition LED on the BNC port turns off, and the port is reconnected.

The BNC port is partitioned when there are one or more of the following conditions:

- No coaxial cable connected to the BNC port
- Faulty cable or connectors
- Excessive collisions on the connected segment

- Disconnected point somewhere along the coaxial cable length
- Segment that is not terminated with a 50 Ω terminator on both ends

Check all connectors along the cable length. If the segment is not terminated, terminate both ends with 50 Ω terminators.

Partition LED for the AUI Port

When the AUI port is connected with a 10BASE-T twisted pair or 10BASE-FL fiber optic transceiver, the Partition LED turns on after 32 continuous collisions are detected on the connected segment. After the first good packet without a collision is received, the Partition LED on the AUI port turns off, and the port is reconnected.

If the port is connected with coaxial media type AUI transceivers, the LED functions the same way as described in the previous section, “Partition LED for the BNC Port.” Be sure that the coaxial transceiver is functioning properly and that the signal quality error (SQE) test has been disabled.

Installation

Verify that all system components have been properly installed. If one or more components are malfunctioning, isolate the defective component(s) by testing them in a different environment where all other components are functioning properly.

Cabling

Be sure all cable connectors are securely positioned in the required ports. Straight-through cables should be used for all standard twisted pair connections.

Make sure all devices are still connected to the network. The equipment might have been accidentally disconnected.

To verify that the cabling is correct, refer to Appendix B, “Cabling Specifications.”

Network Interface Cards

Make sure the network interface cards installed in the workstations are in working condition.

Configuration

If problems occur after altering the network configuration, restore the original connections and determine the problem by implementing the new changes, one procedure at a time. Ensure that cable distances, repeater limits, and other physical aspects of the installation do not exceed the recommendations.

Hub Integrity

If required, verify the integrity of the hub by resetting it. Turn off the power to the switch and then turn the power to the switch back on. If the problem continues and you have completed all the preceding diagnoses, contact Customer Support. See page iii for the phone number of Customer Support in your area.

Appendix A
Technical Specifications

This appendix provides technical specifications for the NETGEAR Model EN516 Ethernet Hub.

General Specifications

Network Protocol and Standards Compatibility

IEEE 802.3 10BASE-T, 10BASE-2, 10BASE5 Ethernet
IEEE 802.3 CSMA/CD

Data Rate

10 Mbps, Manchester encoded

Interface

16 10BASE-T ports (RJ-45)
1 BNC 10BASE-2 port
1 AUI port (15 pin D-type)

Power Adapter

100-240V, 50/60 Hz (auto selection)

Electrical Specifications

Power Consumption:	0.15 A maximum

Physical Specifications

Width:	13.0 inches (33 cm)
Height:	1.7 inches (4.3 cm)
Depth:	8.0 inches (20.3 cm)
Weight:	4.8 lb (2.2 kg)

Environmental Specifications

Operating temperature: 0° C to 40° C (32° F to 104° F)
Operating humidity: 90% maximum relative humidity, noncondensing

Electromagnetic Emissions

CE mark, commercial
FCC Part 15 Class A
EN 55 022 (CISPR 22), Class B
VCCI Class 1 ITE

Electromagnetic Susceptibility

CE mark, commercial
Electrostatic discharge (ESD): IEC 801-2, Level 2/3/4
Radiated electromagnetic field: IEC 801-3, Level 2
Electrical fast transient/burst: IEC 801-4, Level 2
Electrical surge: IEC 801-5, Level 2

Safety Agency Approvals

CE mark, commercial
UL listed (UL 1950)
CSA certified (CSA 22.2 #950)
TUV licensed (EN 60 950)

Appendix B
Cabling Specifications

This appendix provides specifications for cables used with the NETGEAR Model EN516 Ethernet Hub.

Cable Specifications

For 10 Mbps connections, Category 3, 4, or 5 cables can be used. NETGEAR highly recommends using Category 5 cable to avoid unnecessary expense or confusion if you upgrade to Fast Ethernet. Table B-1 lists the electrical requirements of Category 3, 4, and 5 cables.

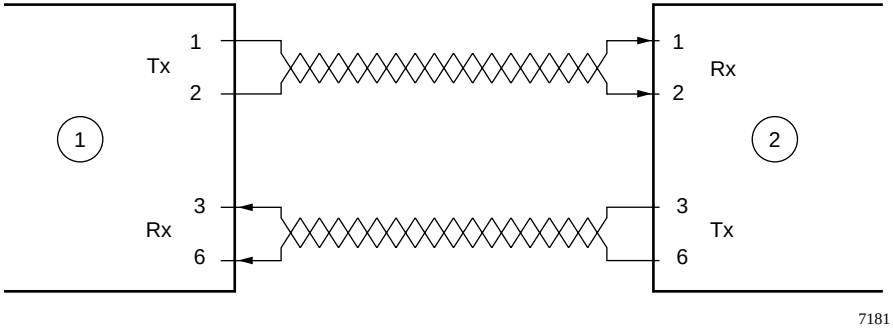
Table B-1. Electrical requirements of Category 3, 4, and 5 cables

Specification	Category 3	Category 4	Category 5
Number of pairs	Four	Four	Four
Impedance	100 Ω ± 15%	100 Ω ± 15%	100 Ω ± 15%
Mutual capacitance at 1 KHz	≤6.6 nF per 100 m	≤5.6 nF per 100 m	≤5.6 nF per 100 m
Maximum attenuation (dB per 100 m, at 20° C)	at 4 MHz: 5.6 at 10 MHz: 9.8 at 16 MHz: 13.1	at 4 MHz: 4.3 at 10 MHz: 7.2 at 16 MHz: 8.9	at 16 MHz: 8.2 at 31 MHz: 11.7 at 100 MHz: 22
NEXT loss (dB minimum)	at 4 MHz: 32 at 10 MHz: 26 at 16 MHz: 23	at 4 MHz: 47 at 10 MHz: 41 at 16 MHz: 38	at 16 MHz: 44 at 31 MHz: 39 at 100 MHz: 32

Twisted Pair Cables

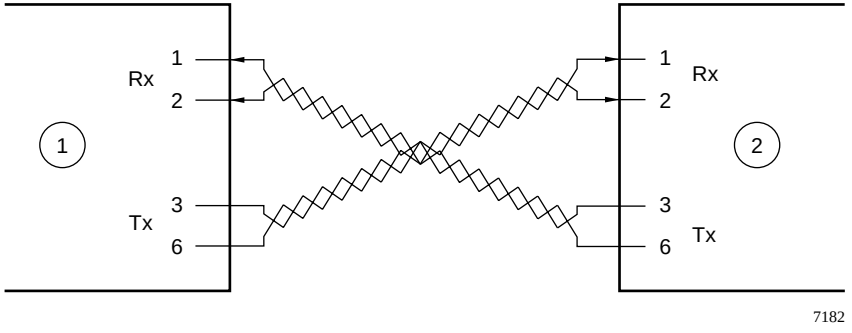
For two devices to communicate, the transmitter of each device must be connected to the receiver of the other device. The crossover function is usually implemented internally as part of the circuitry in the device. Most repeaters and switch ports are media-dependent interfaces with crossover ports, referred to as MDI-X or Normal ports. Computers and workstation adapter cards are usually media-dependent interface ports, referred to as MDI or Uplink ports. Refer to the installation instructions in Chapter 3, “Installation,” for appropriate cable use and connection.

Figure B-1 and Figure B-2 illustrate the use of straight-through and crossover twisted pair cables.



Key:
1 = Uplink or MDI port
2 = Normal or MDI-X port

Figure B-1. Straight-through twisted pair cable



Key:
1 = Normal or MDI-X port
2 = Normal or MDI-X port

Figure B-2. Crossover twisted pair cable

50 Ω Coaxial Cable

The 50 Ω coaxial cable, the BNC T-connector, and the 50 Ω terminator, allow a user to construct a 10BASE-2 network. Table B-2 lists the specifications of 10BASE2 (ThinNet) RG 58 A/U or RG 58 C/U coaxial cable.

Table B-2. Specifications of 10BASE2 (ThinNet) RG 58 A/U or RG 58 C/U coaxial cable

Characteristic impedance	Attenuation (185 m cable)	Transfer impedance	DC loop resistance
50 +/-2 Ω	<8.5 db @ 10 MHz <6.0 db @ 5 MHz	20 mΩ @ 1 MHz 100 mΩ @ 10 MHz 500 mΩ @ 100 MHz	50 mΩ /meter

The Ethernet specifications limit segments to 30 stations, specify a minimum of 0.5 m between any two stations, and limit segments to 600 feet (185 m) in length.

AUI Cable

The AUI cable connects the AUI port on the Model EN516 hub to a transceiver. The Ethernet specifications limit the cable length to 164 ft (50 m). Table B-3 lists the specifications of AUI cable.

Table B-3. Specifications of AUI cable

Electrical characteristic	AUI cable specifications
Nominal dc resistance	<1.75 Ω per conductor
Pair-to-pair balanced crosstalk	Minimum 40 dB attenuation from 5 MHz to 10 MHz
Differential characteristic impedance	78 +/- 5 Ω at 10 MHz <3 Ω difference between pairs
Transfer impedance	<10 mΩ @ 500 KHz <3 mΩ @ 2 MHz <3 mΩ @ 10 MHz <30 mΩ @ 100 MHz
Attenuation	<3 dB from 5 MHz to 10 MHz
Timing jitter	<1.0 ns introduced by the cable system
Total signal delay	<257 ns

Appendix C
Connector Pin Assignments

This appendix provides information on the RJ-45, AUI, and BNC connectors that are used for the NETGEAR Model EN516 Ethernet Hub.

RJ-45 Connector

The RJ-45 connector is used to connect workstations, hubs, and switches through unshielded twisted pair cable. The RJ-45 connector accepts four-pair Category 3 or Category 5 UTP cable. Only two pairs are used for 10BASE-T wiring. Figure C-1 illustrates the RJ-45 connector.

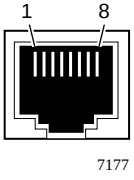


Figure C-1. RJ-45 connector

Table C-1 lists the pin assignments for the RJ-45 connector.

Table C-1. RJ-45 connector pin assignments

Pin	Normal assignment on ports 1 to 15	Uplink assignment on port 16
1	Input Receive Data +	Output Transmit Data +
2	Input Receive Data -	Output Transmit Data -
3	Output Transmit Data +	Input Receive Data +
6	Output Transmit Data -	Input Receive Data -
4, 5, 7, 8	Not used	Not used

AUI Connector

The AUI connector for the Model EN516 hub connects the hub through an external transceiver to other devices. An inter-repeater fiber link for 10BASE-F or FOIRL are examples of such applications. Figure C-2 illustrates the AUI connector pin assignments.

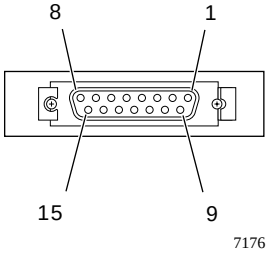


Figure C-2. AUI connector pin assignments

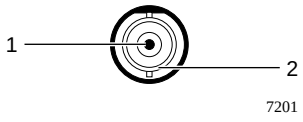
Table C-2 lists the AUI connector pin assignments.

Table C-2. AUI connector pin assignments

Pin	Signal
1, 4, 11, 14, 15	Ground
2	CI-A
3	DO-A
5	DI-A
6	+ 12V DC return
7, 8	Not used
9	CI-B
10	DO-B
12	DI-B
13	+ 12V DC (500 mA maximum)

BNC Connector

The BNC connector for the Model EN516 hub supports 10 Mbps data transmission and connects the hub to other devices. Figure C-3 illustrates the parts of the BNC connector.



Key:
1 = Center conductor
2 = Ground shield

Figure C-3. BNC connector

BNC T-Connector and 50 Ω Terminator

The BNC port on the Model EN516 hub, with the BNC T-connector and the 50 Ω terminator, is used for connecting to a thin coaxial segment. Figure C-4 illustrates the BNC T-connector and 50 Ω terminator. For information on connecting to the BNC port, refer to Chapter 3, "Installation," and Appendix B, "Cabling Specifications."

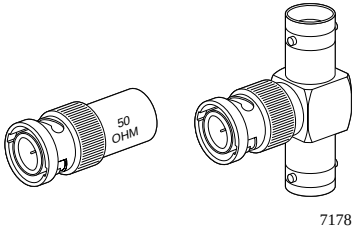


Figure C-4. 50 Ω terminator and BNC T-connector

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