Installing and Operating BayStack ARN Routers

Router Software Version 11.00 Rev. 4n
Site Manager Software Version 5.00 Rev. 4n

Part No. 114200 Rev. A
November 1996

Bay Networks

4401 Great America Parkway
Santa Clara, CA 95054

8 Federal Street
Billerica, MA 01821

USA Requirements Only

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

This equipment generates, uses, and can radiate radio-frequency energy. If you do not install and use this equipment according to the instruction manual, this product may interfere with radio communications. This product has been tested and found to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Operating this equipment in a residential area is likely to interfere with radio communications; in which case, the user, at his/her own expense, must correct the interference.

Shielded-compliant cables must be used with this unit to ensure compliance with the Class A limits.

European Requirements Only

EN 55 022 Declaration of Conformance

This is to certify that the Bay Networks products in this book are shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022:1987 Class A (CISPR 22:1985/BS 6527:1988).

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EN 55 022 Declaration of Conformance

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Voluntary Control Council for Interference (VCCI) Statement

This equipment is in the 1st category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines that are aimed at preventing radio interference in commercial and/or industrial areas.

Consequently, when this equipment is used in a residential area or in an adjacent area thereto, radio interference may be caused to equipment such as radios and TV receivers.

Compliance with the applicable regulations is dependent upon the use of shielded cables. The user is responsible for procuring the appropriate cables. Read instructions for correct handling.

Canada Requirements Only

Canada CS-03 Rules and Regulations

Note: The Canadian Department of Communications label identifies certified equipment. The certification means that the equipment meets certain telecommunications network protective operations and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent the degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Canada CS-03 -- Règles et règlements

Note: L’étiquette du ministère des Communications du Canada indique que l’appareillage est certifié, c’est-à-dire qu’il respecte certaines exigences de sécurité et de fonctionnement visant les réseaux de télécommunications. Le ministère ne garantit pas que l’appareillage fonctionnera à la satisfaction de l’utilisateur.

Avant d’installer l’appareillage, s’assurer qu’il peut être branché aux installations du service de télécommunications local. L’appareillage doit aussi être raccordé selon des méthodes acceptées. Dans certains cas, le câblage interne du service de télécommunications utilisé pour une ligne individuelle peut être allongé au moyen d’un connecteur certifié (prolongateur téléphonique). Le client doit toutefois prendre note qu’une telle installation n’assure pas un service parfait en tout temps.

Les réparations de l’appareillage certifié devraient être confiées à un service d’entretien canadien désigné par le fournisseur. En cas de réparation ou de modification effectuées par l’utilisateur ou de mauvais fonctionnement de l’appareillage, le service de télécommunications peut demander le débranchment de l’appareillage.

Pour leur propre sécurité, les utilisateurs devraient s’assurer que les mises à la terre des lignes de distribution d’électricité, des lignes téléphoniques et de la tuyauterie métallique interne sont raccordées ensemble. Cette mesure de sécurité est particulièrement importante en milieu rural.

Attention: Les utilisateurs ne doivent pas procéder à ces raccordements eux-mêmes mais doivent plutôt faire appel aux pouvoirs de réglementation en cause ou à un électricien, selon le cas.

Canada Requirements Only *(continued)*

D. O. C. Explanatory Notes: Equipment Attachment Limitations

The Canadian Department of Communications label identifies certified equipment. This certification meets certain telecommunication network protective, operational and safety requirements. The department does not guarantee the equipment will operate to the users satisfaction.

Before installing the equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations.

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Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority, or electrician, as appropriate.

Notes explicatives du ministère des Communications: limites visant les accessoires

L'étiquette du ministère des Communications du Canada indique que l'appareillage est certifié, c'est-à-dire qu'il respecte certaines exigences de sécurité et de fonctionnement visant les réseaux de télécommunications. Le ministère ne garantit pas que l'appareillage fonctionnera à la satisfaction de l'utilisateur.

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Attention: Les utilisateurs ne doivent pas procéder à ces raccordements eux-mêmes mais doivent plutôt faire appel aux pouvoirs de réglementation en cause ou à un électricien, selon le cas.

Canada Requirements Only *(continued)*

Canadian Department of Communications Radio Interference Regulations

This digital apparatus (Access Feeder Node, Access Link Node, Access Node, Access Stack Node, Backbone Concentrator Node, Backbone Concentrator Node Switch, Backbone Link Node, Backbone Link Node Switch, Concentrator Node, Feeder Node, Link Node) does not exceed the Class A limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Réglement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique (Access Feeder Node, Access Link Node, Access Node, Access Stack Node, Backbone Concentrator Node, Backbone Concentrator Node Switch, Backbone Link Node, Backbone Link Node Switch, Concentrator Node, Feeder Node, Link Node) respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Réglement sur le brouillage radioélectrique du ministère des Communications du Canada.

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About This Guide

This guide explains how to install, start, and operate a BayStack™ Advanced Remote Node™ (ARN™) router, including instructions to

- Physically install the ARN
- Attach communications equipment
- Connect the ARN to the network using one of the software configuration options
- Use the ARN operator switches and interpret LED displays

Before You Begin

Before using this guide, you must coordinate with the network administrator for the ARN that you are installing.

Conventions

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: if command syntax is **ping** *<ip_address>*, you enter **ping 192.32.10.12**
bold text	Indicates text that you need to enter command names in text. Example: Use the **dinfo** command.
brackets ([ ])	Indicate optional elements. You can choose none, one, or all of the options.

italic text	Indicates variable values in command syntax descriptions, new terms, file and directory names, and book titles.
quotation marks (“ ”)	Indicate the title of a chapter or section within a book.
separator (>)	Separates menu and option names in instructions and internal pin-to-pin wire connections. Example: Protocols > AppleTalk identifies the AppleTalk option in the Protocols menu. Example: Pin 7 > 19 > 20
`screen text`	Indicates data that appears on the screen. Example: `Set Bay Networks Trap Monitor Filters`
vertical line (|)	Indicates that you enter only one of the parts of the command. The vertical line separates choices. Do not type the vertical line when entering the command. Example: If the command syntax is **show at routes** | **nets**, you enter either **show at routes** or **show at nets**, but not both.

Acronyms

ANSI	American National Standards Institute
AUI	Attachment Unit Interface
BootP	Bootstrap Protocol
BRI	Basic Rate Interface
CCITT	(now ITU-T)
CSMA/CD	carrier sense multiple access with collision detection
CSU	channel service unit
CTS	clear to send
DCD	data carrier detect
DCE	data communications equipment
DCM	Data Collection Module
DLCMI	Data Link Control Management Interface
DSR	data set ready
DSU	data service unit

DTE	data terminal equipment
DTR	data terminal ready
EIA	Electronic Industries Association
GUI	graphical user interface
HDLC	high-level data link control
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITU-T	International Telecommunications Union–Telecommunications
LED	light-emitting diode
LMI	Local Management Interface
MAC	media access control
MAU	media access unit
NBMA	nonbroadcast multi-access
NEMA	National Electrical Manufacturers Association
NVFS	Nonvolatile File System
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First Protocol
PCMCIA	Personal Computer Memory Card International Association
PPP	Point-to-Point Protocol
RIP	Routing Information Protocol
RLSD	received line signal detection
RTS	request to send
SMDS	switched multimegabit data service
SNMP	Simple Network Management Protocol
SQE	signal quality error
STP	shielded twisted-pair
TCP/IP	Transmission Control Protocol/Internet Protocol
TELNET	Telecommunication Network
TFTP	Trivial File Transfer Protocol
TPE	twisted-pair Ethernet
UTP	unshielded twisted-pair

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Asia/Pacific Region	(612) 9927-8800	(612) 9927-8811
Latin America	(407) 997-1713	(407) 997-1714

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- Log notes to existing open cases.
- Create new cases for rapid, efficient handling of noncritical network situations.
- Communicate directly via e-mail with the specific technical resources assigned to your case.

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Sydney, Australia	(612) 9927-8800	(612) 9927-8811
Tokyo, Japan	(81) 3-5402-0180	(81) 3-5402-0173

Chapter 1
Installing the BayStack Advanced Remote Node

This chapter describes how to install the BayStack ARN. Topics include the following:

- Preparing to install the ARN
- Installing the ARN
- Connecting communication cables
- Connecting a management console
- Connecting a modem
- Connecting the power cable
- Installing the Flash memory card

Note: The installation instructions in this chapter assume that wiring is already installed on the premises using common cable system practices. Your exact installation procedure may differ slightly, depending on your particular cable system.

Preparing to Install the ARN

Verify the following before beginning the installation, as explained in the sections that follow:

- Your shipment is complete and undamaged.
- You have the proper equipment and tools.
- Your installation site meets physical, electrical, and environmental requirements.
- You have the communications devices and the cabling that you need to attach to the ARN.

Verifying Shipment Contents

We strongly suggest that you inspect all items for shipping damage. If you detect any damage, do not install the ARN. Call the Bay Networks Technical Response Center in your area, as described in "About This Guide."

In addition to the ARN and this manual, your shipping container should contain several other hardware accessory items. Verify that the items in the shipping container match those on the packing list.

Note: You can find the packing list affixed to the shipping container.

Refer to the following checklist when verifying the contents of the shipping container:

__ One **power cable** for connecting the ARN to a wall outlet.

__ One **cable kit** (Order No. 110310) for connecting an optional local console or modem. The console/modem cable kit contains one 15-foot AT standard molded serial cable (with DB-9 receptacle to DB-25 plug connectors) and one null modem crossover adapter (with DB-25 to DB-25 receptacle connectors).

__ Two **flange brackets** and eight #6 flathead **screws**.

__ Four **#10 cagenut screws and washers** for rack-mounting the ARN.

__ Four **rubber feet** (for table-top operation).

Figure 1-1 illustrates the ARN shipping accessories.

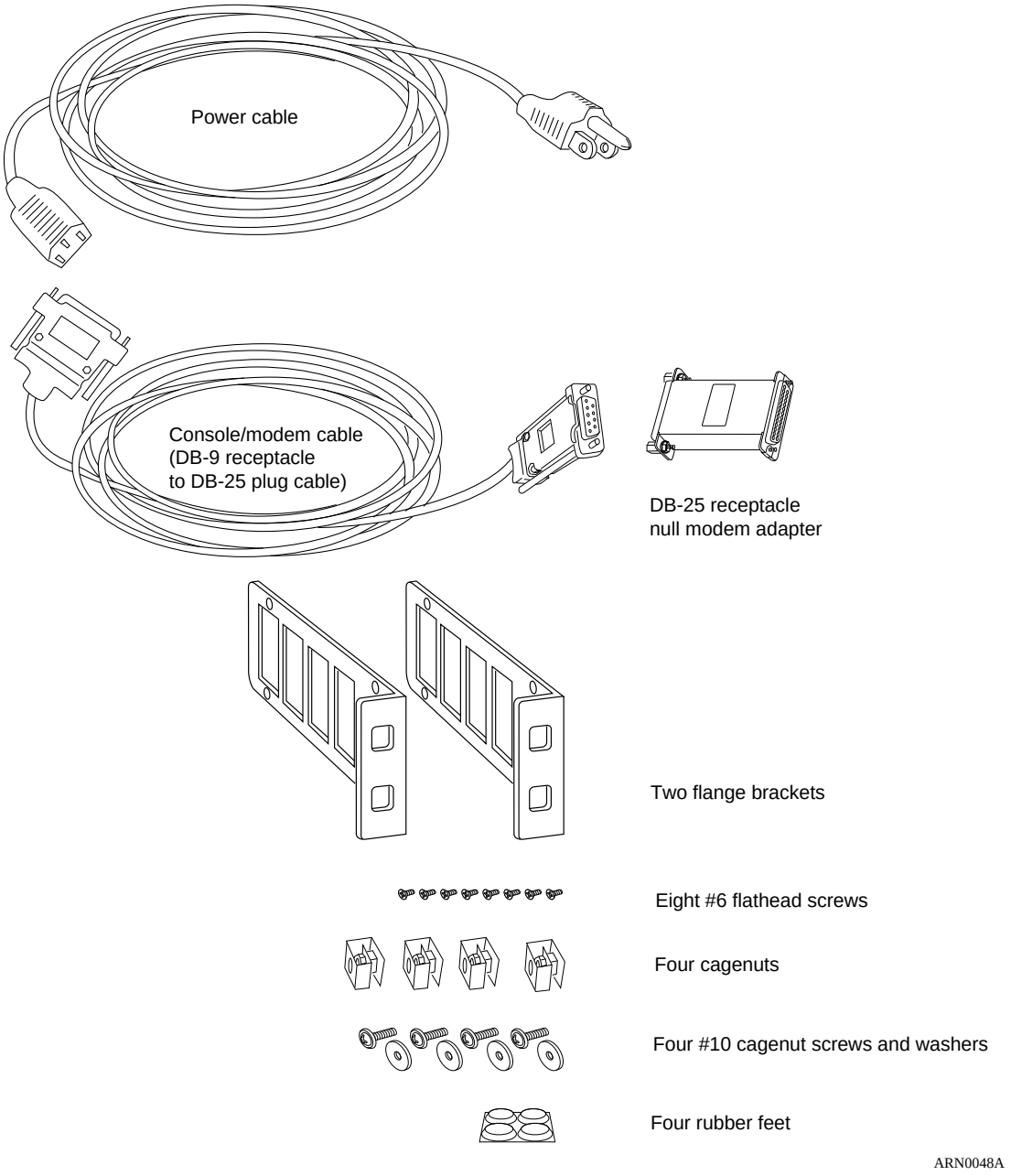


Figure 1-1. Accessories in the ARN Shipping Container

Supplying Equipment

You may need items that are not part of the ARN accessory package. Before installing the ARN hardware, ensure that you have all the cables, tools, and other equipment that you need.

Cables

Unless they were specifically ordered, the cables necessary for your network configuration are not part of the ARN accessory package. If you do not have the proper cables, contact your network administrator or see the *Cable Guide for Routers and BNX Platforms*.

Service Console

You can attach an optional VT-100 console (or equivalent) to the ARN to monitor the results of startup diagnostics and perform manual boot configurations. Or you can attach any AT-compatible modem to allow remote dial-in access to diagnostics and configuration.

Note: To use the Netboot, Directed Netboot, or Local Boot configuration options (see Chapter 3), you must have a local terminal connected the first time the ARN powers up.

Mounting Hardware

To rack-mount the ARN, you need a Phillips screwdriver and an electronic enclosure rack that meets the following specifications:

- Heavy-duty steel construction
- Electronic Industries Association (EIA) standard hole-spacing
- Width of 19 in. (48.26 cm) and depth of 24 in. (60.96 cm)

If the rack does not have threaded rail holes, you must use cagenuts (see Figure 1-1) to use with the cagenut screws.

Verifying Site Requirements

The installation site must provide a certain amount of free space around the ARN to dissipate heat, as detailed in Table 1-1.

Table 1-1. Installation Space Requirements

Width	Depth (minimum)	Depth (for servicing)
22.5 in. (57.2 cm)	15 in. (38.1 cm)	25 in. (63.5 cm)

In addition, the installation site must meet the electrical and environmental specifications listed in Appendix C.

Caution: You must use grounded electrical power outlets with the ARN.

Installing the ARN

Once you are ready to install the ARN in its final location, you can

- Position the ARN on a flat, sturdy, horizontal surface.
- Mount the ARN in an electronic enclosure rack.

Positioning the ARN on a Flat Surface

When positioning the ARN on a flat surface, make sure that the surface is

- Large enough for the ARN to operate properly
- Sturdy enough to support the combined weight of the ARN and any cables that you connect

We recommend that you place the self-adhesive, rubber feet on the bottom of the ARN chassis (shipped with the ARN). These feet not only protect the surface on which you position the ARN, they provide added friction against the weight of any cables that you attach to the device.

Rack-Mounting the ARN

For this procedure, you need

- Four #10 cagenut screws and washers (shipped with the ARN)
- Two flange brackets and eight #6 flathead screws (shipped with the ARN)
- A Phillips screwdriver
- An electronic enclosure rack

Note: If the rack does not have threaded rail holes, you must supply and attach four cagenuts.

To rack-mount the ARN:

1. **Attach a flange bracket to both sides of the ARN.**

   On each side of the chassis:

   a. **Align the holes in the longer end of the flange bracket with the mounting holes near the front panel of the ARN (Figure 1-2).**

   b. **Insert a #6 flathead screw through each hole and into the ARN.**

   c. **Tighten the four screws with a Phillips screwdriver.**

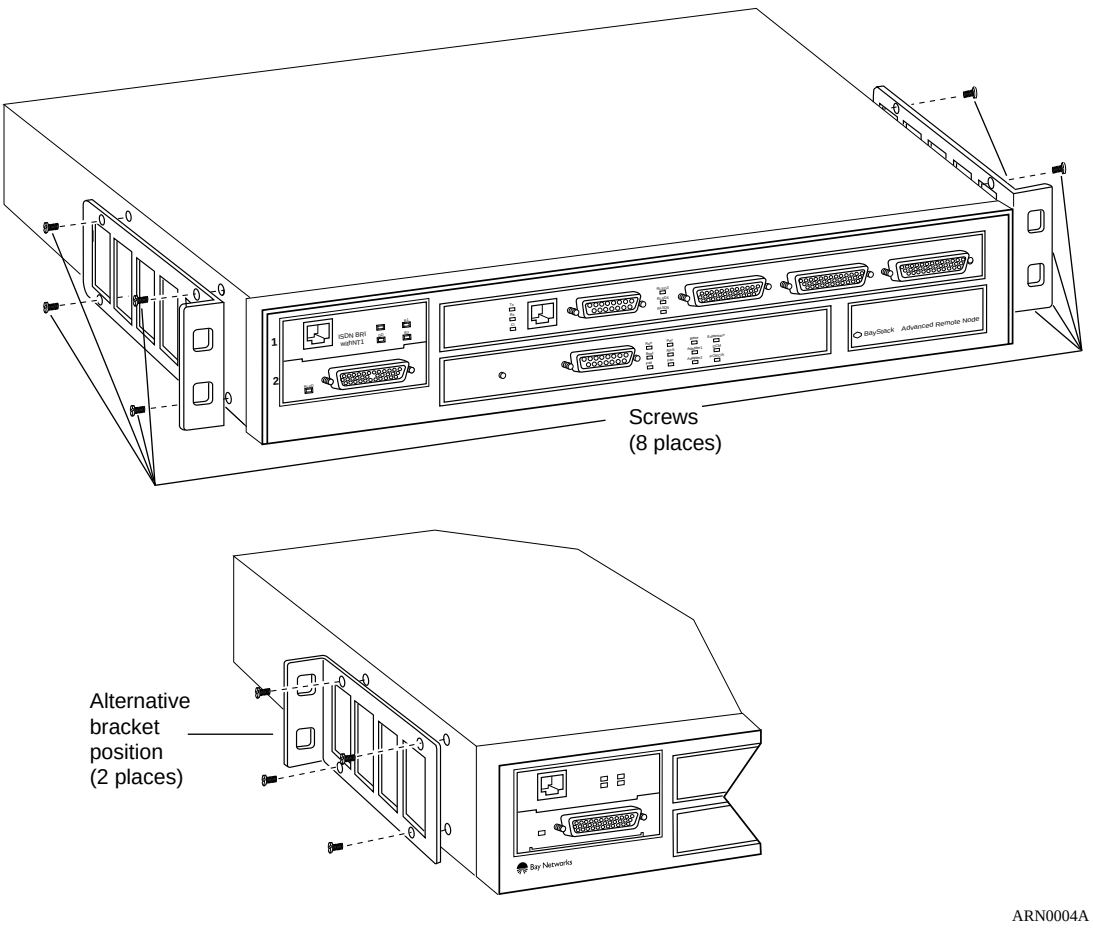


Figure 1-2. Attaching Flange Brackets to Rack-Mount the ARN

2. **Align the holes in the shorter end of the flange bracket with the holes in the front vertical supports of the rack (Figure 1-3).**

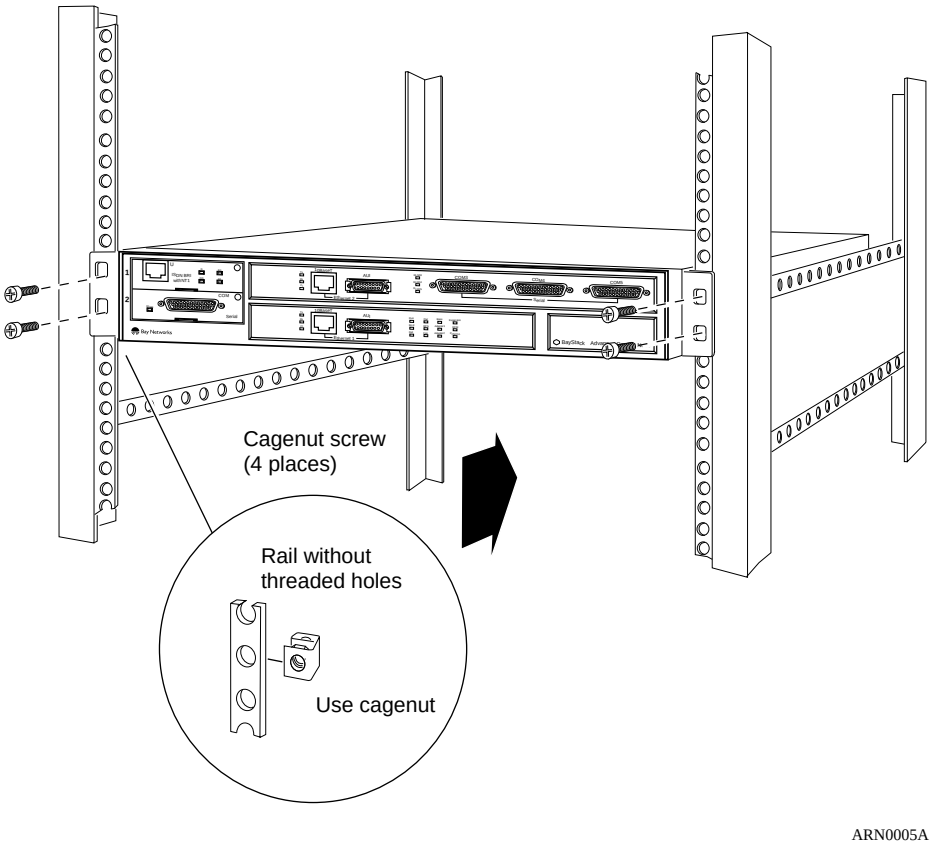


Figure 1-3. Installing the ARN in an Electronic Enclosure Rack

3. **Insert a cagenut screw through each bracket hole and into the corresponding holes in the rack.**
4. **Tighten each cagenut screw with a Phillips screwdriver.**

Understanding the ARN Module Locations

The ARN is designed to scale to your needs. In addition to either an Ethernet or token ring base module, the ARN can contain an optional expansion module and up to two adapter modules (Figure 1-4).

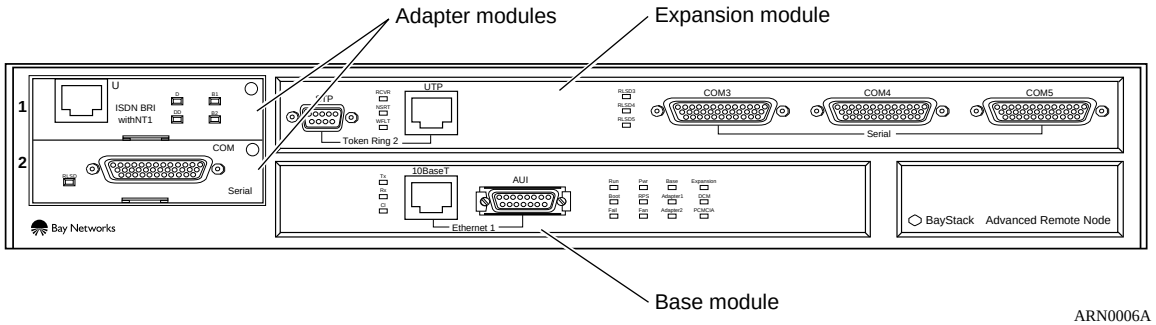


Figure 1-4. ARN Module Locations

The ARN is available in the following base module configurations:

- One Ethernet AUI and Ethernet 10Base-T interface
- One Token Ring interface (STP only)

The ARN supports the following expansion modules:

- One Ethernet AUI and Ethernet 10Base-T interface
- One Token Ring interface (STP and UTP)
- Three serial interfaces
- One Ethernet AUI and Ethernet 10Base-T interface and three serial interfaces
- One Token Ring interface (STP and UTP) and three serial interfaces

Note: The Ethernet base and expansion modules can also contain an optional data collection module (DCM). The DCM gathers Ethernet statistics for a remote monitoring (RMON) utility. Your network administrator can refer to *Configuring Remote Access* for additional information about how to enable and use the DCM.

The ARN also supports up to two of the following adapter modules:

- Single serial interface
- Single ISDN BRI S/T interface
- Single ISDN BRI U interface
- Single V.34 modem adapter interface
- Single 56/64K DSU/CSU interface

Connecting Communications Cables

Gather the communications equipment and cabling that you will attach to the ARN. If you do not have the proper cables, contact your network administrator or see the *Cable Guide for Routers and BNX Platforms*.

Note: Refer to Appendix C, later in this manual, for ARN cable interface descriptions.

Connecting to an Ethernet Interface

You can connect an Ethernet cable to any ARN base or expansion module that contains an Ethernet interface option. Each Ethernet interface option offers two Ethernet interface types -- an AUI transceiver interface or a 10Base-T interface.

Note: You can use only one Ethernet interface on an ARN base or expansion module at any time. For example, you can connect to either the AUI transceiver interface or the 10Base-T interface on a base module, but you cannot use both interfaces at the same time.

Connecting to an AUI Interface

To connect an Ethernet AUI transceiver cable to an AUI interface:

Caution: Connecting the ARN AUI interface directly to the AUI interface on an Ethernet station violates IEEE 802.3 standards. The AUI interface is designed only for connection to a transceiver.

1. **Connect an Ethernet AUI drop cable to the interface labeled AUI (Figure 1-5).**

   The cable must have a 15-position D-SUB receptacle.

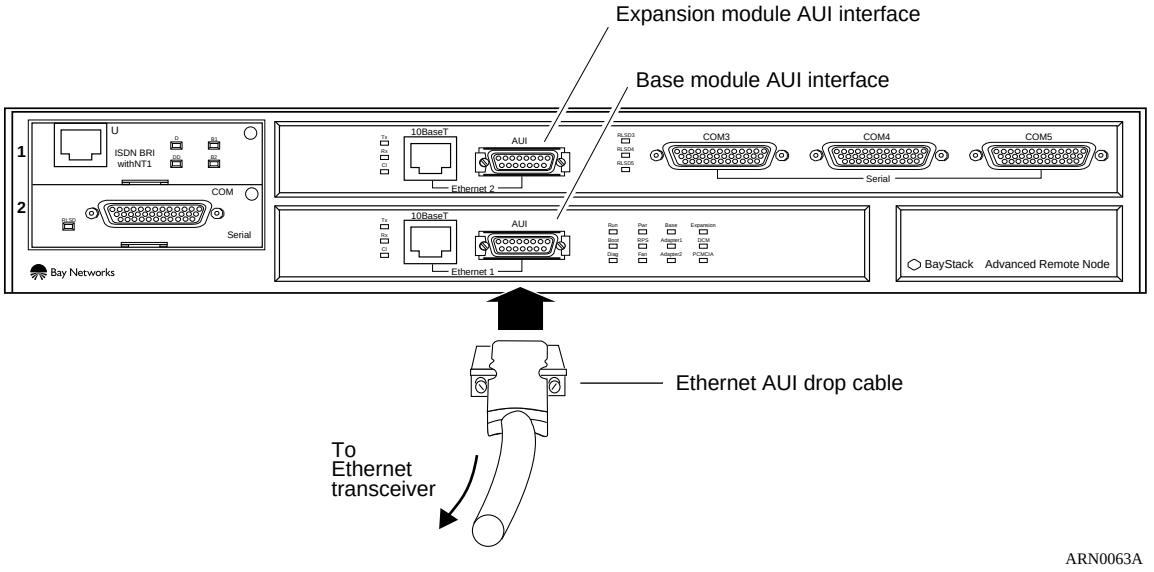


Figure 1-5. Connecting an AUI Cable

2. **Secure the AUI cable using the slide lock on the interface.**
3. **Connect the other end of the cable to an Ethernet transceiver.**

Connecting to a 10Base-T Interface

To connect an unshielded twisted-pair (UTP) cable to the base module or expansion module 10Base-T interface, insert the UTP jack into the RJ-45 interface, as shown in Figure 1-6.

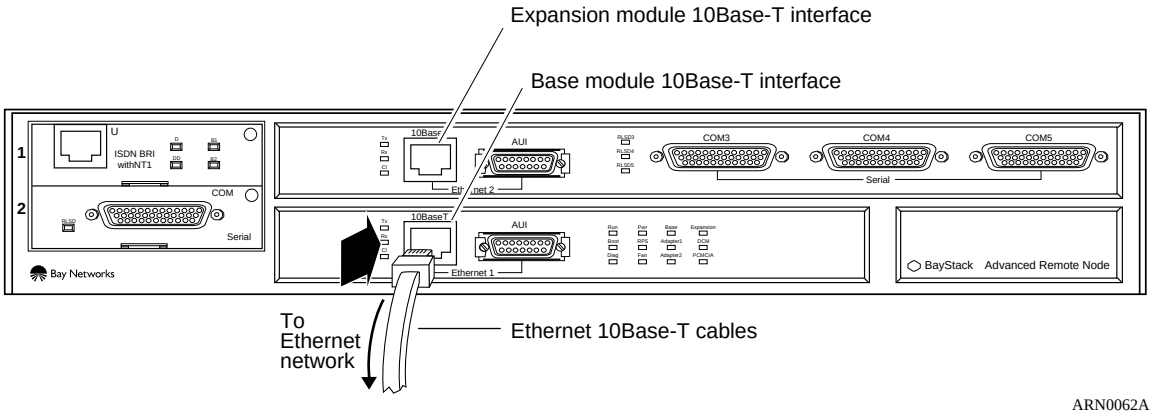


Figure 1-6. Connecting a 10Base-T Ethernet Cable

Connecting to a Token Ring Interface

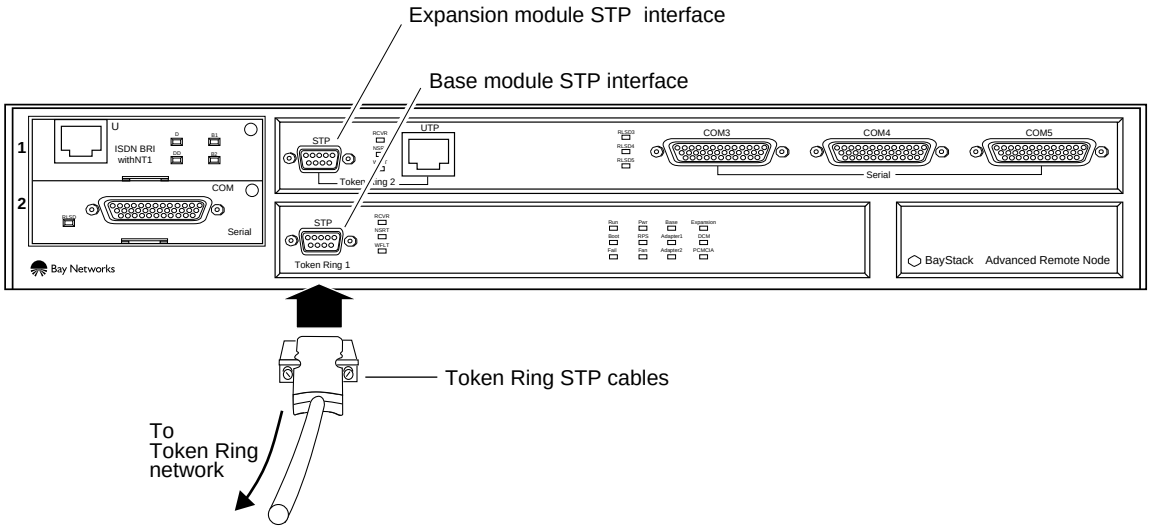
You can connect a token ring cable to any ARN base module or expansion module that contains a token ring interface option. Each of these interface options offers two token ring interface types -- an STP interface or a UTP interface.

Note: You can use only one token ring interface on an ARN base or expansion module at any time. For example, you can connect to either the STP interface or the UTP interface on a base module, but you cannot use both interfaces at the same time.

Connecting to an STP Token Ring Interface

To connect a token ring STP cable to the base module or expansion module token ring interface:

1. **Attach the 9-pin D-SUB plug to the token ring STP interface (Figure 1-7).**



ARN0068A

Figure 1-7. Connecting a Token Ring STP Cable

2. **Secure the token ring cable using the capture screws.**

Connecting to a UTP Token Ring Interface

To connect a Token Ring UTP cable to the expansion module token ring interface, insert the RJ-45 connector into the UTP interface, as shown in Figure 1-8.

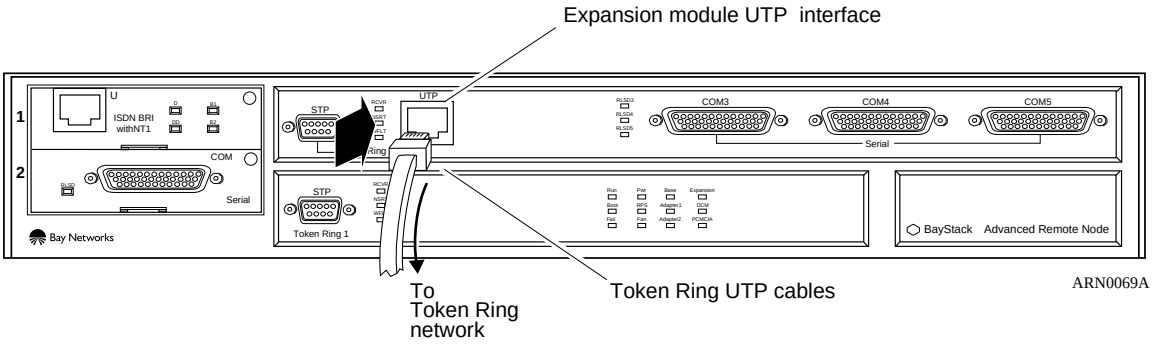


Figure 1-8. Connecting Token Ring UTP Cables

Connecting to a Serial Interface

The ARN supports up to five serial interfaces. You can connect

- Up to three, 44-pin serial cables to an ARN that contains an Ethernet/tri-serial, Token Ring/tri-serial, or Tri-Serial expansion module
- One, 44-pin serial cable to each Serial adapter module (the ARN can support two)

To connect to a serial interface:

1. **Locate the RS-232, RS-422, RS-530, V.28, V.35, or X.21 interface cable.**

   See the *Cable Guide for Routers and BNX Platforms*.

Note: The *Cable Guide for Routers and BNX Platforms* refers to serial cables that transmit synchronous data as "synchronous" cables.

2. **Connect the cable to a serial interface.**

   The serial interfaces on an ARN expansion module are labeled COM3, COM4, or COM5 (Figure 1-9).

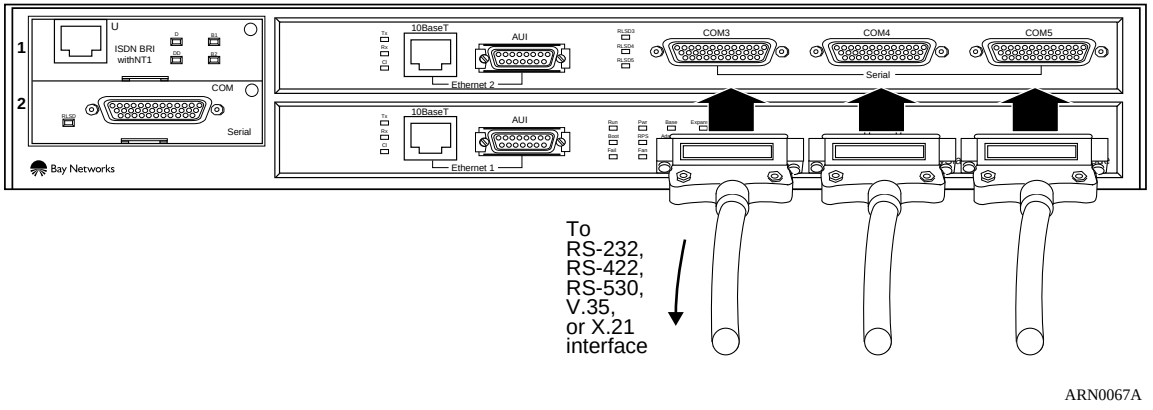


Figure 1-9. Connecting Serial Cables to an Expansion Module

On an ARN adapter module, the serial interface is labeled COM (Figure 1-10).

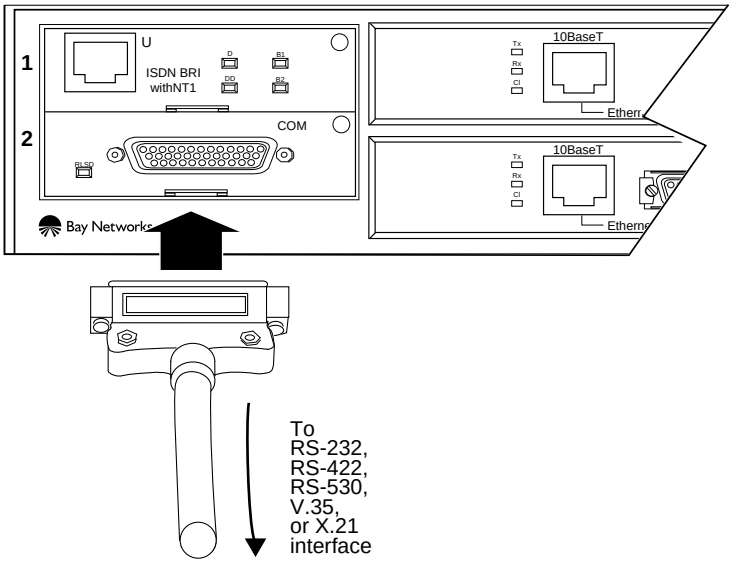


Figure 1-10. Connecting a Serial Cable to a Serial Adapter Module

3. **Secure the cable to the interface using the capture screws on the cable.**
4. **Connect the remote end of each cable to the appropriate communications equipment.**

Connecting to an ISDN Interface

You can connect an ISDN cable to any ARN that contains an ISDN BRI S/T or U adapter module.

To connect to an ISDN BRI interface:

1. **Insert the ISDN cable into the ISDN BRI interface (Figure 1-11).**

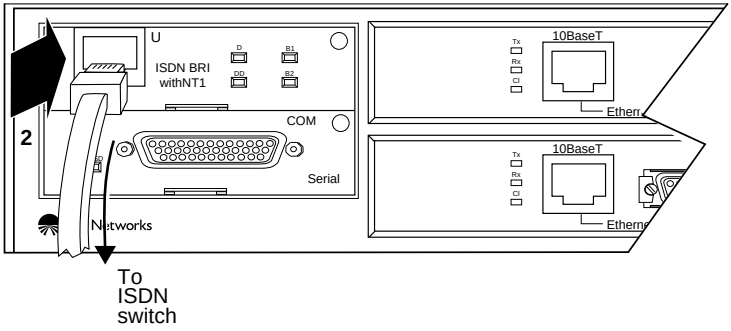


Figure 1-11. Connecting an ISDN BRI Cable

2. **Connect the other end of the cable to the ISDN communications device.**

Connecting to a DSU/CSU Interface

You can connect a DSU/CSU cable to any ARN that contains a DSU/CSU adapter module.

To connect to a DSU/CSU interface:

1. **Insert the DSU/CSU cable connector into the DSU/CSU interface labeled DDS (Figure 1-12).**

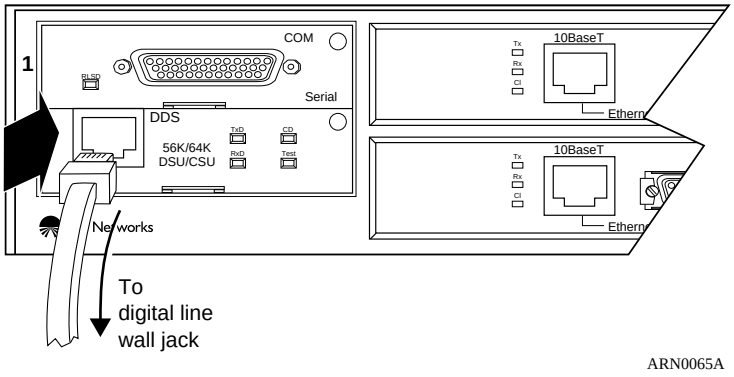


Figure 1-12. Connecting a DSU/CSU Cable

2. **Connect the other end of the cable to a digital line (for example, a digital line wall jack that connects to an office channel unit [OCU]).**

Connecting to a V.34 Modem Interface

You can connect an RJ-11 telephone cable to any ARN that contains a V.34 modem adapter module.

Note: The default settings for the front-panel V.34 modem adapter module differ from the default settings for the back-panel V.34 modem. Refer to "Connecting to a V.34 Modem Module" earlier in this chapter for information about the V.34 modem adapter and its default settings.

Table 1-2 provides the default settings for the V.34 modem adapter module.

Table 1-2. V.34 Modem Adapter Module Defaults

Modem Signal/Parameter	Value
Clear To Send (CTS)	On
Data Terminal Ready (DTR)	Depends on the modem type. Set the modem to answer incoming calls when DTR is active.
Data Carrier Detect (DCD) or RLSD	On while carrier is present (the ARN uses DCD to detect modem connect and disconnect).
Data Set Ready (DSR)	On
Ready to Send (RTS)	Ignore
Synchronous/Asynchronous Mode	Asynchronous
AutoAnswer	Set on *n* rings with DTR active (*n* must be greater than 0).
Local Character Echo	Off
Supervisory Functions	Off
Baud Rate	28800
Data Bits	8
Stop Bits	1
Parity	None

To connect to a V.34 modem interface:

1. **Insert the RJ-11 telephone cable into the V.34 modem interface labeled Telco (Figure 1-13).**

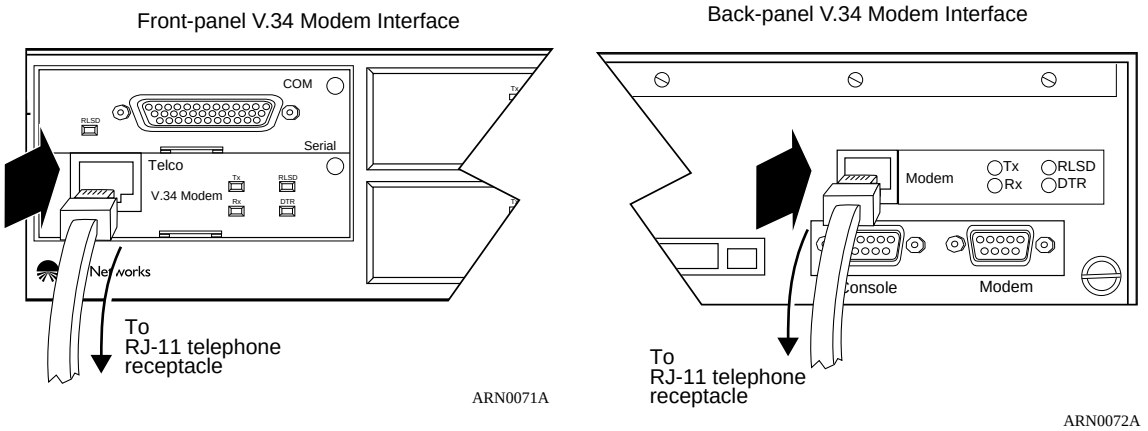


Figure 1-13. Connecting an RJ-11Cable

2. **Connect the other end of the cable to an analog telephone line (for example, the telephone wall receptacle).**

Connecting a Management Console

Use the back-panel console port to connect an ASCII-based terminal or a personal computer terminal emulator to the ARN.

Using a local terminal, you can monitor the results of startup diagnostics and set the boot configuration. Using an attached modem, you can allow remote dial-in access to diagnostics.

Note: To use the Netboot, Directed Netboot, or Local Boot software configuration options, you must connect a console the first time you power up the ARN, as described in Chapter 3.

Connecting a Terminal Console

You need both pieces in the ARN console/modem cable kit (Order No. 110310) to connect a terminal console:

- Order No. 110307 serial console/modem cable (with 9-pin receptacle to 25-pin plug connectors)
- Order No. 110308 null modem crossover adapter (with two 25-pin receptacle connectors)

Once you have the appropriate equipment, complete the following steps:

1. **Power on and configure the console, using the parameters in Table 1-3.**

   Refer to the console user manual for instructions.

Table 1-3. Console Parameters

Parameter	Value
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None

2. **Power off the console.**
3. **Attach the null modem crossover adapter to the 25-pin cable connector.**
4. **Insert the screw on the cable connector into the receptacle on the adapter connector and tighten the screw (Figure 1-14).**

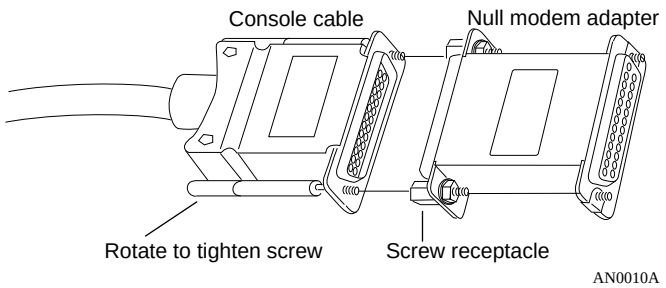


Figure 1-14. Attaching the Null Modem Adapter

5. **Attach the 25-pin receptacle connector on the combined cable and adapter to the console host connector (Figure 1-15).**

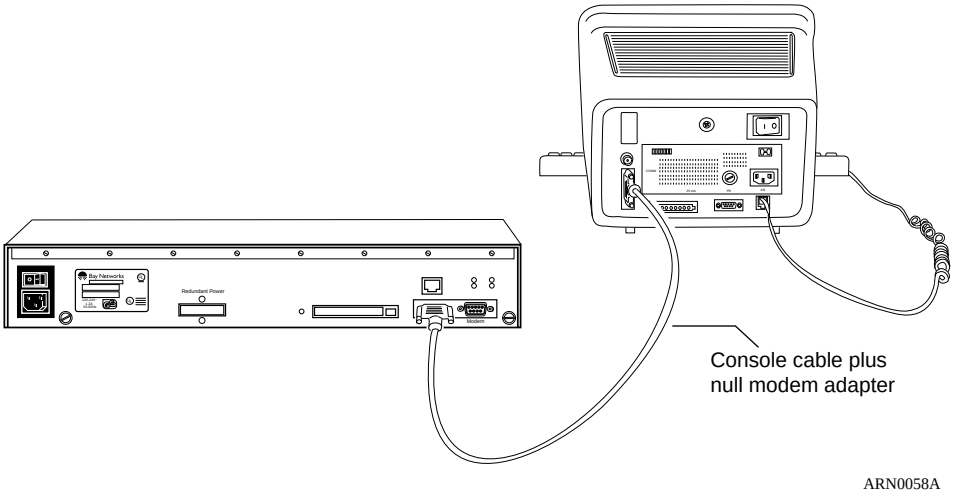


Figure 1-15. Connecting a Terminal Console to an ARN

6. **Insert the 9-pin receptacle end of the console cable into the ARN console port connector.**

   The console is now connected to the ARN.

Connecting a PC Console

You need both pieces in the ARN console/modem cable kit to connect a PC:

- Order No. 110307 serial console/modem cable (with 9-pin receptacle to 25-pin plug connectors)
- Order No. 110308 null modem crossover adapter (with two 25-pin receptacle connectors)

You also need another standard AT serial cable with a 25-pin plug connector.

Once you have the correct equipment, complete the following steps:

1. **Power on and configure the PC console, using the parameters in Table 1-3 and instructions in the console user manual.**

2. **Power off the PC console.**
3. **Insert the 9-pin receptacle end of the console cable into the console port (Figure 1-16).**
4. **Attach the null modem crossover adapter to the other end of the console cable (refer to Figure 1-14).**

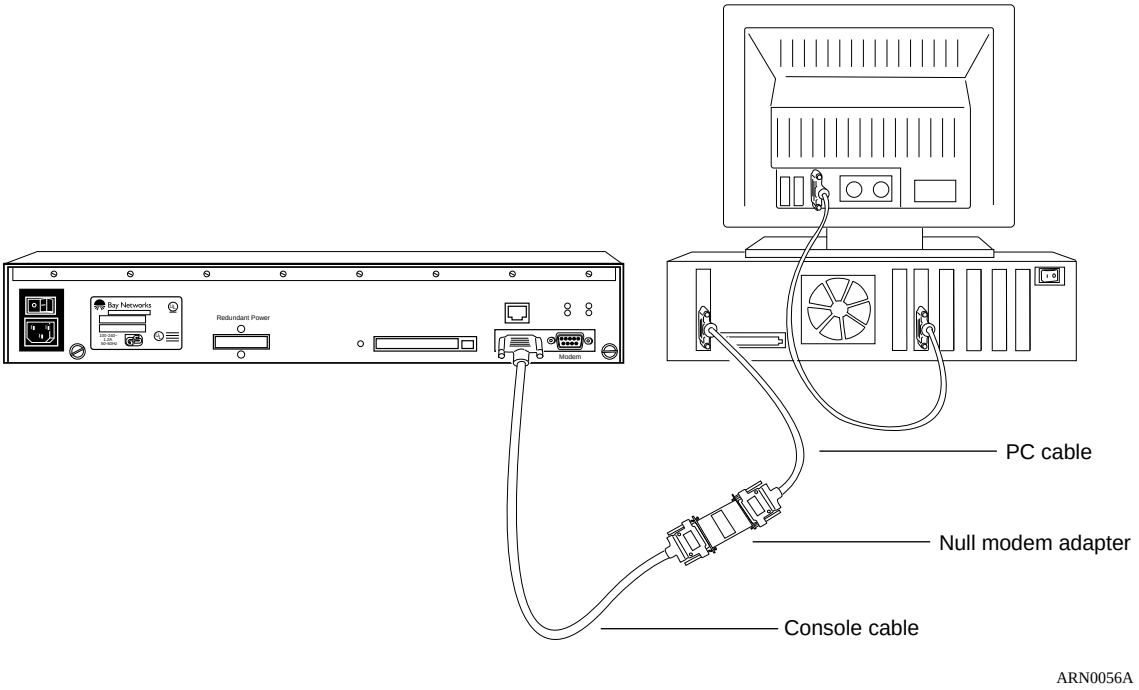


Figure 1-16. Connecting a PC Console to an ARN

5. **Attach the 25-pin receptacle end of the cable-plus-adapter to the PC console cable 25-pin plug connector.**
6. **Connect the complete cable unit to the communications port at the back of the PC (Figure 1-16).**

Connecting a Modem

You can connect a modem to the ARN using the back-panel modem port or you can connect a telephone line directly to an optional, back-panel V.34 modem adapter module.

Note: To use the Netboot, Directed Netboot, or Local Boot software configuration options, you must connect a console the first time you power up the ARN. Refer to Chapter 3 for details.

A modem provides remote access to the ARN for a system administrator. We recommend that you connect a modem in case the ARN experiences system problems.

Connecting to the Back-Panel Modem Port

To connect a modem to the ARN back panel, you need an AT (or Hayes) compatible modem and the Order No. 110307 modem cable that came in the ARN console/modem cable kit.

Note: Do *not* use the Order No. 110308 null modem crossover adapter in the ARN cable kit to connect to a modem.

Complete the following steps:

1. **Configure the modem, using the parameters in Table 1-4.**

Table 1-4. External Modem Parameters

Modem Signal/Parameter	Value
Clear To Send (CTS)	On
Data Terminal Ready (DTR)	Set to answer all incoming calls.
Data Carrier Detect (DCD) or RLSD	On while carrier is present (the ARN uses DCD to detect modem connect and disconnect).
Data Set Ready (DSR)	On
Ready to Send (RTS)	Ignored

(continued)

Table 1-4. External Modem Parameters *(continued)*

Modem Signal/Parameter	Value
Synchronous/Asynchronous Mode	Asynchronous
AutoAnswer	Answer on 2 rings with DTR active.
Local Character Echo	Off
Supervisory Functions	Off
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None

Refer to the modem user guide for instructions.

2. **Power off the modem.**
3. **Insert the 9-pin receptacle end of the modem cable into the front-panel console port (Figure 1-17).**

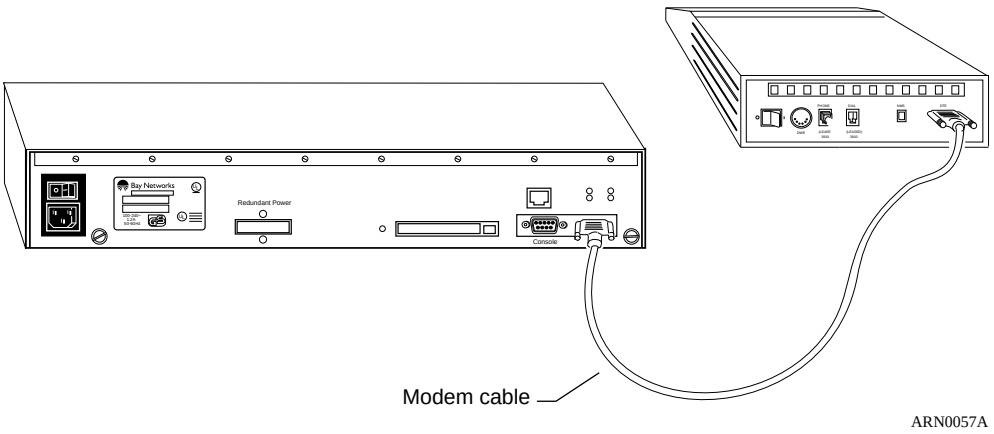


Figure 1-17. Connecting a Modem to an ARN

4. **Insert the 25-pin plug at the other end of the modem cable into the modem RS-232 data communications port.**

Connecting to a V.34 Modem Module

If your ARN contains an optional, back-panel V.34 modem module, you need only connect the telephone line to the V.34 interface for access to the router.

Note: The default settings for the back-panel V.34 modem differ from the default settings for the front-panel V.34 modem adapter module. Refer to "Connecting to a V.34 Modem Interface" earlier in this chapter for information about the V.34 modem adapter and its default settings.

Table 1-5 provides the default settings for the back-panel V.34 modem adapter.

Table 1-5. Back-Panel V.34 Modem Defaults

Modem Signal/Parameter	Value
Clear To Send (CTS)	On
Data Terminal Ready (DTR)	Set to answer all incoming calls.
Data Carrier Detect (DCD) or RLSD	On while carrier is present (the ARN uses DCD to detect modem connect and disconnect).
Data Set Ready (DSR)	On
Ready to Send (RTS)	Ignored
Synchronous/Asynchronous Mode	Asynchronous
AutoAnswer	Answer on 2 rings with DTR active.
Local Character Echo	Off
Supervisory Functions	Off
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None

Note: Physically connecting to either a front-panel or back-panel V.34 modem interface is essentially the same. Refer to "Connecting to a V.34 Modem Interface" earlier in this chapter for details.

Connecting the Power Cable

Complete these steps to connect the power cable:

1. **Connect the power cable to the power connector on the ARN back panel (Figure 1-18).**

Danger: Be sure that the power switch is in the OFF (0) position before you connect the power cable.

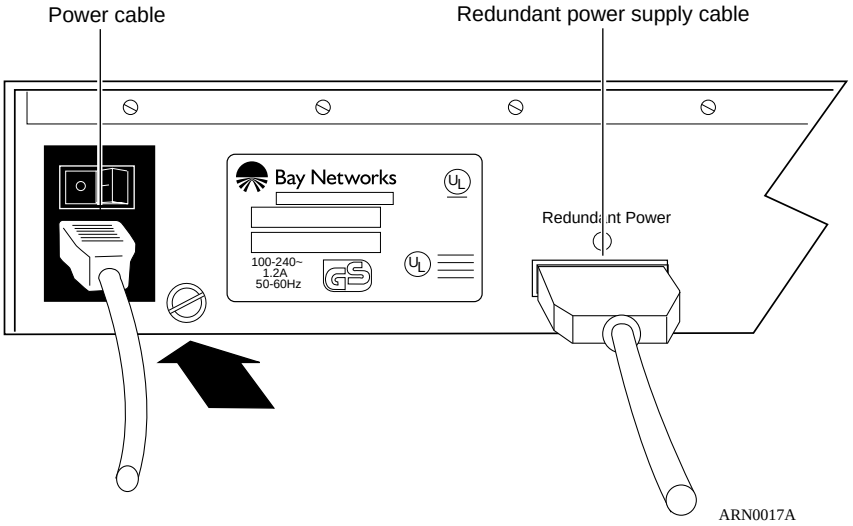


Figure 1-18. Connecting the Power Cable

2. **Connect the remote end of the power cable to a grounded outlet.**

Note: For information about connecting a redundant power supply to the ARN, refer to your redundant power supply documentation.

Installing the Flash Memory Card

A PCMCIA Flash memory card (Figure 1-19) provides storage capability for the Nonvolatile File System (NVFS) in the ARN. When you remove a formatted memory card, the NVFS automatically removes access to the card. When you insert and format a card or insert an already formatted card, the NVFS automatically provides access.

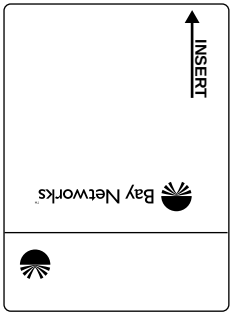


Figure 1-19. Flash Memory Card

Before starting the ARN, install the Flash memory card supplied with the router by following these steps:

1. **Position the card with the label facing up and the INSERT arrow pointing toward the card receptacle.**
2. **Insert the card into the receptacle.**

   Figure 1-20 shows how to insert the Flash memory card in an ARN.
3. **Gently push the card until it fits snugly into place.**

If the card is new, and you did not obtain it from Bay Networks, you must format the card before attempting to write to it. You can format the card using Site Manager software or the **format** command available with the Bay Networks Technician Interface. (Refer to *Using Technician Interface Software* for instructions.)

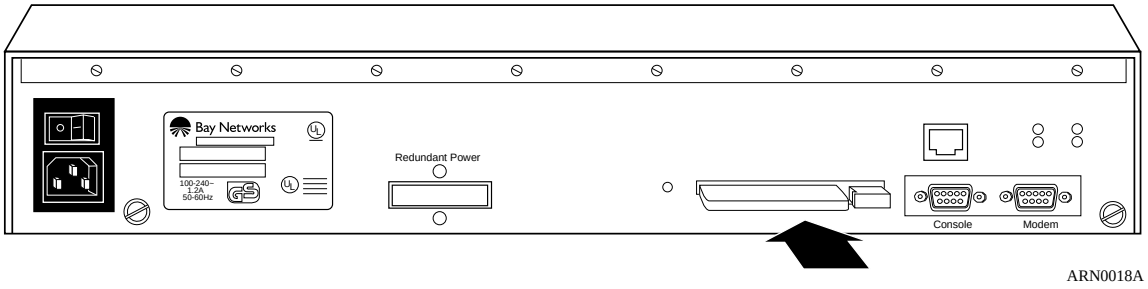


Figure 1-20. Inserting the Flash Memory Card in the ARN Receptacle

Where to Go Next

Use the following table to determine where you want to go next.

For information about	Go to
Starting the ARN	Chapter 2
Operating the ARN	Chapter 3
Configuring the ARN for Netboot and Directed Netboot	Appendix A
Using Local Boot (the Quick-Start Procedure)	Appendix B
ARN Technical Specifications	Appendix C

Chapter 2
Starting the ARN

The first time you start the ARN, you complete an important software configuration process -- you provide the ARN with the files it needs to operate over the network. This chapter discusses the need for these specific startup files, what methods you can use to ensure that the router installs and uses the appropriate files, and how to use each of these installation methods.

Note: Coordinate the initial startup of the ARN with your network administrator. This person refers to *Configuring Remote Access* to determine which software configuration option is best for your site and for instructions on setting up a boot server.

Software Installation

Before it can operate, the ARN hardware must install two startup files -- a *software image* and a *configuration file*.

The software image is a group of executable files that operate the protocols that the network requires. The process of installing and using this image is called *booting*. The software image that the ARN uses is called *arn.exe*.

To bridge and route traffic, the ARN also needs a configuration file that is tailored to the network. A configuration file is a binary system file that contains hardware and software configuration data. The default configuration file is named *config*. Bay Networks ships the executable and default configuration files on PCMCIA Flash cards.

You must complete an initial startup procedure to obtain the executable and default configuration files and connect the ARN to the network. Getting a file over the network is called network booting, or *netbooting*. Getting a file from the ARN file system, stored in Flash memory, is called *local booting*.

Caution: The ARN must contain a Flash memory card if you plan to obtain any startup files through the local boot procedure. If you attempt to local boot the ARN without the Flash memory card inserted, the router does not operate. Refer to "Installing the Flash Memory Card" in Chapter 1 for instructions.

Understanding the ARN Boot Options

You use one of four boot options to complete software installation: EZ-Install, Netboot, Directed Netboot, or Local Boot. Table 2-1 summarizes the four options; the sections that follow provide steps for completing each option.

Table 2-1. Summary of Initial Startup Options

Boot Option	Source for Image file	Source for Configuration File	Description and Requirements
EZ-Install	Local	Network (serial interface only)	The default option. The ARN boots from local Flash memory, then obtains its configuration file from a remote workstation that is configured as a Boot Protocol (BootP) server. The ARN saves the configuration to the Flash memory. This option requires a High-Level Data Link Control (HDLC) or Frame Relay serial connection.
Netboot*	Local or Network	Local or Network	The ARN locates and obtains **at least one** startup file from a remote workstation that is configured as a BootP server. This option requires a communications connection over an HDLC, Frame Relay, Ethernet, token ring, or DSU/CSU interface, and a local console connection.

(continued)

Table 2-1. Summary of Initial Startup Options *(continued)*

Boot Option	Source for Image file	Source for Configuration File	Description and Requirements
Directed Netboot†	Local or Network	Local or Network	The ARN obtains **at least one** startup file from a remote workstation that is configured as a Trivial File Transfer Protocol (TFTP) server. You must specify the IP address of the TFTP server and the complete path to the startup files before booting. This option requires a communications connection over an HDLC, Frame Relay, Ethernet, token ring, or DSU/CSU interface, and a local console connection.
Local Boot	Local	Local	The ARN boots from a local software image and generic startup configuration file. You create a customized configuration file by running the Quick-Start script. This option requires a local console connection.

*. The ARN supports netboot over serial, Ethernet, token ring, and DSU/CSU interfaces only.

†. The ARN supports directed netboot over serial, Ethernet, token ring, and DSU/CSU interfaces only.

Starting the ARN for the First Time

The ARN factory defaults are set to find the configuration and image files from the following locations:

- Configuration file -- over the *network*
- Image file -- on the *local* PCMCIA Flash memory card

These default settings work with the default EZ-Install procedure.

The first time you power on an ARN, the router steps through its diagnostic tests and then attempts to boot over all of its serial (COM) interfaces using EZ-Install.

If your network administrator has configured the network for the EZ-Install procedure, the router boots using its local image and obtains its configuration file over the network. Your network administrator can then connect to the ARN and manage it remotely. Refer to the next section, “Using EZ-Install,” for more information.

If your network administrator does not configure the network for EZ-Install, the ARN cannot obtain its configuration file from the network, and the EZ-Install procedure fails. The ARN then attempts to boot locally with the configuration file that resides on its Flash memory card. Refer to “Using Netboot, Directed Netboot, or Local Boot” for more information.

If both the EZ-Install and local boot attempts fail, the EZ-Install and local boot processes repeat until one of the following occurs:

- The ARN boots successfully.
- You interrupt the boot process to enter the ARN monitor.
- You turn off the ARN.

The following sections describe how to use each of the different boot options for the ARN.

Using EZ-Install

EZ-Install is the default installation option. This option requires that your network administrator has set up the network so that you can start the EZ-Install procedure. In addition, this option requires that you

- Install a Flash memory card.
- Connect at least one serial (COM) interface to the network.

Refer to Chapter 1 for instructions on how to perform any of these tasks.

Note: If your ARN does not have a COM interface, you must configure the ARN using netboot or directed netboot over an Ethernet, token ring, or DSU/CSU interface, or local boot the ARN and run the Quick-Start script. Go to the next section, “Using Netboot, Directed Netboot, or Local Boot,” for more information.

To use EZ-Install:

1. **Press the power switch on the ARN back panel to the ON position.**

   The ARN comes on and activates EZ-Install.

Note: If you power on the ARN before the network administrator is ready, restart the ARN by pressing the reset button on the rear panel. See Chapter 3 for more information on resetting the ARN.

2. **Ensure that the ARN boots correctly.**

   When the ARN boots, its LEDs flash in a particular order. See Chapter 3 for information on checking the ARN front-panel LEDs to ensure that the installation was successful and that the router is operating properly.

Using Netboot, Directed Netboot, or Local Boot

You must use a command line interface that accesses the router software when you netboot or local boot the ARN. To use a command line interface, you can

- Wait for the ARN to local boot (that is, wait for the router to fail EZ-Install and then attempt to boot using its local configuration file). After the ARN boots locally, you can log in to the Technician Interface and redefine the boot process.
- Interrupt the boot process using a break sequence and log in to the ARN monitor to redefine the boot process.

Using the netboot, directed netboot, or local boot options requires that you

- Connect any necessary communications cables to access the network.
- Connect a management console.
- Connect the ARN power cable.
- Install a Flash memory card.

Refer to Chapter 1 for instructions on how to perform these tasks.

Interrupting the Boot Process

Interrupting the boot process automatically starts the ARN monitor. Using the ARN monitor allows you to bypass the EZ-Install procedure.

Note: Before you power on the ARN, make sure that you have installed the router and connected the necessary management console equipment (refer to Chapter 1 for instructions).

To interrupt the boot process:

1. **Press the power switch on the ARN back panel to the On position.**

   As the router powers on, your console displays the ARN diagnostic tests. After successfully completing these tests, the router begins the EZ-Install procedure and attempts to boot over the network.

2. **While the router is running the EZ-Install procedure, issue a break sequence from the management console.**

   The ARN monitor login prompt appears.

Note: Be sure to issue a break sequence before the boot process completes. Break sequences can vary, depending on the console equipment type. Some console terminals have specific break keys on their keyboards; other management terminals require a specific key sequence to issue a break (for example, **Cntrl-C** or **~ #**). Refer to your console terminal or terminal emulator documentation for the break sequence specific to your console equipment.

Logging in to the Command Line Software

Regardless of the command line software used -- ARN monitor or Technician Interface -- the procedures are identical from the login prompt.

To log in to the command line:

1. **Type the following command at the login prompt and press the Return key:**

   Manager

   Note the use of an uppercase “M.”

   The Technician Interface or ARN monitor command line prompt appears. You are now using a command line interface to the router.

2. **To use the netboot, directed netboot, or the local boot option, go to one of the following sections that describes the procedure you want to use:**

   - Continuing with Netboot
   - Continuing with Directed Netboot
   - Continuing with Local Boot

Continuing with Netboot

Note: Continuing with the netboot option requires that you have already logged in to the Technician Interface or ARN monitor command line software. Refer to the previous section, "Logging in to the Command Line Software," for instructions.

You must have at least one serial, Ethernet, or token ring interface connected to the network to use the netboot option. Before you start the netboot procedure, ask your network administrator to

- Verify that the network is set up for the netboot procedure.
- Provide you with the interface configuration command (**ifconfig**) to use in Step 4.

Note: Refer to Appendix A for more information about the **ifconfig** command.

The **ifconfig** command configures the parameters necessary to load the software image and configuration files from a remote server over the network. Write the command in Table 2-2 for your reference.

Table 2-2. Your ifconfig Command -- Netboot

ifconfig

You can use the ARN Monitor, Technician Interface, or Site Manager to perform netboot. However, this guide assumes that you are using either the ARN monitor or the Technician Interface. To manage the ARN from a remote site, refer to *Configuring Remote Access*.

To use the netboot option:

1. **Enter the** ifconfig **command (refer to Table 2-2) at the command line prompt and press the Return key.**

   The following is a sample command:

   ifconfig com1 9.0.0.2 255.0.0.0 9.0.0.3

   Refer to Appendix A for more information about the **ifconfig** command.

2. **Enter the following command and press the Return key to verify the configuration you specified in Step 1:**

   getcfg

   The **getcfg** command shows the source -- either local or network -- of the boot image and the network configuration file. It also shows the interface configuration that you specified using the **ifconfig** command.

   Verify the interface configuration, as shown in Figure 2-1.

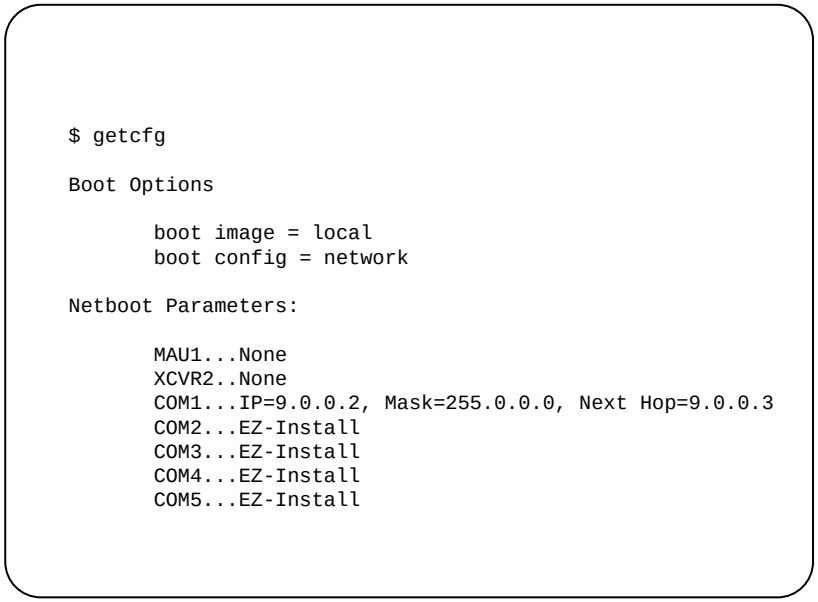


Figure 2-1. Verifying the Interface Configuration

If getcfg displays the correct information, continue to the next step. Otherwise, reenter the correct **ifconfig** command. Contact your network administrator if you need assistance.

3. **Enter the following command and press the Return key to boot the ARN:**

   boot

   Your console displays messages indicating the progress of the netboot procedure.

Note: If the ARN cannot find a software image or configuration file using the netboot procedure, it attempts to local boot once. If both attempts fail, the ARN continues to netboot and local boot until it boots successfully. If the ARN remains in this loop, refer to "Interrupting the Boot Process" earlier in this chapter.

4. **Ensure that the ARN boots correctly.**

   When the ARN boots, its LEDs flash in a particular order. See Chapter 3 for information on checking the ARN front-panel LEDs to ensure that the installation was successful and that the router is operating properly.

Contact your network administrator to verify that the ARN is now connected to the network. Your network administrator can refer to *Configuring Remote Access* to troubleshoot any problems.

Contact your local Bay Networks Technical Response Center if you need additional assistance.

After connecting the ARN to the network, you can replace the local console with a modem connection to enable remote dial-in access.

Continuing with Directed Netboot

Note: Continuing with the directed netboot option requires that you have already logged in to the Technician Interface or ARN monitor command line software. Refer to the previous section, "Logging in to the Command Line Software," for instructions.

You must have at least one serial, DSU/CSU, Ethernet, or token ring interface connected to the network to use the directed netboot option. Before you start the directed netboot procedure, ask your network administrator to

- Verify that the network is set up so that you can start the directed netboot procedure.
- Provide you with the **ifconfig** command to use in Step 1.
- Provide you with the boot option configuration commands (**bconfig**) to use in Step 2.

Note: Refer to Appendix A for more information about the **ifconfig** and **bconfig** commands.

The **ifconfig** command configures the parameters necessary to load the software image and configuration files from a remote server over the network. Write the command in Table 2-3 for your reference.

Table 2-3. Your ifconfig Command -- Directed Netboot

ifconfig

The **bconfig** commands let you specify the location of a startup file. To use directed netboot, the location must includes the following information:

- The source of the image and configuration files (local or network)
- The address of the TFTP server
- The full directory path description locating the files on the TFTP server

Write the commands in Table 2-4 for your reference.

Table 2-4. Your bconfig Commands

bconfig image
bconfig config

You can use the ARN monitor, Technician Interface, or Site Manager to perform directed netboot. However, this guide assumes that you are using either the ARN monitor or the Technician Interface. To manage the ARN from a remote site, refer to *Configuring Remote Access*.

To use the directed netboot feature:

1. **Enter the** ifconfig **command (refer to Table 2-3) at the command line prompt and press the Return key.**

   The following is a sample command:

   ifconfig com1 9.0.0.2 255.0.0.0 9.0.0.3

   Refer to Appendix A for more information about the **ifconfig** command.

2. **Enter the** bconfig **commands (refer to Table 2-4) at the command line prompt and press the Return key.**

   You must enter one **bconfig** command to specify the location of the software image, and another to specify the location of the configuration file.

   The following are sample commands:

   bconfig image network 192.32.5.8 /usr/arnstartup/krnl_arn.exe
   bconfig config network 192.32.5.8 /usr/arnstartup/config

   Refer to Appendix A for more information about the **bconfig** command.

3. **Type the following command and press the Return key to verify the configuration you specified in Step 3:**

   getcfg

   The **getcfg** command shows the location of the boot image and the network configuration file, the interface configuration that you specified using the **ifconfig** command, as well as the TFTP server information and file paths that you specified using the **bconfig** commands.

   Verify the interface configuration, as shown in Figure 2-2.

```
$ getcfg

Boot Options
       boot image = network
       boot config = network
       host IP address = 192.32.5.8
       image pathname =
            "/usr/arnstartup/krnl_arn.exe"
       config pathname =
            "/usr/arnstartup/config"

Netboot Parameters:

       MAU1...None
       XCVR2..None
       COM1...IP=9.0.0.2, Mask=255.0.0.0, Next Hop=9.0.0.3
       COM2...EZ-Install (disabled)
       COM3...EZ-Install (disabled)
       COM4...EZ-Install (disabled)
       COM5...EZ-Install (disabled)
```

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Figure 2-2. Verifying Directed Netboot Configuration

   If **getcfg** displays the correct information, continue to Step 4. Otherwise, reenter the correct **ifconfig** and **bconfig** commands. Contact your network administrator if you need assistance.

4. **Type the following command and press the Return key to boot the ARN:**

   boot

Note: If the ARN cannot find a software image or configuration file using the directed netboot procedure, it attempts to netboot once. If the netboot procedure fails, the ARN tries to local boot once. If all three boot attempts fail, the ARN continues to try directed netboot, netboot, and local boot until it boots successfully. If the ARN remains in this loop, refer to "Interrupting the Boot Process" earlier in this chapter.

5. **Ensure that the ARN boots correctly.**

   When the ARN boots, its LEDs flash in a particular order. See Chapter 3 for information on checking the ARN front-panel LEDs to ensure that the installation was successful and that the router is operating properly.

Contact your network administrator to verify that the ARN is now connected to the network. Your network administrator can refer to *Configuring Remote Access* to troubleshoot any problems.

Contact your local Bay Networks Technical Response Center if you need additional assistance.

After connecting the ARN to the network, you can replace the console connection with a modem connection to enable remote dial-in access.

Continuing with Local Boot (the Quick-Start Procedure)

Note: Continuing with the local boot option requires that you have already logged in to the Technician Interface or ARN monitor command line software. Refer to the previous section, "Logging in to the Command Line Software," for instructions.

You can use either the ARN monitor or the Technician Interface to configure the ARN to local boot. However, you must use the Technician Interface to run the Quick-Start script.

Before starting the local boot procedure, ask your network administrator to assist you in completing the Quick-Start worksheets in Appendix B.

To use the local boot feature:

1. **At the command line prompt, type the following command and press the Return key to configure the ARN to use its local *config* file:**

   bconfig config local

Note: The default setting for finding the software image is `local`; you do not have to change this setting for the local boot option.

2. **Type the following command and press the Return key to boot the ARN:**

   boot

Note: If the ARN tries to local boot and cannot find a software image or configuration file, it attempts to netboot once. If both attempts fail, the ARN continues to local boot and netboot until it boots successfully. If the ARN remains in this loop, refer to "Interrupting the Boot Process" earlier in this chapter.

3. **Ensure that the ARN boots correctly.**

   When the ARN boots, its LEDs flash in a particular order. See Chapter 3 for information on checking the ARN front-panel LEDs to ensure that the installation was successful and that the router is operating properly.

   After the ARN boots using its local software image and configuration file, the Technician Interface login prompt appears.

4. **Type the following command at the login prompt and press the Return key:**

   Manager

   Note the use of an uppercase "M."

   The Technician Interface prompt (**$**) appears.

Note: To check the contents of the router local file system on the installed Flash memory card, type **dir** and press the Return key. The *arn.exe* software image, *config* file, and *inst_arn.bat* file should appear among the files listed.

5. **Enter the following command and press the Return key to run the Quick-Start script:**

   run inst_arn.bat

   The Quick-Start script begins running.

6. **Using your completed Quick-Start worksheet from Appendix B, enter the appropriate network information as the prompts appear.**

   The ARN uses this information to configure interfaces to the network.

   Refer to Appendix B for sample Quick-Start screen output and for information on using Quick-Start commands.

7. **Choose whether you want to configure another module/port.**

   Entering **n** stops the Quick-Start script and returns you to the Technician interface prompt. Entering **y** allows you to configure another module/port.

   Once the install script completes, the ARN starts bridging and routing traffic.

Contact your network administrator to verify that the ARN is now connected to the network. Your network administrator can refer to *Configuring Remote Access* to troubleshoot any problems.

Contact your local Bay Networks Technical Response Center if you need additional assistance.

After configuring the ARN network interface, you can replace the console connection with a modem connection to enable remote dial-in access.

Where to Go Next

Use the following table to determine where you want to go next.

For information about	Go to
Installing the ARN	Chapter 1
Operating the ARN	Chapter 3
Configuring the ARN for Netboot and Directed Netboot	Appendix A
Using Local Boot (the Quick-Start Procedure)	Appendix B
ARN Technical Specifications	Appendix C

Chapter 3
Operating the ARN

This chapter describes how to

- Locate and understand the function of base module LEDs
- Use the expansion module and adapter module LEDs to check the status of various interfaces
- Ensure a successful installation using the base module LEDs
- Power on and off the ARN
- Reset the ARN
- Remove a Flash memory card
- Protect the files on the Flash memory card

LED Descriptions

LEDs on the ARN front and back panels provide information about how the ARN is operating. The following sections describe the LEDs on the ARN base modules, expansion modules, adapter modules, and the ARN back panel.

Base Module LEDs

The ARN base module LEDs include diagnostic LEDs and either Ethernet or token ring interface LEDs.

Diagnostic LEDs

The base module diagnostic LEDs (Figure 3-1) indicate the status of the ARN itself. All of these LEDs light briefly when you plug the ARN into the wall outlet and turn on the power switch.

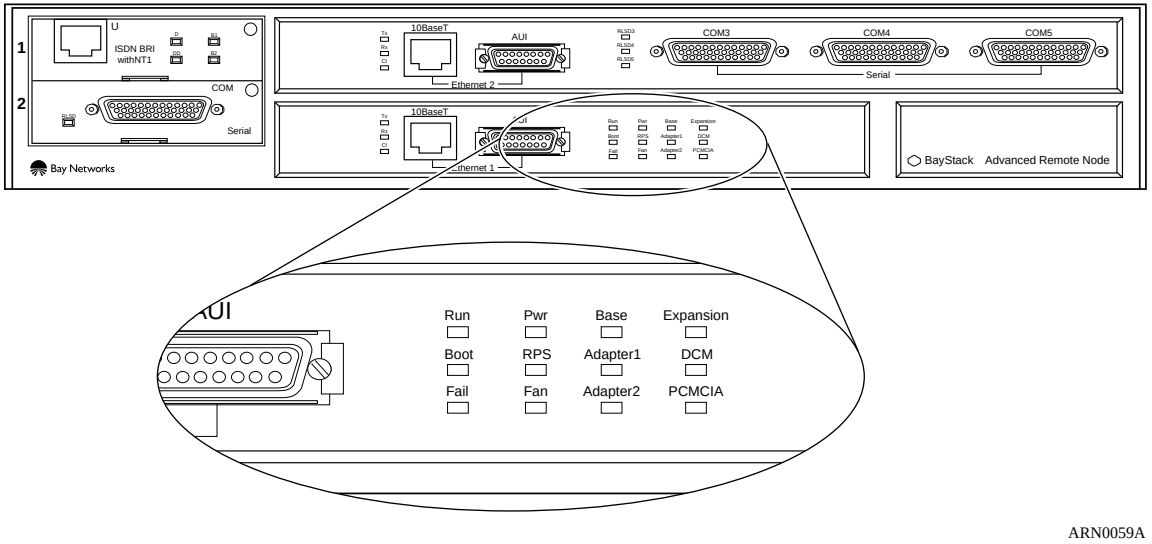

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Figure 3-1. ARN Base Module Diagnostic LEDs

Table 3-1 describes the base module diagnostic LEDs.

Table 3-1. Base Module Diagnostic LEDs

LED	Meaning
Run	Flashes for 1 to 3 minutes, indicating that diagnostic tests are running. When it lights again and remains on, the ARN is operational.
Boot	Lights for 1 to 3 minutes, indicating that diagnostic tests were successful and the ARN is booting.
Fail	Lights again and remains on when diagnostic failure occurs.
Pwr	Lights and remains on when the ARN is on and receiving power.
RPS	Lights and remains on when the redundant power supply (optional) is operating.
Fan	Lights and remains on when the ARN cooling fan is operating.
Base	Lights and remains on when the base module is operating properly. Flashes slowly to indicate that the module is running its diagnostic tests. Flashes rapidly to indicate that the module failed its diagnostic tests.
Adapter1	Lights and remains on when adapter module #1 is operating properly. Flashes slowly to indicate that the module is running its diagnostic tests. Flashes rapidly to indicate that the module failed its diagnostic tests.
Adapter2	Lights and remains on when adapter module #2 is operating properly. Flashes slowly to indicate that the module is running its diagnostic tests. Flashes rapidly to indicate that the module failed its diagnostic tests.
Expansion	Lights and remains on when an expansion module is installed and operating properly. Flashes slowly to indicate that the module is running its diagnostic tests. Flashes rapidly to indicate that the module failed its diagnostic tests.
DCM	Lights and remains on when an RMON DCM is installed and operating properly. Flashes slowly to indicate that the module is running its diagnostic tests. Flashes rapidly to indicate that the module failed its diagnostic tests.
PCMCIA	Lights and remains on when the ARN contains a flash memory card in its PCMCIA slot.

Ethernet LEDs

Table 3-2 describes the base module Ethernet LEDs.

Table 3-2. Base Module Ethernet LEDs

LED	Meaning
Tx (Transmit)	Lights when the Ethernet interface transmits data.
Rx (Receive)	Lights when the Ethernet interface receives data.
Cl (Collision)	Lights when the Ethernet interface detects a collision.

Token Ring LEDs

Table 3-3 describes the base module token ring LEDs.

Table 3-3. Base Module Token Ring LEDs

LED	Meaning
RCVR (Receiver)	Lights when the interface is connected to the network.
NSRT (Insert)	Lights when you insert the ARN into the token ring network.
WFLT (Wire Fault)	Lights when the token ring hardware detects a wire fault condition.

Expansion Module LEDs

An ARN expansion module can contain Ethernet, token ring, or serial interface LEDs.

Ethernet LEDs

Table 3-4 describes the expansion module Ethernet LEDs.

Table 3-4. Expansion Module Ethernet LEDs

LED	Meaning
Tx (Transmit)	Lights when the interface is transmitting data over the network.
Rx (Receive)	Lights when the interface is receiving data from the network.
Cl (Collision)	Lights when the interface detects a collision on the network.

Token Ring LEDs

Table 3-5 describes the expansion module token ring LEDs.

Table 3-5. Expansion Module Token Ring LEDs

LED	Meaning
RCVR (Receiver)	Lights when the interface is connected to the network.
NSRT (Insert)	Lights when you insert the ARN into the Token Ring network.
WFLT (Wire Fault)	Lights when the Token Ring hardware detects a wire fault condition.

Serial LEDs

Table 3-6 describes the expansion module serial interface LEDs.

Table 3-6. Expansion Module Serial LEDs

LED	Meaning
RLSD3 (Received Line Signal Detection 3)	Lights when Received Line Signal Detection is active on COM 3.
RLSD4 (Received Line Signal Detection 4)	Lights when Received Line Signal Detection is active on COM 4.
RLSD5 (Received Line Signal Detection 5)	Lights when Received Line Signal Detection is active on COM 5.

Adapter Module LEDs

An ARN adapter module can contain serial, ISDN, DSU/CSU, or V.34 modem LEDs.

Serial LED

Table 3-7 describes the serial adapter module LED.

Table 3-7. Serial LED

LED	Meaning
RLSD (Received Line Signal Detection)	Lights when Received Line Signal Detection is active on the serial interface.

ISDN BRI LEDs (S/T or U Interfaces)

Table 3-8 describes the ISDN adapter module LEDs.

Table 3-8. ISDN BRI LEDs

LED	Meaning
S/T Interface	
Unlabeled LED	Lights when the ARN is using the D-channel.
U Interface	
D (D-channel; 16-KB Management Channel)	Lights when the ARN is using the D-channel.
DD (Data Detect)	Lights when the interface detects connection to an external device (that is, a switch).
B1 (B-Channel #1; 64-KB Data Channel)	Lights when the ARN is using B-channel #1.
B2 (B-Channel #2; 64-KB Data Channel)	Lights when the ARN is using B-channel #2.

DSU/CSU LEDs

Table 3-9 describes the DSU/CSU adapter module LEDs.

Table 3-9. DSU/CSU LEDs

LED	Meaning
TxD (Transmit Data)	Lights when the interface transmits data over the network.
RxD (Receive Data)	Lights when the interface receives data from the network.
CD (Carrier Detect)	Lights when the interface detects a connection to another device.
Test	Lights when the interface is in test or loopback mode.

V.34 Modem LEDs

Table 3-10 describes the V.34 modem adapter module LEDs.

Table 3-10. V.34 Modem LEDs

LED	Meaning
TX (Transmit)	Lights when the interface transmits data over the network.
RX (Receive)	Lights when the interface receives data from the network.
RLSD (Received Line Signal Detection)	Lights when the modem activates.
DTR (Data Terminal Ready)	Lights when the interface is ready to transmit data.

Back-Panel LEDs

The ARN back-panel allows for an optional V.34 Modem Adapter module. Refer to the previous section, “V.34 Modem LEDs,” for more information about these LEDs.

Ensuring a Successful Installation

After connecting the ARN to the network, you can ensure a successful installation by checking the diagnostic LEDs on the front panel of the base module (refer to Figure 3-1).

When you power on the ARN, the following sequence of front panel LED activity should occur:

- All base module LEDs light momentarily; this tests that the LEDs are operational.
- The Run, Boot, and Fail LEDs count through a short, initial startup sequence.
- The Pwr (power) LED lights and remains on.
- The Run LED begins flashing and continues to flash until the ARN completes all diagnostic tests.
- As the diagnostic procedure tests each module, the LED representing that module flashes slowly. If the module passes its diagnostic test, the LED remains on. If the module fails its diagnostic test, the Fail LED remains on and the module LED flashes rapidly.
- After completing the diagnostic testing procedure, the boot process begins. The Run and Boot LEDs indicate the boot status as shown in Table 3-11.

Table 3-11. Boot Status LEDs

Boot Status	Run LED	Boot LED
Local Boot	Off	On
Netboot (attempting)	Off	Flashing
Netboot (downloading)	Flashing	On
Interrupted (using ARN monitor)	Flashing	Flashing

- After the boot process completes, the Run LED lights and the Boot LED turns off, indicating that the ARN is operational.

If the LEDs on the ARN light in this sequence, your installation is successful. Contact your network administrator to verify that the ARN is now connected to the network.

If the LEDs do not light in this sequence, your network administrator can refer to *Configuring Remote Access* to help troubleshoot the problem.

Note: If the ARN does not contain an expansion module, an adapter module, a redundant power supply, a data collection module, or a Flash card, the LEDs associated with these components remain off.

If you need additional assistance, contact your local Bay Networks Technical Response Center.

Powering On and Off the ARN

The ARN power switch is located on the back panel (Figure 3-2). To power on an ARN, press the power switch to the ON position (1). To power off the ARN, press the power switch to the OFF position (0).

Note: To ensure a complete power cycle, we recommend that you wait at least 4 seconds between powering off the ARN and powering it back on.

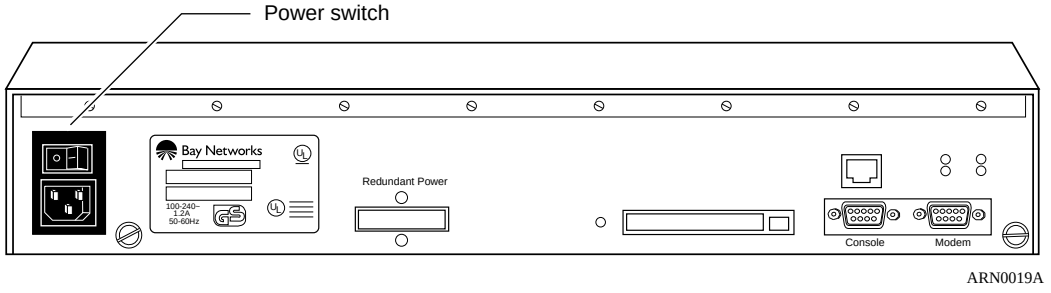


Figure 3-2. ARN Power Switch

Resetting the ARN

The Reset button is set inside the ARN back panel and resides next to the Flash card slot, as shown in Figure 3-3.

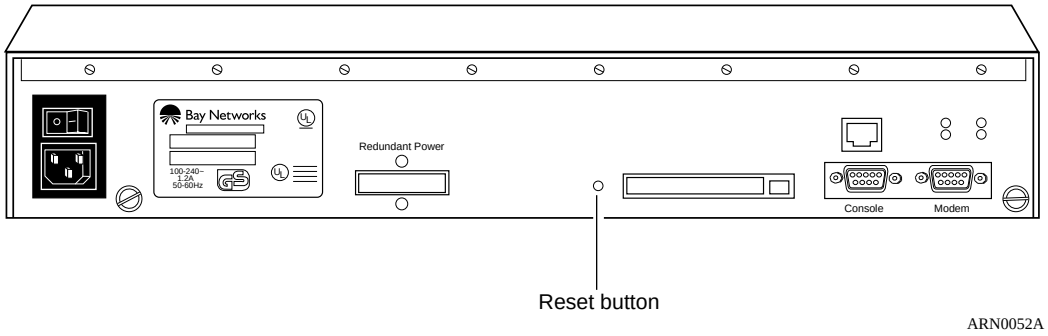


Figure 3-3. ARN Reset Button

To press the Reset button, insert a small pointed object (for example, a paper clip) into the Reset button hole.

You can use the Reset button to reboot the ARN hardware without cycling power, as follows:

- To *warm-boot* the ARN (no diagnostic tests run), press the Reset button for less than 5 seconds.
- To *cold-boot* the ARN (diagnostic tests run), press the Reset button for more than 5 seconds.

Note: If you reset the ARN while it is running its diagnostic tests, the LEDs remain in the state they were in when you pressed the Reset button. You must cycle power on the ARN to reset the LEDs.

Removing a Flash Memory Card

To remove a memory card from an ARN:

1. **Press the Eject button next to the card receptacle on the back panel.**
2. **Pull the memory card out of the card receptacle.**

   See Figure 3-4.

Caution: Do not remove the Flash memory card while the router is operating. Removing the memory card interferes with current networking operations.

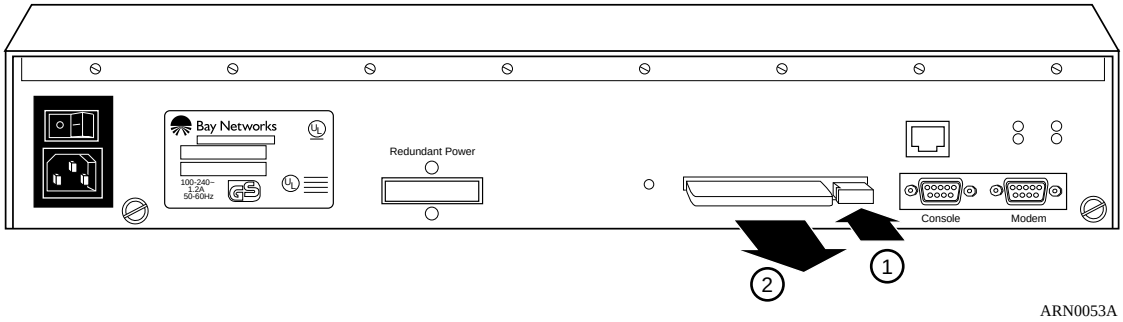


Figure 3-4. Removing an ARN Flash Memory Card

To insert another memory card into the receptacle, refer to “Installing the Flash Memory Card” in Chapter 2.

When you remove a formatted memory card, the NVFS automatically removes access to the card. When you insert and format a card or insert an already formatted card, the NVFS automatically provides access.

Protecting Memory Card Files

Bay Networks ships each memory card with its Read/Write Protect switch in the unprotected position (Figure 3-5). After successfully loading the configuration file and saving your configuration, you may want to write-protect the memory card for backup purposes.

Note: You typically do not operate the ARN with a write-protected memory card. We recommend making a copy of your configuration on another memory card, write-protecting the card, and storing it in a safe place.

To change memory card protection, complete the following steps:

1. **Remove the memory card as described in the previous section.**
2. **Adjust the read-write protect switch, which is located on the edge opposite the INSERT arrow of the memory card (Figure 3-5).**

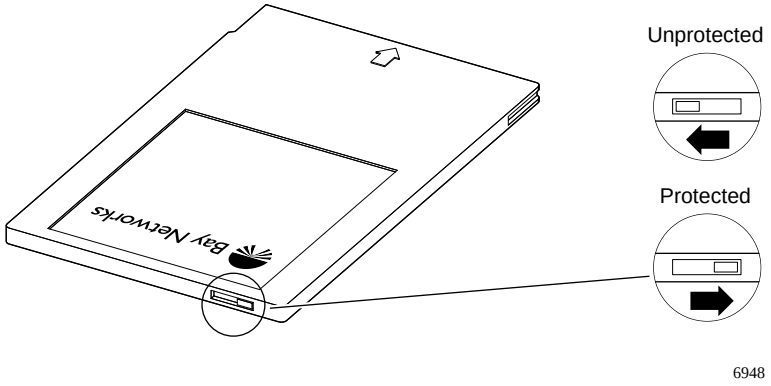


Figure 3-5. Memory Card Read/Write Protect Switch

3. **Reinsert the memory card into the card receptacle.**

Where to Go Next

Use the following table to determine where you want to go next.

For information about	Go to
Installing the ARN	Chapter 1
Starting the ARN	Chapter 2
Configuring the ARN for Netboot and Directed Netboot	Appendix A
Using Local Boot (the Quick-Start Procedure)	Appendix B
ARN Technical Specifications	Appendix C

Appendix A
Configuring the ARN for Netboot and Directed Netboot

The following commands configure the ARN for netboot and directed netboot:

- Use the **ifconfig** command to configure the router initial IP interface to the network. You need this information to complete the procedure in "Continuing with Netboot" in Chapter 2.
- Use the **bconfig** command to specify the location and name of the ARN software image and configuration file. You need this information to complete the procedure in "Continuing with Directed Netboot" in Chapter 2.

Contact your network administrator for additional assistance in determining the appropriate **ifconfig** command and **bconfig** commands that you need for the ARN at your site. (Your network administrator has information on these commands in *Configuring Remote Access*.)

Using the ifconfig Command

A router interface cannot communicate in an IP network without an IP address. Because an ARN netboots over one of its serial, DSU/CSU, Ethernet, or Token Ring links, the netboot interface must have a valid IP address.

You use the **ifconfig** command to do the following:

- Configure the router's initial IP interface to the network. (The initial IP interface should be a serial interface if you are using EZ-Install.) You also use the same procedure to configure other serial interfaces for the netbooting procedure.
- Configure Ethernet or token ring interfaces for the netbooting procedure.

- Enable or disable netbooting on an interface.

The following sections describe each use of the **ifconfig** command.

Configuring an IP Serial or DSU/CSU Interface for Netbooting

Configure a serial or DSU/CSU (COM) interface to the IP network using the following interface configuration command:

ifconfig [*synchronous options*] *<interface>* [*<IP address> <subnet mask>* [*<next hop address>*]]

The *synchronous options* variable indicates some combination of the following settings:

[**-d** | **-fr** [**-annexd** | **-lmi** | **-annexa**] | **-int_clk**]

Note: Make sure to separate command options with spaces.

Table A-1 describes the **ifconfig** command arguments for configuring a COM interface.

Table A-1. ifconfig Command Settings for a COM Interface

Setting	Description
Default Setting	
-d	Resets the router IP interface settings to the default values. This setting tries four WAN configurations in the following order until it finds the correct type for the router connection to the network: 1. Bay Networks HDLC encapsulation (also referred to as Bay Networks Standard Point-to-Point) with external clocking 2. Frame Relay Annex D 3. Frame Relay LMI 4. Frame Relay Annex A

(continued)

Table A-1. ifconfig Command Settings for a COM Interface *(continued)*

Setting	Description
Frame Relay Settings	
-fr	Configures the router COM interface as a Frame Relay connection. With this setting, use one of the following options to specify a DLCMI setting: **-annexd**, **-annexa**, or **-lmi**.
-annexd **-annexa** **-lmi**	When one of these options is used with the **-fr** setting, it specifies a DLCMI setting. Use the same setting as the network to which the router's Frame Relay interface is connected. The default setting for Frame Relay is **-annexd**.
Internal Clocking Setting	
-int_clk	Sets the serial interface to internal clocking at 1.25 MB/s. If you do not specify this setting, the router defaults to external clocking.
IP Connector Setting	
<interface>	Specifies the IP connector you are configuring. Use the format **com**<*port #*>.
IP Address Settings	
<IP address>	Specifies the IP address of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<subnet mask>	Specifies the IP subnet mask of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<next hop address>	Specifies the IP address of the next-hop router. Provide this address in dotted decimal notation. Specify this address only if there are intermediate routers between the router and the BootP server.

Configuring an Ethernet Interface for Network Booting

To configure an ARN Ethernet interface for network booting, use the following command format:

ifconfig [**-d**] *<interface>* [*<IP address>* *<subnet mask>* [*<next hop address>*]]

Table A-2 describes the **ifconfig** command arguments for configuring the router's Ethernet interface.

Table A-2. ifconfig Command Settings for an Ethernet Interface

Setting	Description
Default Setting	
-d	Resets the router IP interface settings to the default values. Resetting an Ethernet interface makes it inactive in the network booting process. (The output of the **getcfg** command shows the default as None.)
IP Connector Setting	
<interface>	Specifies the IP connector you are configuring. Use the format **xcvr**<*port #*>.
IP Address Settings	
<IP address>	Specifies the IP address of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<subnet mask>	Specifies the IP subnet mask of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<next hop address>	Specifies the IP address of the next-hop router. Provide this address in dotted decimal notation. Specify this address only if there are intermediate routers between the router and the BootP server.

Configuring a Token Ring Interface for Network Booting

To configure an ARN token ring interface for network booting, use the following command format:

ifconfig [**-d**] [**-r**<*speed*>] *<interface>* [*<IP address> <subnet mask>* [*<next hop address>*]]

Table A-3 describes the **ifconfig** command arguments for configuring the router token ring interface.

Table A-3. ifconfig Command Settings for a Token Ring Interface

Setting	Description
Default Setting	
-d	Resets the router IP interface settings to the default values. Resetting a Token Ring interface makes it inactive in the network booting process. (The output of the **getcfg** command shows the default as None.)
IP Connector Setting	
-r*<speed>*	Specifies the speed of the Token Ring interface. Enter either **16** or **4** (Mb/s). The default is 16 Mb/s.
<interface>	Specifies the IP connector you are configuring. Use the format **mau**<*port #*>.
IP Address Settings	
<IP address>	Specifies the IP address of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<subnet mask>	Specifies the IP subnet mask of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<next hop address>	Specifies the IP address of the next-hop router. Provide this address in dotted decimal notation. Specify this address only if there are intermediate routers between the router and the BootP server.

Enabling and Disabling Interfaces with ifconfig

To enable or disable an ARN interface for the network boot process, use the following command formats:

ifconfig -disable *<interface>*
ifconfig -enable *<interface>*

Table A-4 describes the **ifconfig** command arguments for enabling and disabling interfaces for network booting.

Table A-4. ifconfig Settings to Enable and Disable Netboot Interfaces

Setting	Description
<interface>	Specifies the IP connector you are enabling or disabling for network booting. Use one of the following formats: **xcvr***<port #>* **com***<port #>* **mau***<port #>*

ifconfig Command Examples

1. Configure the current interface for the default Netboot procedure.

   ifconfig -d

2. Specify the IP address and subnet mask of the base module Ethernet interface.

   ifconfig xcvr1 21.3.5.62 255.255.255.0

3. Specify the IP address and subnet mask of the expansion module Ethernet interface.

   ifconfig xcvr2 21.3.5.61 255.255.255.0

4. Configure the IP address and Frame Relay DLCMI of the third serial interface on the expansion module.

   ifconfig com3 21.3.5.62 -fr -annexa

5. Specify the IP address and subnet mask of the base module token ring interface.

   ifconfig mau1 21.3.4.77 255.255.255.0

Using the bconfig Command

To use netboot, you use the **bconfig** command to specify that the ARN configuration file or software image resides on the network. To use directed netboot, you use the **bconfig** command to specify the IP address of the server and the full pathname to the software image and configuration file. To use local boot, you use the **bconfig** command to specify that the configuration file and software image both reside on the local file system (that is, the PCMCIA Flash card).

bconfig Command Format

To configure an interface for netboot, use the following format for the **bconfig** command:

bconfig -d [**image** | **config**]

To configure an interface for directed netboot, use the following format:

bconfig [**image** | **config**] [**local** | **network** [*<TFTP host> <TFTP pathname>*]]

You must use the **bconfig** command twice: once to specify the location of the software image, and again to specify the location of the configuration file.

Refer to Table A-5 for a complete description of the **bconfig** command.

Table A-5. bconfig Command Settings

Option	Description
image	Indicates the router's software image.
config	Indicates the router's configuration file.
local	Indicates that the specified file (image or config) resides in the router's local file system.
network	Indicates that the specified file (image or config) resides on a remote file system.
<TFTP host>	Specifies the IP address of the TFTP server. If both the software image and configuration file are on the network, both files must reside on the same host.
<TFTP pathname>	Specifies the complete pathname of the remote software image or configuration file.
-d	Reverts to the default values for the software image or configuration file and nullifies any previously specified IP address and pathname for the file, thus disabling directed netboot.

bconfig Command Examples

1. Configure the default netboot procedure -- use a local image file and look for the configuration file over the network using BootP.

   bconfig -d image (or **bconfig image local**)
   bconfig -d config (or **bconfig config network**)

2. Use netboot for both the boot image and configuration file.

   bconfig image network
   bconfig config network

3. Use a local configuration file and directed netboot for the boot image file.

   bconfig image network 21.3.5.62 /usr/mykernel.exe
   bconfig config local

4. Use a local boot image file and directed netboot for the configuration file.

   bconfig image local
   bconfig config network 21.3.5.62 /usr/arnstartup/config

5. Use directed netboot for both the boot image and configuration file.

   bconfig image network 21.3.5.62 /usr/mykernel.exe
   bconfig config network 21.3.5.62 /usr/arnstartup/config

Verifying Your Configuration

You can use the **getcfg** command to verify

- Whether the router is set to boot using a local or remote software image
- Whether the router is set to configure using a local or remote configuration file
- The configuration of any serial, DSU/CSU, Ethernet, and token ring connectors

Enter the following command to display the ARN startup options:

getcfg

The following sample response shows the settings for an ARN with one Ethernet, one token ring, and five serial interfaces:

```
Boot Options

    boot image=local
    boot config=network

Netboot Parameters:

    MAU1...None
    XCVR2..None
    COM1...EZ-Install
    COM2...EZ-Install
    COM3...EZ-Install
    COM4...EZ-Install
    COM5...EZ-Install
```

Appendix B
Using Local Boot (the Quick-Start Procedure)

This appendix explains how to local boot the ARN using the Quick-Start procedure. The Quick-Start Procedure is the initial configuration that gets a Bay Networks ARN router up and running on the network. The procedure enables the Internet Protocol (IP) so that the router can connect to Site Manager.

To power-start the ARN, you run the *inst_arn.bat* script and enter information at the prompts. The ARN automatically selects options for some prompts, and you can accept default values for many of the other prompts.

To aid you in answering Quick-Start prompts, fill out the following worksheets with assistance from your network administrator. The worksheets contain all the options that appear at each prompt, and space for you to enter your information.

The last two sections in this appendix, "Using the Quick-Start Commands" and "Running the Installation Script," provide additional information about the Quick-Start procedure.

Be sure to fill out the worksheets and read all sections of this appendix before you begin the Quick-Start procedure.

Note: Contact your network administrator for assistance in selecting worksheet options.

Understanding Quick-Start Connector Names and Numbers

The Quick-Start script assigns a name and number to each interface, depending on its location on the ARN.

In addition to either an Ethernet or token ring base module, the ARN can contain expansion modules and adapter modules (Figure B-1).

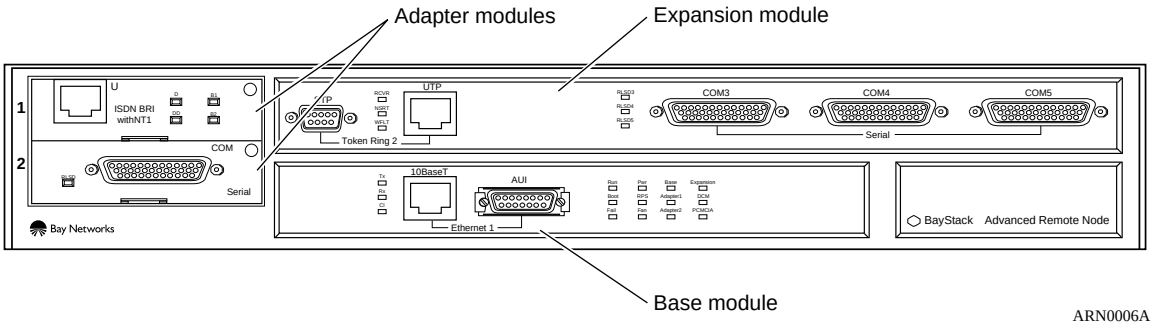


Figure B-1. ARN Module Locations

Table B-1 provides the connector names and numbers you should use during the Quick-Start procedure.

Table B-1. Quick-Start Connector Names and Numbers

	Module			
Interface*	**Base**	**Expansion**	**Adapter 1**	**Adapter 2**
Ethernet	XCVR1	XCVR2	N/A	N/A
Token Ring	MAU1	MAU2	N/A	N/A
Serial	N/A	COM3, COM4, or COM5	COM1	COM2
56/64K DSU/CSU	N/A	N/A	COM1	COM2

*. The Quick-Start script does not support initial ISDN or V.34 interface configuration.

Filling Out the Worksheets

The *inst_arn.bat* script provides many options for configuring the ARN on a network. Since typical remote access uses a serial interface over a wide area connection, this section lists *only* the options involved with a serial configuration.

Note: This section provides worksheets only for a serial interface configuration over a wide area connection. It does not contain worksheets for LAN configuration options.

We suggest the following procedure when you fill out worksheets:

1. **Fill out the Global Information Worksheet completely.**

   This worksheet lists options common to all serial interface configurations.

2. **After you record your protocol selections on the Global Information Worksheet, fill out *one* Router Protocol worksheet.**

   This worksheet lists specific options for RIP, OSPF, or Static Route configurations. For example, if you select RIP as your routing protocol, you need to fill out only the worksheet pertaining to RIP.

3. **Fill out *one* Wide Area Protocol worksheet.**

   This worksheet lists specific options for Bay Networks (proprietary) Point-to-Point Protocol (PPP), Frame Relay, Standard PPP, and switched multimegabit data service (SMDS) configurations. For example, if you select Frame Relay as your wide area protocol, you need to fill out only the Frame Relay worksheet.

4. **Run *inst_arn.bat* as described in "Running the Quick-Start Script" later in this chapter.**

   Or, a remote-site operator runs the installation script as described in the hardware installation guide.

5. **Once the router has an initial connection to the network, use the guide *Configuring Routers* to configure the router using Site Manager.**

Global Information Worksheet

This section contains the prompts and possible options relating to all ARN serial configurations. Write your selection in the "Your Response" column.

Global Information Worksheet

Step	Requested Information	Options	Your Response
1	Enter the module number [1]:	The script lists the available modules that you can use to connect the router's IP network interface to Site Manager. For example, the script might offer the following options: 1. Token Ring on Base Module 2. Serial on Adapter Module 1 3. Ethernet Tri-Serial on Expansion Module	Enter the number that corresponds to the module you want to use.
2	Driver Type:	If there is only one interface on the module you chose, the script automatically selects the driver type for that interface and bypasses this prompt. Otherwise, the script displays a menu of driver types. The actual menu depends on the modules you have installed.	Choose the Synchronous driver.

(continued)

Global Information Worksheet *(continued)*

Step	Requested Information	Options	Your Response
	Enter connector number [1]:	If there is only one connector on the module you chose, the script automatically assigns a connector number and bypasses this prompt. Otherwise, the script lists the available connectors. For example, for an ARN with five serial connectors, the options are 1. COM1 2. COM2 3. COM3 4. COM4 5. COM5	
	Enter clock source number [2]:	1. Internal 2. External	
	Enter clock speed number [10]:	This prompt appears only if you chose an Internal clock source. The script lists a range of values, with 64 K as the default.	
	Enter circuit name [S#]:	The script displays a default circuit name for the COM interface you selected (for example, S11 for COM1 and S12 for COM2).	Press the Return key.

(continued)

Global Information Worksheet *(continued)*

Step	Requested Information	Options	Your Response
3	Enter IP address in dotted decimal notation:	Enter the IP address for the COM interface.	
	Enter IP subnetwork mask in dotted decimal notation:	Enter the subnetwork mask for the COM interface IP address.	
	Is the router connected to the same local area network as the Site Manager workstation? (y/n) [n]:	y(es) n(o)	Press the Return key.
	Enter routing protocol number [1]:	1. RIP 2. OSPF 3. Static Route to Site Manager	(Complete the worksheet for the protocol you select.)
	Enter wide area protocol number [1]:	1. Bay Networks Point-to-Point Protocol (Proprietary) 2. Frame Relay 3. Point-to-Point Protocol (PPP) Standard 4. Switched Multimegabit Data Service (SMDS)	(Complete the worksheet for the protocol you select.)
	Do you wish to set SNMP community management? (y/n) [n]:	y(es) n(o) Setting up SNMP community management is optional.	
4	Enter (TFTP) volume number [1]:	The script automatically selects “1” as the TFTP default volume.	None
5	Do you want to enable FTP? (y/n) [n]:	y(es) n(o) Enabling FTP is optional.	
	Enter (FTP) volume number [1]:	The script automatically selects “1” as the FTP default volume.	

(continued)

Global Information Worksheet *(continued)*

Step	Requested Information	Options	Your Response
6	Do you want to enable TI TELNET (y/n) [n]:	y(es) n(o) Enabling TELNET is optional.	
7	Do you wish to save this configuration to a file? (y/n) [y]	y(es) n(o)	Press the Return key.
	Enter filename [*startup.cfg*]:	We recommend using the default filename.	Press the Return key.
	Do you wish to set up another port/module? (y/n) [y]	y(es) n(o)	Type **n** and press the Return key.

Router Protocol Worksheets

This section contains requested information and possible options relating to the routing protocol choices on the Global Worksheet.

RIP Worksheet

Requested Information	Options	Your Response
Should RIP listen to the default route? (y/n) [n]:	y(es) n(o) **Note:** RIP listens to a specific network or subnet route where Site Manager is located. Answering y(es) to this request forces RIP to also listen to the default route (0.0.0.0). This is useful when no specific route is available in the RIP updates that the router receives.	

OSPF Worksheet

Requested Information	Options	Your Response
Enter OSPF router ID in dotted decimal notation:	Enter an IP address to uniquely identify the router in the OSPF domain. The router provides the IP address of the COM port. We suggest using the default IP address.	
Enter the OSPF area ID in dotted decimal notation [0.0.0.0]:	Enter the area ID. This ID must match the area ID of the router's neighbor. **Note:** The backbone area ID is always 0.0.0.0.	
Enable Simple Password authentication? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the router requests a password.	Password: _____
Follow default paths for unknown subnets? (y/n) [n]:	y(es) n(o)	
Enter OSPF MTU size selection [1]:	1. Default 2. Ethernet size (Bay Networks Series 5 compatible) 3. User Defined MTU	

(continued)

OSPF Worksheet *(continued)*

Requested Information	Options	Your Response
Enter OSPF interface type selection [1]:	1. Broadcast 2. NBMA 3. Point-to-Point 4. Point-to-Multipoint (Proprietary) 5. Point-to-Multipoint (Per OSPF Standard) **Note:** When using a wide area protocol other than Bay Networks Proprietary PPP, we suggest selecting NBMA.	
Enter decimal value in seconds for Hello Interval [10]: **Note:** This value must match all other interfaces in the OSPF area for connection to take place.	The script suggests the following intervals: Broadcast -- 10 seconds Point-to-Point -- 15 seconds NBMA -- 20 seconds Point-to-MultiPoint --10 seconds	
Enter decimal value in seconds for Router Dead Interval [40]: **Note:** This value must match all other interfaces in the OSPF area for connection to take place.	The script suggests the following intervals: Broadcast -- 40 seconds Point-to-Point -- 60 seconds NBMA -- 80 seconds Point-to-MultiPoint (STD) -- 40 seconds	
Enter decimal value for Router Priority [1]: (For Broadcast, NBMA, or Point-to-MultiPoint)	Enter a router priority value. The lower the value (above zero), the higher the priority. **Note:** If you set the router priority to zero (0), the router is not eligible to become the designated router on this network.	

(continued)

OSPF Worksheet *(continued)*

Requested Information	Options	Your Response
Enter decimal value in seconds for Poll Interval [20]: (For NBMA only)	Enter the largest number of seconds allowed between Hello packets that the router sends to an inactive NBMA neighbor. The router suggests a 20-second interval.	
Enter IP address of neighbor in dotted decimal notation or enter **q** to quit: (For NBMA only)	Enter addresses for all NBMA neighbors you want the router to communicate with. When you finish entering addresses, enter **q** and press the Return key.	
Enter IP address of neighbor in dotted decimal notation: (For PPP only)	Enter addresses for the PPP neighbor you want the router to communicate with.	

Static Route to Site Manager Worksheet

Requested Information	Options	Your Response
Destination Network [0.0.0.0]:	Enter the gateway address of the destination network. An address of 0.0.0.0 specifies the default route.	
Destination Network Mask [0.0.0.0]:	Enter the subnetwork mask of the destination network. A mask of 0.0.0.0 specifies the default route.	
Next-Hop Address:	Enter a next-hop address. All static routes require a next-hop address in the same subnet as the initial IP interface.	

(continued)

Static Route to Site Manager Worksheet *(continued)*

Requested Information	Options	Your Response
Follow the default route for unknown subnets? (y/n) [n]:	y(es) n(o) The default route does not apply for subnets unless you enter **y** at this prompt.	

Wide Area Protocol Worksheets

This section contains requested information and possible options relating to wide area protocol choices on the Global Worksheet.

Bay Networks Proprietary PPP Worksheet

Requested Information	Options	Your Response
Enter BofL (Breath of Life) timer value (1-60) [5]:	Enter the maximum amount of time that can elapse between the successful transmission of BofL messages.	
Enter Local Address selection [3]:	1. DCE 2. DTE 3. EXPLICIT **Note:** Reverse local and remote address values when configuring the device at the other end of the circuit. (Exception: When connecting to a Series 5 router that uses DCE/DTE addressing, use the SAME local address value.)	

(continued)

Bay Networks Proprietary PPP Worksheet *(continued)*

Requested Information	Options	Your Response
Enter Remote Address selection [3]:	1. DCE 2. DTE 3. EXPLICIT **Note:** Reverse local and remote address values when configuring the device at the other end of the circuit. (Exception: When connecting to a Series 5 router that uses DCE/DTE addressing, use the SAME local address value.)	

Frame Relay Worksheet

Requested Information	Options	Your Response
Enter Management type [3]:	1. DLCMI None 2. Rev 1 LMI 3. ANSI T1 617D 4. CCITT Annex A 5. LMI Switch 6. Annex D Switch 7. Annex A Switch	
Enter addressing type [4]:	1. ADDR Q.921 2. ADDR Q.922 (MARCH ’90) 3. ADDR Q.922 (NOVEMBER ’90) 4. ADDR Q.922	
Enter address field length [2]:	2. Two Bytes 3. Three Bytes 4. Four Bytes	
Enter DLCI number [30]: (For DLCMI None, LMI Switch, Annex D Switch, and Annex A Switch only)	Enter the permanent virtual channel (PVC) number. **Note:** The valid range for the DLCI number is between 16 and 1007.	

PPP Standard Worksheet

Requested Information	Options	Your Response
Enter Remote IP address in dotted decimal notation:	Enter the IP address of the peer connection.	
Do you wish to turn on the PPP echo function? (y/n) [n]:	y(es) n(o)	
Enable PAP (Password Authentication Protocol)? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the router requests a PAP ID and password for this interface. If you answer n(o), the router asks whether you want to enable CHAP.	
Enable CHAP (Challenge Handshake Authentication Protocol)? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the router requests a CHAP secret for this interface.	
Does the Remote Peer have PAP authentication enabled? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the router requests the PAP ID and password for the remote interface.	
Enable the LQR (Link Quality Reporting) Protocol? (y/n) [n]:	y(es) n(o) **Note:** Link Quality Monitoring on a Bay Networks Series 5 router is not compatible with this feature.	

(continued)

PPP Standard Worksheet *(continued)*

Requested Information	Options	Your Response
Enable use of the Remote Peer router's LQR Timer? (y/n) [y]: (For LQR Protocol only)	y(es) n(o) **Note:** If the LQR timer is enabled, the remote peer router maintains its own LQR timer for this interface. When the LQR timer is disabled, the AN is responsible for maintaining the timer for this interface.	
Number of seconds (1-120) [3]: (For LQR Protocol only)	Enter the maximum number of seconds between the transmission of LQR packets.	
Enter [inbound] success rate percentage (1-100) [90]:	Enter the minimal acceptable success rate (percentage) of packets transmitted by the peer router and received on this interface over the last five LQR reporting periods.	
Enter [outbound] success rate percentage (1-100) [90]:	Enter the minimal acceptable success rate (percentage) of packets transmitted by this interface and received by the peer router over the last five LQR reporting periods.	

SMDS Worksheet

Requested Information	Options	Your Response
Enter 10-digit individual address:	Enter the individual address assigned to you by your SMDS service provider.	
Enter 10-digit group address:	Enter the group address assigned to you by your SMDS service provider.	
Enter 10-digit arp address:	Enter the Address Resolution Protocol (ARP) address assigned to you by your SMDS service provider.	

Running the Quick-Start Script

You run the *inst_arn.bat* script as part of the Local Boot process.

Note: Make sure that you have the completed worksheets with you.

Begin local boot as follows:

1. **At the Technician Interface** `login:` **prompt, enter Manager to log in.**
2. **Enter bconfig config local to configure the router to use the local** *config* **file when booting.**

   For information about the **bconfig** command, see "Using the bconfig Command" in Appendix A.
3. **Reboot the router by entering boot.**

   The Technician Interface login prompt appears.
4. **Log in to the Technician Interface.**

   The Technician Interface mounts the local file system and displays a prompt indicating the present working directory.

5. **Type the following command and press the return key:**

   run inst_arn.bat

6. **Follow the script online, using your worksheets when responding to its prompts.**

   Refer to the list of commands in Table B-2.

Table B-2. Quick-Start Commands

Task	Action	Details
Accept a default value	Press return	Your console displays default values in brackets; for example, [E11].
Repeat a step (for example, if you make a mistake)	Press **Control-c** Press **n**	When prompted, "Terminate script y/n?" press the **n** key. You return to the beginning of the step so that you can reenter the information.
Stop the Quick-Start installation procedure	Press **Control-c** Press **y**	When prompted, "Terminate script y/n?" press the **y** key. The procedure is terminated and you return to the Technician Interface prompt. To restart the Quick-Start/Power-Start procedure, you must reboot the router by entering **boot**.

The script prompts you for the following information (in the order given):

a. The initial Global Worksheet information

b. Specific protocol information

c. Wide area protocol selection

d. Specific protocol information

e. The rest of the Global Worksheet information

After you enter all of the Global Worksheet protocol information, the script displays a Configuration Summary and prompts you to save the configuration to a file.

7. **Name and save the configuration file.**

   The script begins to test the configuration on the new IP interface (Figure B-2).

```
Testing local IP interface

ping -IP 192.32.00.000 -r5
IP ping:  192.32.00.000 is alive (size - 16 bytes)
IP ping:  192.32.00.000 is alive (size - 16 bytes)
IP ping:  192.32.00.000 is alive (size - 16 bytes)
IP ping:  192.32.00.000 is alive (size - 16 bytes)
IP ping:  192.32.00.000 is alive (size - 16 bytes)


This test attempts to ping the Site Manager workstation.

NOTE: If routing has not yet converged, an attempt
       to ping the Site Manager workstation may fail.  If
       this happens, you may either enter a new IP address or
       quit and wait a short period of time and try again from
       the TI command line.

Type q<return> to cancel this test.

Enter IP address of Site Manager workstation:
```

Figure B-2. Starting the IP Interface Test

8. **To continue the IP configuration test, enter the IP address for the Site Manager workstation.**

   To cancel the test, enter **q**.

9. **Choose whether you want to configure another module/port.**

   If you enter **n**, (to stop configuring modules/ports), the Technician Interface prompt appears. If you enter **y**, you return to Step 6 of this procedure.

10. **When the Technician Interface prompt reappears, enter logout to exit the Technician Interface.**

Once the router creates and tests the configuration, it starts using the configuration information you entered. Refer to *Configuring Routers* to configure the router using Site Manager.

Appendix C
Technical Specifications

This appendix provides technical specifications and a product overview of the ARN and its interface options. This appendix lists

- Physical, electrical, and environmental specifications
- Hardware communications options
- BayStack ARN configurations

Physical Specifications

The dimensions and weight of the ARN are as follows:

- Height: 2.8 in. (7.1 cm)
- Width: 17.25 in. (43.8 cm)
- Depth: 12.5 in. (31.8 cm)
- Weight: 15 lb (6.8 kg)

Your installation site must provide a certain amount of free space around the ARN to dissipate heat. The space requirements for installing the ARN at your site are as follows:

- Width: 22.5 in. (57.2 cm)
- Minimum depth: 15 in. (38.1 cm)
- Depth for servicing: 25 in. (63.5 cm)

If you are installing your ARN in an electronic enclosure rack, make sure that the rack meets the following specifications:

- Heavy-duty steel construction
- Electronic Industries Association (EIA) standard hole-spacing
- Width of 19 in. (48.26 cm)
- Depth of 24 in. (60.96 cm)

Electrical Specifications

Your installation site must meet the following power requirements:

- Proximity to wall receptacle: within 6 ft (1.8 m) of the ARN
- Voltage: 100 to 240 Vac
- Amperage: 0.5 to 1.0 A

Table C-1 lists the wall outlet requirements.

Table C-1. ARN Wall Outlet Requirements

Country	Outlet	Voltage
United States/ Canada	National Electrical Manufacturers Association (NEMA) 5-15P standard outlet	100 to 120 V
Any other country	Your ARN distributor informs you of the outlet you need.	200 to 240 V

Environmental Specifications

The environmental requirements of the ARN are as follows:

- Altitude: 0 to 8,000 ft (0 to 2,438.4 m)
- Humidity: 10% to 90%, noncondensing
- Temperature: 32°F to 104°F (0°C to 40°C) stable

Hardware Communications Options

The ARN is designed to scale to your needs. In addition to either an Ethernet or token ring base module, you can add an optional expansion and up to two optional adapter modules to the ARN.

The ARN is available in the following base module configurations:

- One Ethernet AUI and Ethernet 10Base-T interface
- One Token Ring interface (STP only)

The ARN supports the following expansion modules:

- One Ethernet AUI and Ethernet 10Base-T interface
- One token ring media access unit interface (STP and UTP option)
- Three serial interfaces
- One Ethernet AUI and Ethernet 10Base-T interface and three serial interfaces
- One token ring interface (STP and UTP option) and three serial interfacesinterfaces

Note: The Ethernet base and expansion modules can also contain an optional data collection module (DCM). The DCM gathers Ethernet statistics for a remote monitoring (RMON) utility. Your network administrator can refer to *Configuring Remote Access* for additional information about how to enable and use the DCM.

The ARN also supports up to two of the following adapter modules:

- Single serial interface
- Single ISDN BRI S/T interface
- Single ISDN BRI U interface
- Single V.34 modem interface
- Single 56/64K DSU/CSU interface

Table C-2 describes each interface.

Table C-2. Network Interfaces Available on ARNs

Network Interface	Description
Ethernet and Second Ethernet	Supports the Ethernet and IEEE 802.3 standards that provide LAN connectivity. The ARN can have up to two Ethernet interfaces -- one on the base module and one on an expansion module. The Ethernet interfaces on both the base module and expansion module include a 10Base-T and an 802.3 AUI port; however, you can use only one port (10Base-T or AUI) on each module at a time. The 10Base-T interface provides unshielded twisted-pair support; the AUI interface provides broadband, baseband, fiber, and shielded twisted-pair support, depending on the transceiver and cabling you use.
Token Ring and Second Token Ring	Supports the Token Ring and IEEE 802.5 standards that provide LAN connectivity. The ARN can have up to two token ring interfaces -- one on the base module and one on an expansion module. The token ring base module supports a 9-pin (DB-9) STP token ring interface. The token ring expansion module supports both a 9-pin (DB-9) STP connector and a UTP connector; however, you can use only one port (STP or UTP) on the expansion module at a time. Both token ring connector types support the 802.5 media access control (MAC) token-passing protocol, the 802.2 Type 1 (connectionless) protocol, the 802.2 Type 2 (connection-oriented) protocol, and the 16-Mb/s Early Token Release (ETR) protocol over the appropriate cabling.
Serial	Provides WAN connectivity. ARN models can have up to five serial ports (three on an expansion module and up to two adapter modules). Each port can operate independently with RS-232, RS-422, RS-449, RS-530, V.28, V.35, and X.21 cables. Serial capability allows internal or external clocking.
ISDN BRI	Supports an S/T or U interface. The BRI provides two B channels, and supports full D-channel signaling and call setup/tear-down as defined in 1988 CCITT (now ITU-T) Q.921 and Q.931. For more information on ISDN, functional groups, or reference points, refer to *Configuring Dial Services*. The ISDN BRI option is available as an adapter module for any ARN model.
56/64K DSU/CSU	Supports a 56/64K DSU/CSU interface.
V.34 Modem	Provides a V.34 modem interface.

Note: Refer to the *Cable Guide for Routers and BNX Platforms* for the proper cables or cable pinouts to use for each interface type.

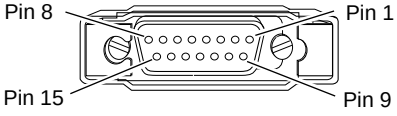
Ethernet Attachment Unit Interface (AUI)

The ARN Ethernet base module, Ethernet expansion module, and Ethernet/tri-serial expansion modules contain a 10Base-T standard 802.3 AUI DB-15 receptacle with a slide lock.

Note: The AUI is designed only for connection to a transceiver. Connecting the AUI directly to an AUI on an Ethernet station (without a transceiver) violates IEEE 802.3 standards.

Table C-3 shows the pin assignments for the standard 15-pin AUI receptacle on the ARN base or expansion module and identifies its pin locations.

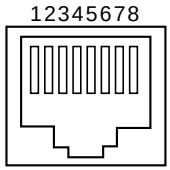
Table C-3. AUI Pin Assignments

Pin Assignment	Pin No.	Signal Name
	1	GND
	2	CI-A
	3	DO-A
	4	GND
	5	DI-A
	6	+12 V dc Return
	7	Not used
	8	Not used
	9	CI-B
	10	DO-B
	11	GND
	12	DI-B
	13	+12 V dc
	14	GND
	15	GND

Ethernet 10Base-T Interface

The Ethernet 10Base-T interface provides UTP support. Table C-4 identifies the pin locations and function assignments for the 10Base-T interface.

Table C-4. 10Base-T Interface Pin Assignments

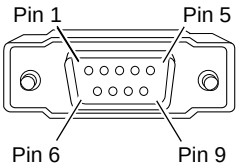
Pin Assignment	Pin No.	Signal (Function)
	1	TD+ (Transmit to UTP wire)
	2	TD- (Transmit to UTP wire)
	3	RD+ (Receive from UTP wire)
	4	Not used
	5	Not used
	6	RD- (Receive from UTP wire)
	7	Not used
	8	Not used

Token Ring STP Interface

The token ring STP interface provides shielded twisted-pair support. The ARN token ring base module, token ring expansion module, and token ring/tri-serial expansion modules contain this standard 802.5 DB-9 receptacle.

Table C-5 shows the pin assignments for the standard 9-pin STP receptacle on the ARN base or expansion module and identifies its pin locations.

Table C-5. Token Ring STP Interface Pin Assignments

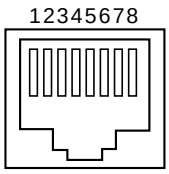
Pin Assignment	Pin No.	Signal Name
	1	RX+ (Receive from STP wire)
	2	GND
	3	GND
	4	GND
	5	TX+ (Transmit to STP wire)
	6	RX- (Receive from STP wire)
	7	GND
	8	GND
	9	TX- (Transmit to STP wire)

Token Ring UTP Interface

The token ring UTP interface provides unshielded twisted-pair support. The ARN token ring expansion module, and token ring/tri-serial expansion modules contain this receptacle.

Table C-6 shows the RJ-45 pin assignments for the UTP interface and identifies the pin locations.

Table C-6. Token Ring UTP Interface Pin Assignments

Pin Assignment	Pin No.	Signal (Function)
	1	Not used
	2	Not used
	3	TX+ (Transmit to UTP wire)
	4	RX+ (Receive from UTP wire)
	5	RX- (Receive from UTP wire)
	6	TX- (Transmit to UTP wire)
	7	Not used
	8	Not used

Serial Interfaces

The ARN supports up to five serial interfaces. You can connect up to three, 44-pin (DB-44) serial cables to an ARN that contains an optional Ethernet/tri-serial, token ring/tri-serial, or tri-serial expansion module. You can connect one, 44-pin serial cable to each Serial adapter module (the ARN can support two).

The serial interfaces provide multiprotocol WAN connection, each operating independently with RS-232, RS-422, RS-530, V.35, and X.21 electrical interfaces at transmission rates from 1200 b/s to 2.048 Mb/s. When used with standard keyed cables, the ports automatically configure to the desired electrical interface.

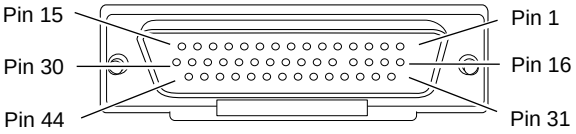
You can use the following cables, described in the *Cable Guide for Routers and BNX Platforms*:

- V.35 connections Order No. 7220
- X.21 connections Order No. 7224
- RS-422 connections Order No. 7318

- RS-232 connections Order No. 7826
- RS-530 connections Order No. AE0018012

Table C-7 shows the signal and pin assignments for these connectors.

Table C-7. Serial Interface Pin Assignments

Pin Assignment	Pin No.	Signal Name	Pin No.	Signal Name
	1	FGND	23	DCD-
	2	SD+	24	ST-
	3	RD+	25	RT-
	4	RTS+	26	TT-
	5	CTS+	27	NC
	6	DSR+	28	RTIN#B
	7	SGND	29	CTSIN#
	8	DTR+	30	ST#
	9	DCD+	31	VST-
	10	ST+	32	VST+
	11	RT+	33	VRT-
	12	TT+	34	VRT+
	13	RTIN#	35	VRD-
	14	CTS#	36	VSD-
	15	RTS#	37	VRD+
	16	SD-	38	VSD+
	17	RD-	39	VTT-
	18	RTS-	40	VTT+
	19	CTS-	41	UNBE
	20	DSR-	42	V35D
	21	NC	43	GND
	22	DTR-	44	SNDC

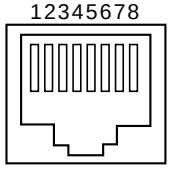
ISDN BRI U Interface

The ARN supports the BRI standard for ISDN using an optional ISDN/BRI adapter module. The integrated ISDN BRI functionality allows you to connect directly to the ISDN network, through a U interface, as opposed to connecting over a terminal adapter. This solution reduces equipment costs and simplifies connection to an ISDN switch.

The BRI implementation supports two dial service applications: dial-on-demand and dial backup. *Configuring Dial Services* describes these services and how to configure them for connection to an ISDN network.

Table C-8 lists the ISDN interface pin assignments.

Table C-8. ISDN BRI U Interface Pin Assignments

Pin Assignment	Pin No.	Signal
	1	Not used
	2	Not used
	3	Tx+ (Transmit to wire)
	4	Rx+ (Receive from wire)
	5	Rx- (Receive from wire)
	6	Tx- (Transmit to wire)
	7	Not used
	8	Not used

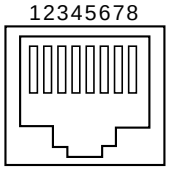
ISDN BRI S/T Interface

The ARN supports the BRI standard for ISDN using an optional ISDN/BRI adapter module. The integrated ISDN BRI functionality allows you to connect to the ISDN network over a terminal adapter through an S/T interface.

The BRI implementation supports two dial service applications: dial-on-demand and dial backup. *Configuring Dial Services* describes these services and how to configure them for connection to an ISDN network.

Table C-9 lists the ISDN interface pin assignments.

Table C-9. ISDN BRI S/T Interface Pin Assignments

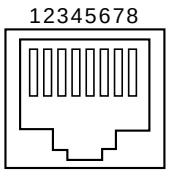
Pin Assignment	Pin No.	Signal
	1	Not used
	2	Not used
	3	Tx+ (Transmit to wire)
	4	Rx+ (Receive from wire)
	5	Rx- (Receive from wire)
	6	Tx- (Transmit to wire)
	7	Not used
	8	Not used

56/64K DSU/CSU Interface

The ARN supports DSU/CSU connectivity using an optional DSU/CSU adapter module. The integrated DSU/CSU functionality allows you to connect directly to a dataphone digital service (DDS) line. This solution reduces equipment costs and simplifies connection to a wide area network.

Table C-10 lists the DSU/CSU interface pin assignments.

Table C-10. DSU/CSU Interface Pin Assignments

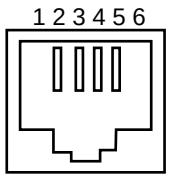
Pin Assignment	Pin No.	Signal
	1	TD (Ring)
	2	TD (Tip)
	3	Not used
	4	Not used
	5	Not used
	6	Not used
	7	RD (Tip)
	8	RD (Ring)

RJ-11 Interface (for V.34 Modem)

The ARN supports a V.34 modem connection using an optional V.34 modem adapter module. The V.34 functionality allows you to connect directly to a phone line, as opposed to connecting over an external modem. This solution reduces equipment costs and simplifies connection to a wide area network.

Table C-11 lists the V.34 interface pin assignments.

Table C-11. V.34 Interface Pin Assignments

Pin Assignment	Pin No.	Signal
	1	Not Used
	2	No connection
	3	TIP
	4	RING
	5	No connection
	6	Not Used

Local Console Connections

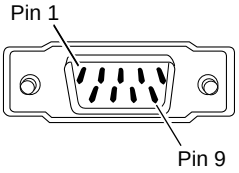
The ARN back panel contains one console service interface, labeled Console; its DB-9 plug connector provides an RS-232-D serial connection. You use this local console port to connect the ARN to any VT100 compatible console device for direct console access.

The BayStack ARN shipping package includes the Order No.110310 console/modem kit for connecting devices to the Console port.

- To connect a terminal to the Console port, use the complete console/modem kit (the Order No.110307 cable with the Order No.110308 null modem adapter).
- To connect an IBM compatible PC to the Console port, use the complete console/modem kit (Order No.110308 cable and Order No.110307 null modem adapter) plus a standard AT serial cable with one DB-25 plug connector, supplied with the PC.

The connector pin assignment described in Table C-12 shows signal and pin assignments for the console port.

Table C-12. Local Console Port DB-9 Pin Assignments

Pin Assignment	Pin No.	Signal Name	Direction
	1	Not used	N/A
	2	Transmit data, TXD	To terminal
	3	Receive data, RXD	From terminal
	4	RTS	To terminal
	5	CTS	From terminal
	6	DSR	From terminal
	7	Ground	N/A
	8	DCD	From terminal
	9	DTR	To terminal

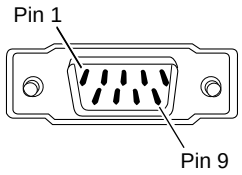
Service Modem Connections

The ARN back panel contains one modem service interface, labeled Modem; its DB-9 plug connector provides an RS-232-D serial connection. You use this local console port to connect the ARN to any Hayes compatible modem for remote dial-in access.

The BayStack ARN shipping package includes the Order No.110310 console/modem kit for connecting devices to the Modem port. To connect a modem, use the Order No.110307 cable, a standard, 15-foot molded AT serial cable with DB-9 receptacle to DB-25 plug connectors.

The connector pin assignment described in Table C-13 shows signal and pin assignments for the modem port.

Table C-13. Service Modem Port DB-9 Pin Assignments

Pin Assignment	Pin No.	Signal Name	Direction
	1	DCD (Data carrier detect)	From modem
	2	TXD (Transmit data)	To modem
	3	RXD (Receive data)	From modem
	4	DSR (Data set ready)	From modem
	5	GND	N/A
	6	DTR (Data terminal ready)	To modem
	7	CTS (Clear to send)	From modem
	8	RTS (Request to send)	To modem
	9	Not used	N/A

Appendix D
Requirements for European Operation

This appendix provides information required for operating the ARN in Europe, cabling requirements for synchronous (serial) connection, and information about using the serial adapter module (Order No. CV0004001) and ISDN BRI adapter module (Order No. CV0004002) in Europe.

ARN Ethernet Base Model Safety Status

Table D-1 lists the safety status of interconnection points to the connection of other equipment.

Table D-1. Safety Status (Order Nos. CV1001001, CV1001002, CV1001003, CV1001004, CV1001005)

Port Location	Port Description	Type of Circuit
AUI	Ethernet AUI	Safety extra-low voltage (SELV)
UTP	Ethernet 10Base-T	SELV
Console	V.28	SELV

ARN Token Ring Base Model Safety Status

Table D-2 lists the safety status of interconnection points to the connection of other equipment.

Table D-2. Safety Status (Order Nos. CV1101001, CV1101002, CV1101003, CV1101004, CV1101005)

Port Location	Port Description	Type of Circuit
MAU	Token Ring	SELV
Console	V.28	SELV

ARN Expansion Modules Safety Status

Order Numbers CV0004011, CV0004012, CV0004013, CV0004014, CV0004015 are upgrade options that provide an additional synchronous interface. These options can be installed in any ARN model.

Table D-3 lists the safety status of the interconnection point (COM3, COM4, COM5) provided by Order Nos. CV0004011, CV0004012, CV0004013, CV0004014, CV0004015 to the connection of other equipment.

Table D-3. Safety Status (Order Nos. CV0004011, CV0004012, CV0004013, CV0004014, CV0004015)

Port Location	Port Description	Type of Circuit
COM3, COM4, and COM5	V.28, X.21, V.35	Telecommunications network voltage (TNV) at SELV levels
AUI	Ethernet AUI	SELV
10Base-T	Ethernet 10Base-T	SELV
MAU	Token Ring	SELV
J2	Host Port	SELV

Synchronous Cabling Requirements

Refer to Figures D-1 through D-3 and Tables D-4 through D-6 for serial interface cabling information.

Note the following compliance requirements:

- V.28 compliance requires an Order No. 7837 cable.
- V.35 compliance requires an Order No. 7220 cable.
- X.21 compliance requires an Order No. 7224 cable.

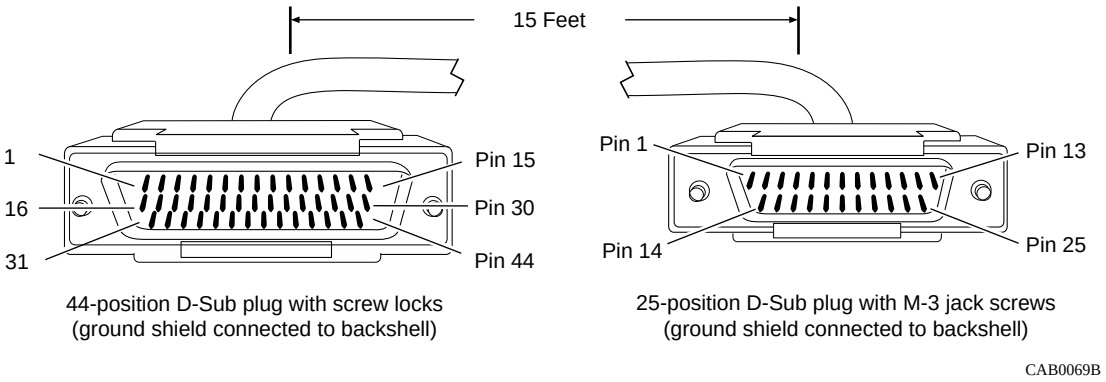


Figure D-1. Cable 7837 (V.28 Compliant)

Table D-4. WAN Interface (Order No. 7837)

Bay Networks Termination		Remote Termination	
Pin	**Signal**	**Pin**	**Signal**
1	Frame Ground	1	Frame Ground
2	Send Data+	2	Send Data
3	Receive Data+	3	Receive Data
4	Request to Send+	4	Request to Send
5	Clear to Send+	5	Clear to Send

(continued)

Table D-4. WAN Interface (Order No. 7837) *(continued)*

Bay Networks Termination		Remote Termination	
6	Data Set Ready+	6	Data Set Ready
8	Data Terminal Ready+	20	Data Terminal Ready
9	Data Carrier Detect+	8	Data Carrier Detect
10	Send Timing+	15	Send Timing
11	Receive Timing+	17	Receive Timing
12	Transmitter Signal Element Timing+	24	Transmitter Signal Element Timing
7	Signal Ground	7	Signal Ground
Local Wire Connections			
Pin 7 > 19 > 20 > 23			
Pin 13 > 28			
Pin 14 > 29			

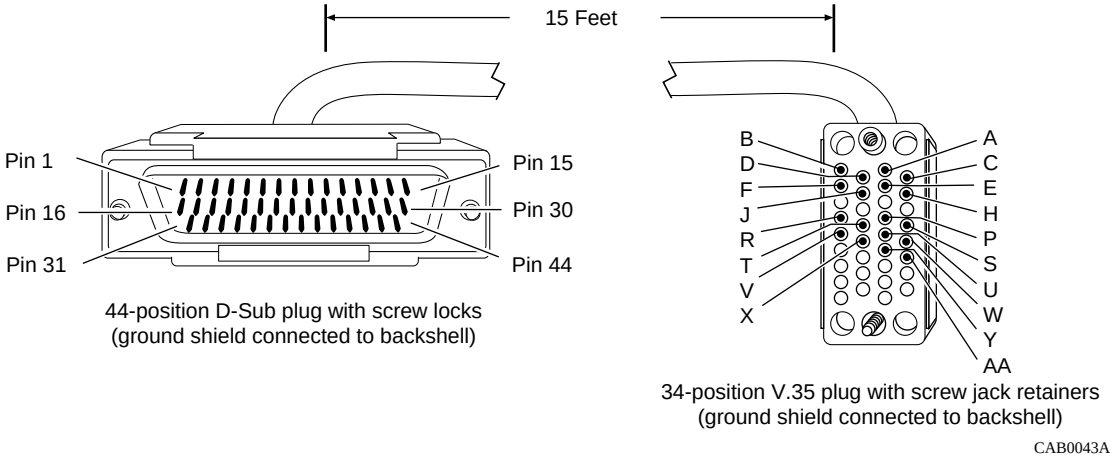


Figure D-2. Cable 7220 (V.35 Compliant)

Table D-5. V.35 Interface (Order No. 7220)

Bay Networks Termination		**Remote Termination**	
Pin	**Signal**	**Pin**	**Signal**
38	VSD+	P	Send Data A
36	VSD-	S	Send Data B
34	VRT+	V	Receive Timing A
33	VRT-	X	Receive Timing B
32	VST+	Y	Send Timing A
31	VST-	AA	Send Timing B
37	VRD+	R	Receive Data A
35	VRD-	T	Receive Data B
6	Data Set Ready+	E	Data Set Ready
8	Data Terminal Ready+	H	Data Terminal Ready
4	Request to Send+	C	Request to Send
5	Clear to Send+	D	Clear to Send
40	VTT+	U	Terminal Timing A
39	VTT-	W	Terminal Timing B
1	Frame Ground	A	Frame Ground
9	Data Carrier Detect+	F	Data Carrier Detect
19	Signal Ground	B	Signal Ground
Local Wire Connections			
Pin 19 > 20 > 23 > 7			
Pin 41 > 42 > 43			
Pin 13 > 28			
Pin 14 > 29			

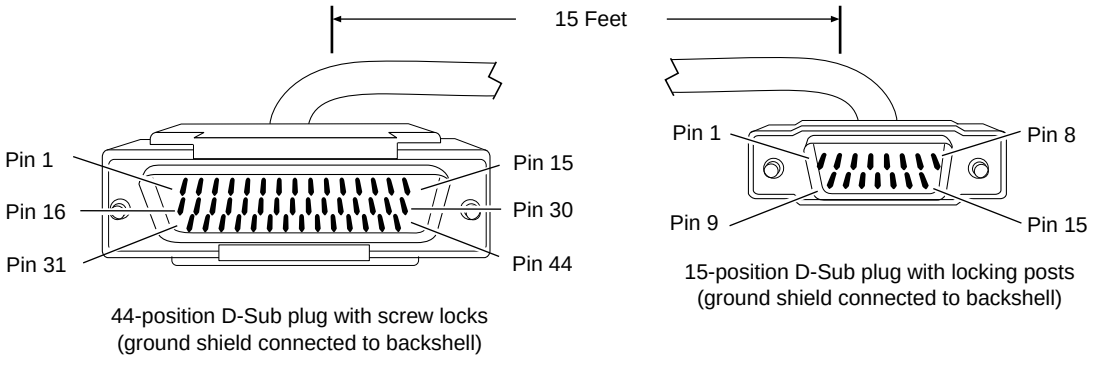


Figure D-3. Cable 7224 (X.21 Compliant)

Table D-6. X.21 Interface (Order No. 7224)

Bay Networks Termination		**Remote Termination**	
Pin	**Signal**	**Pin**	**Signal**
2	Send Data+	2	TD A
16	Send Data-	9	TD B
4	Request to Send+	3	Control A
18	Request to Send-	10	Control B
3	Receive Data+	4	RD A
17	Receive Data-	11	RD B
9	Data Carrier Detect+	5	Indication A
23	Data Carrier Detect-	12	Indication B
10	Send Timing+	6	Timing A
24	Send Timing-	13	Timing B
7	Signal Ground	8	Signal Ground
1	Frame Ground	1	Frame Ground
Local Wire Connections			
Pin 41 > 43			
Pin 28 > 30			
Pin 14 > 15			

Serial Adapter Module Requirements

The Serial Adapter module (Order No. CV0004001) is approved only for installation in a host, and with host attachments, which are either type approved for such apparatus or, if supplied after 1st March 1989, are marked with or supplied with a statement that the host is supplied under the terms of General Approval Number NS/G/1234/J/100003.

Installation of the Serial Adapter module in any BayStack ARN chassis (Order Nos. CV1001001, CV1001002, CV1001003, CV1001004, CV1001005, CV1101001, CV1101002, CV1101003, CV1101004, CV1101005) complies with all requirements listed in this section. Installation of the serial adapter upgrade module in any ARN complies with all requirements listed in this section.

Table D-7 lists the safety status of interconnection points to the connection of other equipment.

Table D-7. Safety Status (Order No. CV0004001)

Port Location	Port Description	Type of Circuit
COM	V.28, X.21, V.35	TNV at SELV levels
P6	Host port	SELV

ISDN BRI Adapter Module Requirements

The ISDN BRI Adapter module (Order No. CV0004002) is approved only for installation in a host, and with host attachments, which are either type approved for such apparatus or, if supplied after 1st March 1989, are marked with or supplied with a statement that the host is supplied under the terms of General Approval Number NS/G/1234/J/100003.

Installation of the ISDN BRI module in any BayStack ARN chassis (Order Nos. CV1001001, CV1001002, CV1001003, CV1001004, CV1001005, CV1101001, CV1101002, CV1101003, CV1101004, CV1101005) complies with all requirements listed in this section. Installation of the ISDN BRI upgrade module in any ARN complies with all requirements listed in this section.

Table D-8 lists the safety status of interconnection points to the connection of other equipment.

Table D-8. ISDN BRI Safety Status (Order No. CV0004002)

Port Location	Port Description	Type of Circuit
ISDN	BRI ISDN	TNV at SELV levels
P6	Host Port	SELV

Table D-9 lists the ISDN connector pinouts.

Table D-9. ISDN Connector Pinouts

Pin	Signal
1	No connection
2	No connection
3	Tx+
4	Rx+
5	Tx-
6	Rx-
7	No connection
8	No connection

Power Requirements for ISDN BRI and Serial Adapter Modules

The ISDN BRI and serial adapter modules obtain power from the host chassis and have the power requirements shown in Table D-10.

Table D-10. ISDN BRI Power Requirements

Voltage	Amperage
+5 V	1 A
+12 V	0.15 A
-12 V	0.15 A

The power drawn from the host chassis combined with that required for any other cards and accessories must be within the power rating of the host chassis.

When you install an ISDN BRI or serial adapter module in an ARN, make sure that you do not impair the integrity of the network protection from hazardous voltages used or generated internally by the host chassis.

Clearance and Creepage Distances for ISDN BRI and Serial Adapter Modules

The clearance and creepage distances (shown as X and Y, respectively, in Figure D-4 and Table D-11) must be maintained between the card and

- The host chassis in which it is installed
- Any adjacent cards installed in the host chassis

The exception to this rule is the edge connector, which resides in the host chassis backplane, where no minimum distance applies.

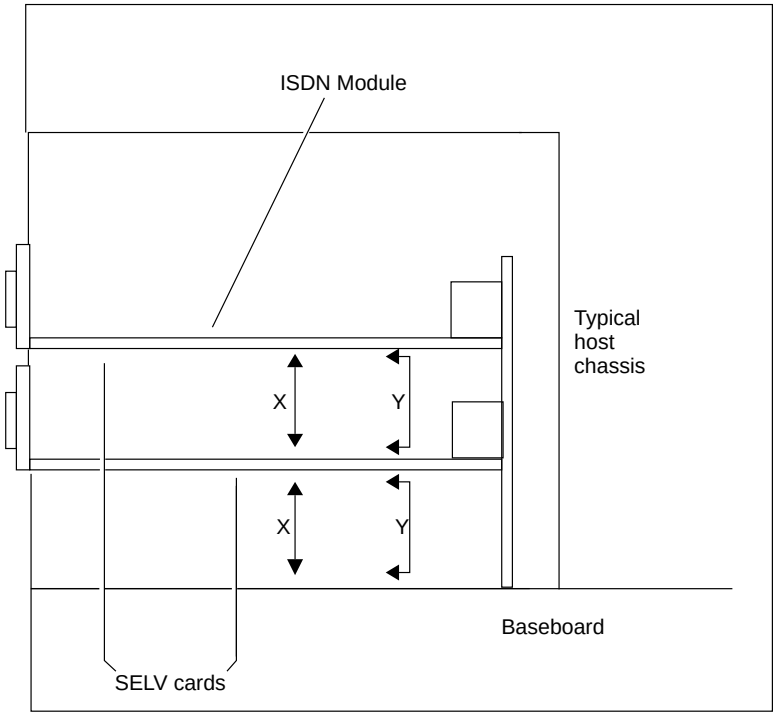


Figure D-4. Clearance and Creepage Distances for ISDN BRI and Serial Adapter Modules

Table D-11. Clearance and Creepage Distances for ISDN BRI and Serial Adapter Modules

Clearance (X)	Creepage (Y)	Voltage used or generated by other parts of the host or expansion card
2.0 mm	2.4 (3.8) mm	Up to 50 V rms or V dc
2.6 mm	3.0 (4.8) mm	Up to 125 V rms or V dc
4.0 mm	5.0 (8.0) mm	Up to 250 V rms or V dc
4.0 mm	6.4 (10.0) mm	Up to 300 V rms or V dc

The creepage distances apply to the normal office environment. When the local environment within the host chassis is subject to conductive pollution or dry nonconductive pollution that could become conductive due to condensation, the creepage distances shown in parentheses in Table D-11 apply.

The clearance and creepage distance between adjacent points should be checked as follows:

- The clearance distance (X) is the shortest distance between two points measured through the air.
- The creepage distance (Y) is the shortest distance between two points measured across a surface.

You should obtain advice from a competent telecommunications safety engineer if in doubt. Failure to install the ISDN BRI or serial adapter module according to these instructions invalidates the General Approval.

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