IBM Network Station

IBM Network Station Service Information Type 8364 (Models Exx, Txx) September 1999

SY44-0073-01

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Note

Before using this information and the product it supports, be sure to read the information in "Safety notices" on page vii and "Notices" on page 123.

Second Edition (September 1999)

Contents

Safety notices

Safety notices contain information that is related to using the IBM Network Station thin client in a safe manner. The notices can be in the form of a danger, warning, or caution notice.

Danger notices

The following danger notices call attention to situations that are potentially lethal or extremely hazardous. These notices pertain throughout this book.

DANGER

To prevent a possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones. (RSFTD003)

DANGER

To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables. (RSFTD004)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (RSFTD201)

DANGER

To prevent a possible electrical shock when installing the system, ensure that the power cords for all devices are unplugged before installing signal cables. (RSFTD202)

DANGER

To prevent a possible electrical shock when adding the device to a system, disconnect all power cords, if possible, from the existing system before connecting the signal cable to that device. (RSFTD205)

DANGER

To reduce the risk of electrical shock use only AC power sources approved by IBM. (RSFTD216)

Caution notices

A caution notice applies to a situation that is potentially hazardous to people because of some existing condition.

CAUTION:
The battery is a lithium battery. To avoid possible explosion, do not burn or charge the battery. Exchange only with the IBM-approved part. Discard the battery as instructed by local regulations. (RSFTC227)

Handling static-sensitive devices

When you handle components, take these precautions to avoid static electricity damage:

- Do *not* open static-protective packages until you are ready to install their contents.
- Limit your movements to avoid static electricity build up around you.
- Handle components carefully, and never touch exposed circuitry.
- Prevent others from touching components.
- Remove and install components without setting them down; or, place components on static-protective packages.
- Do not place components on metal surfaces.

About IBM Network Station Service Information Type 8364 (Models Exx and Txx)

Who should read this book

This information is intended for the hardware support organization for the IBM Network Station thin client (hereafter referred to as Network Station). Use this information in conjunction with the information that ships with the server software.

Information available on the World Wide Web

- **Current Network Station information:** You can obtain the latest version of the customer setup information on the World Wide Web at the following URL:

  `http://www.ibm.com/nc/pubs`
- **Network Station service support information:** You can obtain additional service support information on the World Wide Web at the following URL:

  `http://www.ibm.com/nc`

  In the left frame, click **Support**.
- **Compatible CompactFlash cards:** You can obtain information about CompactFlash cards that are compatible with the Network Station hardware on the World Wide Web at the following URL:

  `http://www.ibm.com/nc`

  Click **Accessories and Upgrades**, and then **Attachments**.

Related information

Refer to the following publications for information relating to the Network Station:

- See *IBM Network Station Safety Information* SA41-4143 for important safety notices.
- See *Setting Up IBM Network Station Hardware - Type 8364 (Models Exx and Txx)* SA41-0046 for hardware setup procedures and upgrade procedures.
- Refer to the information that ships with the server software for information about connecting Network Station hardware to a network server, and general system administrator requirements.

How to send your comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this, or any other IBM information, mail the readers' comment form that is located at the end of this document.

- If you are mailing a comment form from a country other than the United States, you can give the form to the local IBM branch office or IBM representative for postage-paid mailing.
- If you prefer to send comments by FAX, use either of the following telephone numbers:
  - United States and Canada: 1–800–937–3430
  - Other countries: 1–507–253–5192
- If you prefer to send comments electronically, use the following network identification:
  - IBMMAIL, to IBMMAIL(USIB56RZ)
  - RCHCLERK@us.ibm.com

Be sure to include the following:

- The title and publication number of the information.
- The page number or topic to which your comment applies.

Part 1. Hardware Overview

Chapter 1. Learning about the IBM Network Station

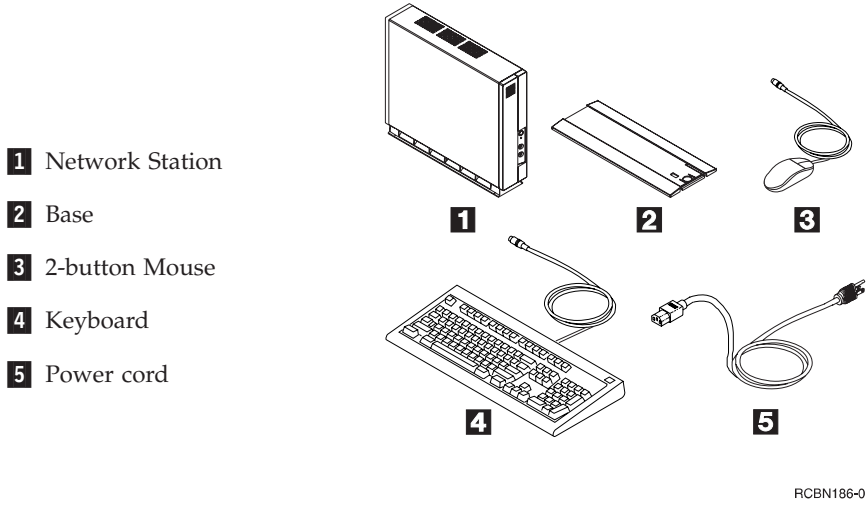
This chapter describes the Type 8364 IBM Network Station (hereafter referred to as Network Station) and associated hardware.

The Network Station hardware requires a connection to a properly configured server to access the operating system, applications, and application data. The server software controls the configuration of the operating system and applications from the server.

Standard hardware

Table 1. Standard Components

The Type 8364 Network Station ships with the following standard hardware components:



The standard Network Station hardware includes the following:

- 266 MMX Intel Pentium processor
- SDRAM DIMM memory (see "Memory upgrade options" on page 7)
- 4 MB SGRAM video memory
- Integrated Token-Ring or Ethernet communication
- 16 bit internal and external sound
- One connector for CompactFlash card
- Two USB ports

- Two PCI adapters
- Two serial ports
- One parallel port.
- One monitor port.

Hardware layout

Note: The Network Station connectors are standard connectors, and follow the standard pin, signal, and signal direction configurations. See "Appendix B. Connector pin information" on page 117 for details.

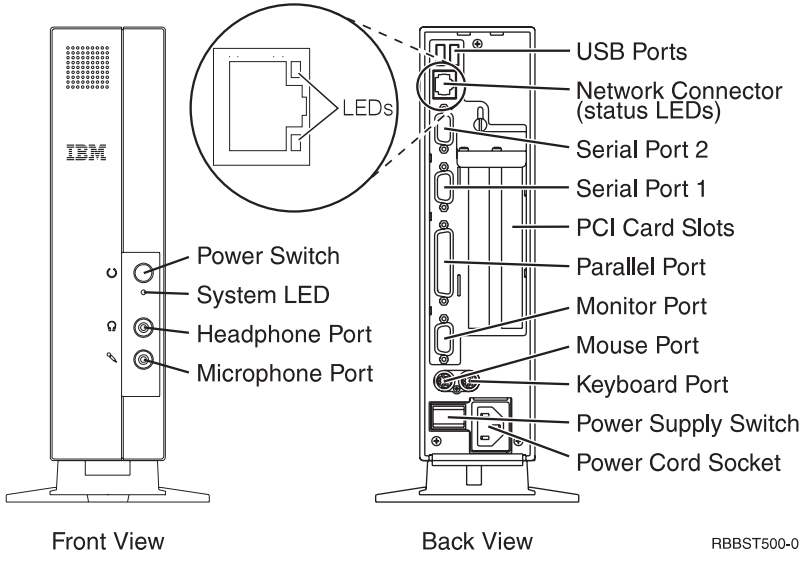


Figure 1. Type 8364 Network Station connectors

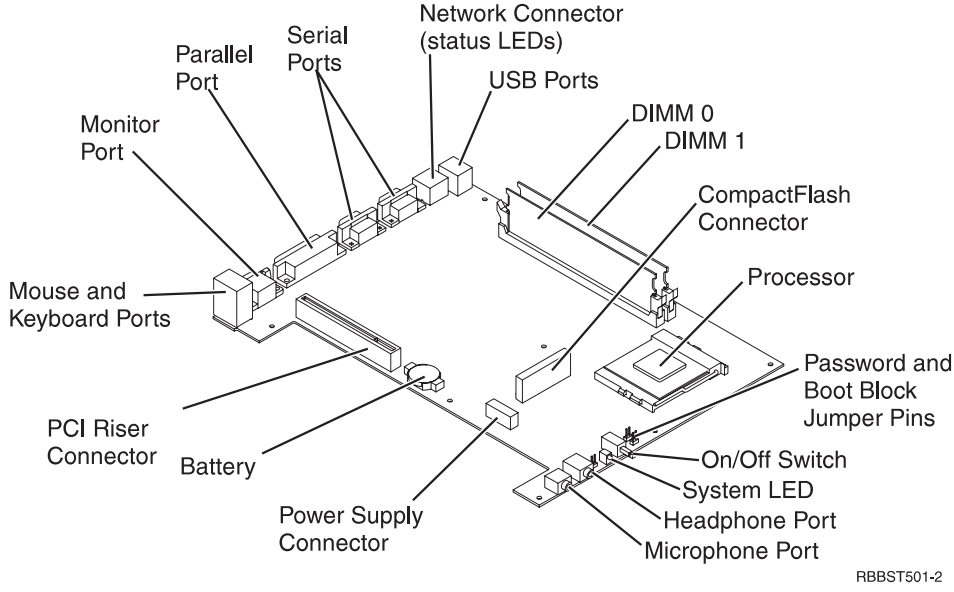


Figure 2. Type 8364 Network Station logic board

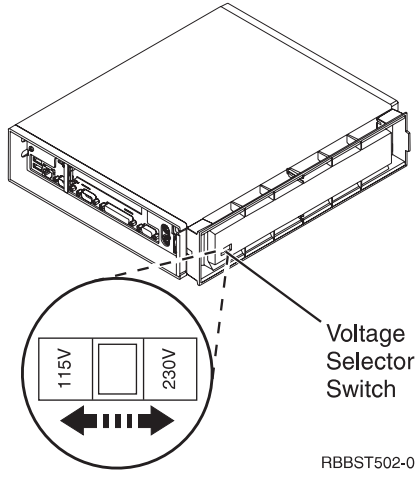


Figure 3. Type 8364 Network Station voltage selector switch (bottom view)

Note: All Network Stations are preset to the 230V setting when manufactured.

Communication hardware

Network Station hardware includes integrated Token-ring communication (Models Txx), or integrated Ethernet communication (Models Exx). Both types of communication can automatically determine line speed and duplex.

Required types of communication cable

The required type of cable for the Token-Ring model Network Station is category 3 for 4MB ring speed operation. The required type of cable is shielded twisted pair category 4 or 5 for 16MB ring speed operation.

The required type of cable for the Ethernet model for 10MB ring speed operation is category 3 or higher Unshielded Twisted Pair (UTP). The required type of cable for 100MB ring speed is category 5 UTP.

Refer to "Chapter 2. Replacing Network Station parts" on page 9 for IBM communication cable options and part numbers.

Monitor specifications

A basic VGA-class monitor that meets the VESA standards of refresh rate and resolution can function with the IBM Network Station. The IBM Network Station supports VESA Display Power Management Signaling (DPMS) and VESA Display Data Channel (DDC2B). Monitors attached to the IBM Network Station do not require either standard.

It is important to remember that all resolutions and refresh rates may not be supported by the monitor attached to the Network Station, or the operating system kernel that the Network Station downloads from the network server.

See "Monitor specifications for the IBM Network Station Manager program" on page 121 for resolution and refresh rate information that applies to Network Station hardware that is configured for the IBM Network Station Manager program.

See "Monitor specifications for WorkSpace On-Demand" on page 122 for resolution and refresh rate information that applies to Network Station hardware configured for WorkSpace On-Demand.

Power consumption

Normal power consumption for the Network Station, while running applications, ranges from 24 to 28 Watts. During periods of inactivity, the system switches into the suspend state, and power consumption reduces to approximately 18 Watts. Once the system enters the soft-off state, power consumption reduces to approximately 10 Watts.

Note: Power consumption may fluctuate or vary from these values, depending on the voltage selection (115V or 230V) of the Network Station.

See "Power management" on page 34 for more information concerning power management modes.

Power reduction occurs when you use the Network Station with a Video Electronics Standards Association (VESA) Display Power Management Signalling (DPMS) Standard monitor.

As an Energy Star Partner, IBM has determined that this product meets the Energy Star Program guidelines for energy efficiency.

Upgrading hardware features

Customers can perform any of the following installation procedures:

- Installing PCI adapter cards.
- Installing a CompactFlash card.
- Connecting USB devices.
- Upgrading memory.

Refer to "Chapter 4. Performing hardware procedures" on page 17 for installation instructions for these, and other hardware-related procedures.

Memory upgrade options

The Type 8364 Network Station has two random access memory (RAM) slots that accept Synchronous Dynamic Random Access Memory (SDRAM) Dual Inline Memory Modules, hereafter referred to as DIMMs. The Network Station hardware supports memory expansions of 32, 64, and 128 MB.

The Network Station supports memory options up to 256MB. "Exchanging the memory" on page 20 explains the procedure for installing and removing

memory DIMMs in the Network Station. Refer to “Ordering optional features” on page 16 for detailed memory specifications and optional Network Station parts.

Chapter 2. Replacing Network Station parts

This chapter defines the service strategy for the Network Station. For information on ordering Network Station parts, refer to "Chapter 3. Ordering Network Station parts" on page 11. "Chapter 4. Performing hardware procedures" on page 17 provides the instructions that are needed to install and remove parts, and perform other hardware-related procedures on the Network Station.

Servicing the Network Station

All Network Station parts except the power supply are Customer Replaceable Units (CRUs). The power supply is a part of the logic unit drawer assembly, and should be replaced by the customer as an entire drawer CRU, if defective. Country warranty service terms and conditions apply.

Note: The power supply part that can be exchanged or replaced is available for onsite service from a service representative, or to be used as a replacement part in a depot repair center.

Replacing the logic unit

To replace a Network Station logic unit, the customer must transfer features, such as DIMMs and optional PCI adapter cards, to the replacement unit. IBM delivers CRUs to the customer for exchange, and the customers return defective part to IBM under the basic service offering. For upgrade service offerings, a service representative delivers replacement parts, transfers features and returns defective parts to IBM.

Customers must **not** remove the lithium battery when preparing a logic unit for shipping. If customers do not transfer their features, the replacement units will not operate properly. See "Handling static-sensitive devices" on page viii for information about handling CRU parts.

Refer to "Chapter 4. Performing hardware procedures" on page 17 for instructions on installing and removing Network Station parts. Refer to "Ordering replacement parts" on page 11 to determine CRU part numbers for replacement parts.

Replacing all other parts

To replace a keyboard, mouse, power module, memory DIMM, or other Network Station part, remove the part from the system, and install a replacement part.

Note: You need to return some parts to IBM. Always check the replacement part packaging for any return instructions regarding defective parts.

Returning parts to IBM

To return a defective logic unit to IBM, customers must ship only the logic unit drawer (covers not included). The customer must package the defective part by using the packaging container they received when the replacement part arrived.

Note: Customers should not ship features, such as memory, and PCI adapter cards, with the defective logic unit, because it is not possible for IBM to return them.

If customers do not follow IBM shipping instructions, any damage to the defective part may be charged to them. IBM covers shipping costs on all warranted hardware and maintenance agreement hardware. Replacement parts become the customer's property in exchange for the defective parts, which become the property of IBM.

Chapter 3. Ordering Network Station parts

Ordering replacement parts

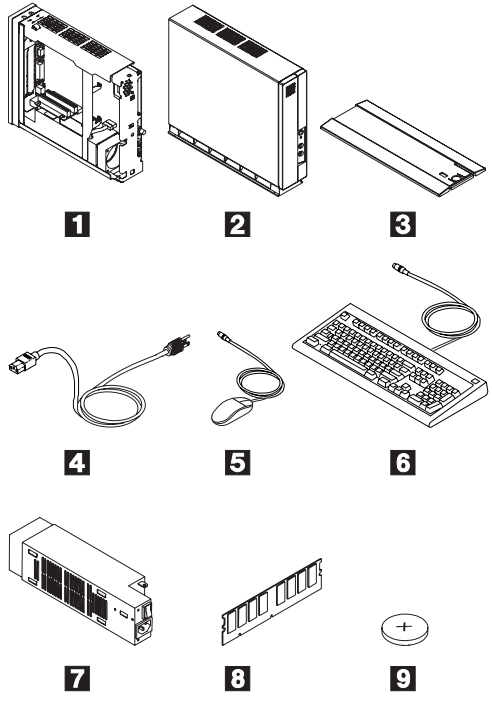
You can order IBM replacement parts for the Network Station. Contact IBM, or your reseller, to order warranty parts and non-warranty parts. IBM will provide warranty service without charge for parts during the warranty period on an exchange basis only. If you need a replacement logic unit, IBM or your reseller will give you instructions for returning your current logic unit to IBM.

The standard Network Station hardware shipped to the customer appears below:

Table 2. Standard Components

Standard component list:

1. Logic unit
2. Cover assembly
3. Base
4. Power cord
5. Mouse
6. Keyboard
7. Power supply
8. Memory DIMM
9. Lithium battery



The following tables list all Network Station parts that are supported by IBM for this product. Use the reference number that is associated with each part above to find the corresponding part numbers in the following tables.

Table 3. Type 8364 Network Station replacement parts

Reference	Description	Country	Part number
	Logic unit and associated parts		
1	Logic Unit for Models Exx (Ethernet Drawer)	All countries	41L5339
1	Logic Unit for Models Txx (Token Ring Drawer)	All countries	41L5392
2	Network Station Cover (Complete Cover Set)	All countries	41L4965
3	Base (Mounting Stand)	All countries	41L4981
9	Lithium Battery (3 Volt)	All countries	33F8354
Memory **Note:** This Network Station supports SDRAM DIMM memory that is 100MHz, 168 pin, 3.3 V, gold tab, unbuffered, and non-parity.			
8	Memory (32 MB SDRAM DIMM)	All countries	01K1146
8	Memory (64 MB SDRAM DIMM)	All countries	01K1147
8	Memory (128 MB SDRAM DIMM)	All countries	01K1148

Table 3. Type 8364 Network Station replacement parts (continued)

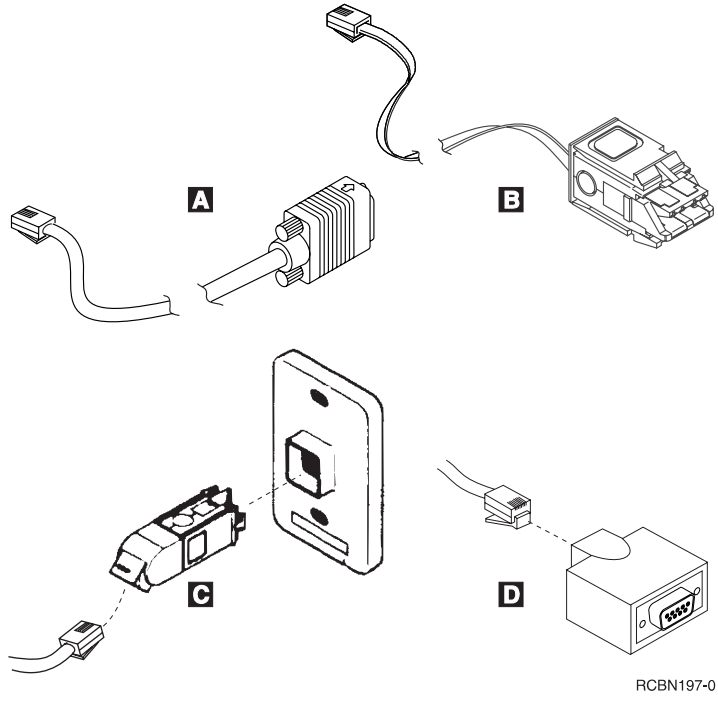
Network cables **Note:** The required cable type is category 3 for 4 MB ring speed operation. The required cable type is shielded twisted pair category 4 or 5 for 16 MB ring-speed operation.  			
A	TTP RJ-45 plug STP cable for connection to 9 pin D shell connector	All countries	60G1066
B	TTP RJ-45 plug Shielded Twisted Pair (STP) cable for connection to IBM Cabling System connector	All countries	60G1063
C	TTP RJ-45 socket adapter for connection to IBM Cabling System	All countries	73G8315
D	TTP RJ-45 socket adapter for connection to 9 pin D shell connector	All countries	73G8320
	Internal power supply (see "Detachable power cables" on page 14 for part numbers)		

Table 3. Type 8364 Network Station replacement parts (continued)

7	Power Supply (115V - 230V)	All countries	94H1254
	Mouse		
5	Mouse (two button)	All countries	76H0889
	Keyboards		
6	Keyboard	Belgian UK	37L0857
6	Keyboard	Brazilian Portuguese	07L9450
6	Keyboard	Canadian French	37L0852
6	Keyboard	Danish	37L0860
6	Keyboard	Dutch	37L0861
6	Keyboard	French	37L0862
6	Keyboard	Finnish	37L0877
6	Keyboard	German	37L0863
6	Keyboard	Italian	37L0868
6	Keyboard	Latin America (Spanish)	37L0853
6	Keyboard	Norwegian	37L0869
6	Keyboard	Spanish	37L0876
6	Keyboard	Swedish	37L0877
6	Keyboard	Swiss (French and German)	37L0878
6	Keyboard	UK English	37L0881
6	Keyboard	US English ISO9995	37L0883
6	Keyboard	US English	37L0851

Detachable power cables

Table 4. Detachable power cables (10 Amp)

Detachable power cables				
Plug	**Receptacle**	**Country**	**Voltage selection**	**Part number**
		Argentina, Australia, New Zealand	230V	13F9940

Table 4. Detachable power cables (10 Amp) (continued)

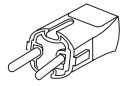
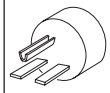
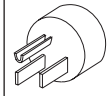
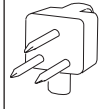
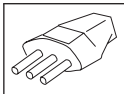
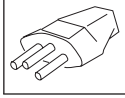
		Abu Dhabi, Austria, Belgium, Bulgaria, Botswana, Egypt, Finland, France, Germany, Greece, Iceland, Indonesia, Korea (South), Lebanon, Luxembourg, Netherlands, Norway, Portugal, Saudi Arabia, Spain, Sudan, Sweden, Turkey, Yugoslavia	230V	13F9979
		Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, El Salvador, Ecuador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherlands Antilles, Panama, Peru, Philippines, Taiwan, Thailand, Trinidad, Tobago, U.S.A. (except Chicago), Venezuela	115V	1838574
		Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Trinidad, Taiwan, U.S.A	115V	6952301
		Bahrain, Bermuda, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Nigeria, Oman, Peoples' Republic of China, Qatar, Singapore, Tanzania, Uganda, United Arab Emirates (Dubai), United Kingdom, Zambia	230V	14F0033
		Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	230V	14F0015
		Denmark	230V	13F9997
		Israel	230V	14F0087

Table 4. Detachable power cables (10 Amp) (continued)

		Chile, Ethiopia, Italy	230V	14F0069
		Liechtenstein, Switzerland	230V	14F0051

Ordering optional features

You can order optional features for the Network Station. See “Compatible CompactFlash cards” on page ix for information about ordering optional CompactFlash cards. Contact IBM, or your reseller, to order options such as memory DIMMs and network cables.

Chapter 4. Performing hardware procedures

This chapter includes the procedures for exchanging parts in the Network Station logic unit, clearing CMOS, reading the boot block, and writing the boot block.

There are two configuration utilities you can use to configure your Network Station hardware for the network server. Each setup utility interacts with the Network Station hardware to report configuration errors and hardware problems differently:

- See "Chapter 11. Identifying problems with hardware that is configured for NS Boot" on page 69 to determine whether or not it is necessary to replace the Network Station logic unit, or any other parts, when working with the NS Boot utility.
- See "Chapter 13. Identifying problems with hardware that is configured for BIOS" on page 93 to determine whether or not it is necessary to replace the Network Station logic unit, or any other parts, when working with the basic input and output system (BIOS) setup utility.

For information on ordering Network Station parts, refer to "Chapter 3. Ordering Network Station parts" on page 11.

The hardware-related procedures in this chapter have been separated into two sections:

- "Installing and removing parts" on page 18:
  - "Removing the logic unit to install parts" on page 18.
  - "Installing an optional CompactFlash card" on page 19.
  - "Exchanging the lithium battery" on page 20.
  - "Selecting the voltage for your location" on page 21.
  - "Exchanging the memory" on page 20.
  - "Installing an optional PCI card" on page 19.
  - "Replacing the power supply" on page 22.
- "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24
  - "Clearing CMOS" on page 24.
  - "Creating a recovery CompactFlash card" on page 25.
  - "Reading a compact flash card" on page 26.

It is important that you understand all of the information that is presented in "Safety notices" on page vii before performing any hardware-related procedures on Network Station hardware.

Installing and removing parts

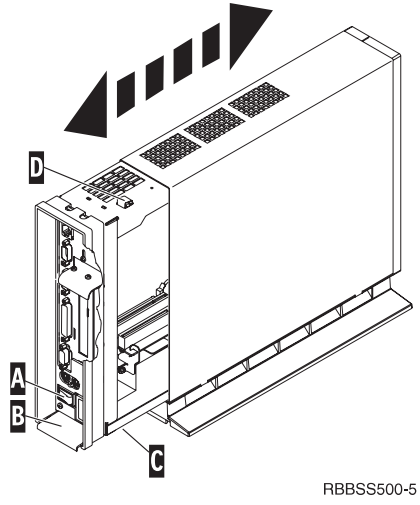
Removing the logic unit to install parts

Read Safety notices, and "Handling static-sensitive devices" on page viii before continuing.

1. Turn off the power supply switch **A**.
2. Disconnect all cables from the Network Station.
3. Hold the Network Station cover assembly, lift latch **B**, and pull the logic unit **C** out.
4. Carefully lay the logic unit down with the internal components facing up. You are now ready to perform the installation procedures provided in this chapter.

Attention: Do not set the logic unit down on the white power switch.

5. Complete the procedure, "Reassembling the Network Station" when you are finished installing components in the logic unit.



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Reassembling the Network Station

Read Safety notices, and "Handling static-sensitive devices" on page viii before continuing.

1. To reassemble the Network Station, carefully slide the logic unit **C** into the cover assembly while depressing the slide stop **D**.
2. Slide the logic unit completely into the cover assembly, until the latch **B** is engaged.

Installing an optional CompactFlash card

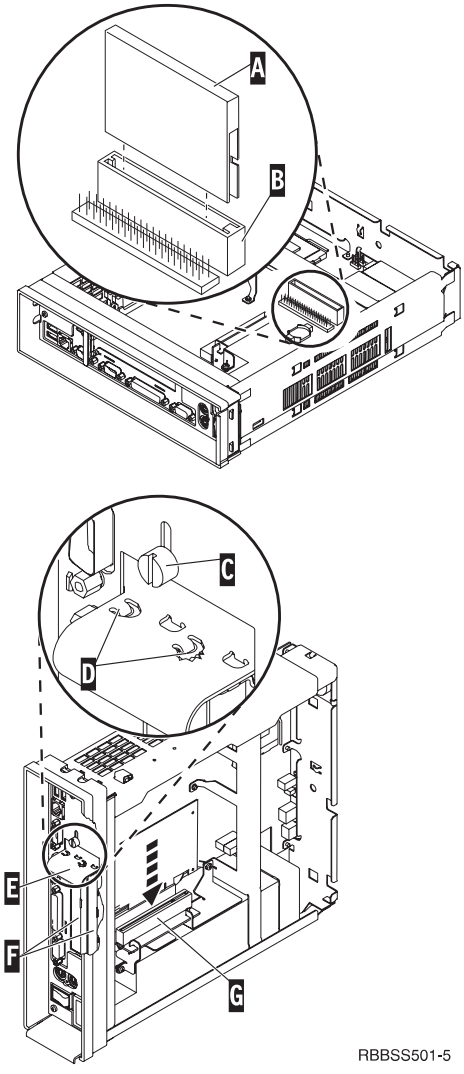
Read "Caution notices" on page viii, "Removing the logic unit to install parts" on page 18 and "Compatible CompactFlash cards" on page ix before continuing.

1. Match the grooves on the sides of the CompactFlash card **A** to the inside of the connector **B**.
2. Install the CompactFlash card **A** into the connector **B**.
   Note: Do not force the card into the connector, as it will damage both the Network Station, and the CompactFlash card.
3. See "Reassembling the Network Station" on page 18.

Installing an optional PCI card

Complete the procedure, "Removing the logic unit to install parts" on page 18 before performing the following Peripheral Component Interconnect (PCI) procedure.

1. Loosen the thumb screw **C** to slide the plate **E** up.
2. Remove the PCI slot covers **F**.
3. From inside the logic unit, install the PCI card down into both the slot, and the PCI socket **G**.
   Note: Inserting the first PCI card into the socket closest to the logic board makes installing a second PCI card easier.
4. Install PCI slot covers over any empty slots.
5. Slide the plate **E** down until the tabs **D** secure the PCI slot covers **F** firmly into place.
6. Tighten the thumb screw **C**,
7. See "Reassembling the Network Station" on page 18.



Exchanging the memory

Complete the procedure, "Removing the logic unit to install parts" on page 18 before performing the following Dual Inline Memory Module (DIMM) procedures.

1. To remove a DIMM from the logic unit, press the two tabs **B** located at each end of the DIMM **A** out and down.
2. To install a DIMM into the logic unit, align the notches on the bottom of the DIMM **A** with the notched areas on the memory socket.
3. Press down firmly on the center of DIMM **A** until the memory socket tabs **B** flip up.
4. See "Reassembling the Network Station" on page 18.

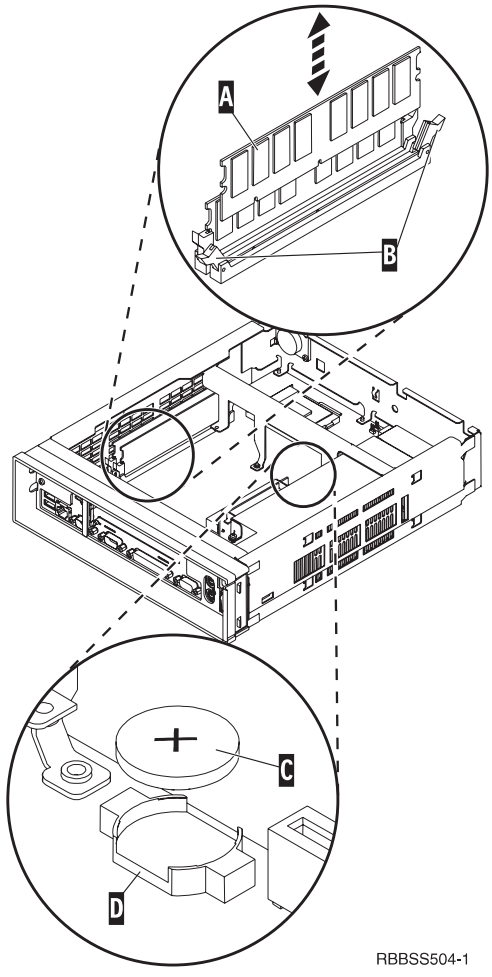
Exchanging the lithium battery

Read "Caution notices" on page viii, and see "Removing the logic unit to install parts" on page 18 before continuing.

1. To remove the battery, place your thumb on the battery **C** and lift it up with your index finger.
2. Dispose of the used battery according to your local regulations.
3. Install the new battery into the battery socket **D**, with the "+" sign facing up.
4. See "Reassembling the Network Station" on page 18.

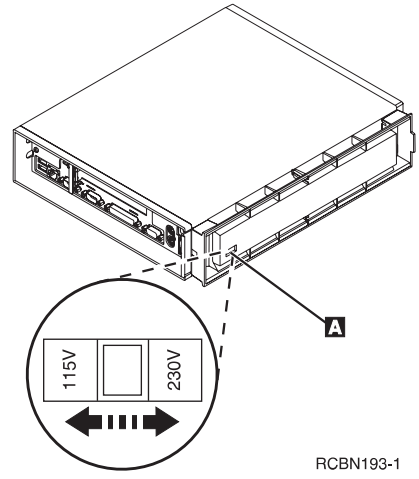
Note: If you receive an error message on your screen after performing this procedure, See "Chapter 11. Identifying problems with hardware that is configured for NS Boot" on page 69, or "Chapter 13. Identifying problems with hardware that is configured for BIOS" on page 93.

See "Setting the date and time" on page 57, and "Part 3. Configuring the Network Station" on page 37 to reconfigure the Network Station.



Selecting the voltage for your location:
Note: All Network Stations are preset to the 230V setting when manufactured.

1. Power off the Network Station.
2. Remove the base from the Network Station.
3. Locate the voltage selector switch **A** .
4. Use a pen, or similar object, to slide the switch to the correct setting for your location (see **Voltage selection** in "Detachable power cables" on page 14).
5. Slide the base back on to the Network Station.
6. Power on the Network Station.



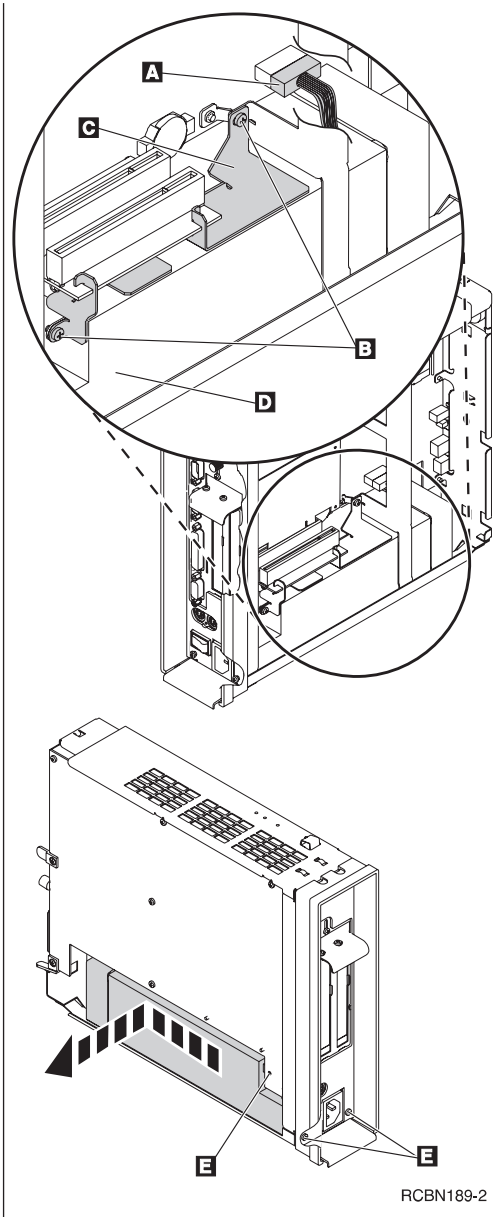
Removing the power supply:

Notes:

1. Only IBM-authorized personnel should remove the power supply.
2. You will need a Phillips head screwdriver for the following procedure.

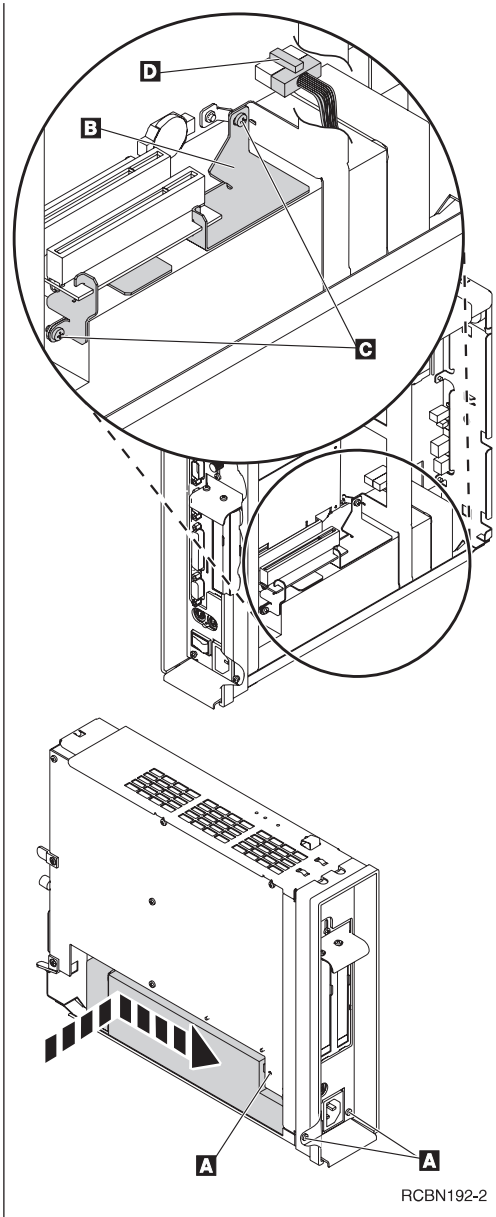
1. Complete the procedure, "Removing the logic unit to install parts" on page 18 before continuing.
2. Disconnect the power supply connector **A** from the logic board.

   Pinch the top of the power supply connector as you disconnect it from the logic board. This releases the power supply connector latch.
3. Remove the two screws **B** attaching the support plate **C** to the power supply **D**.
4. Pull the support plate **C** out of the logic unit and set it aside.
5. Remove the three screws **E** attaching the power supply to the logic unit.
6. Push the power supply toward the front of the logic unit until it stops.
7. Carefully remove the power supply from the logic unit.
8. Continue with the procedure, "Installing the power supply" on page 23.



Installing the power supply:

1. Carefully install the power supply into the logic unit so that the power supply fan assembly faces the front of the logic unit.
2. Slide the power supply toward the back of the logic unit until it stops.
3. Make sure that the power supply is seated correctly, and firmly into the logic unit.
4. Secure the power supply with the three Phillips head screws **A** removed during the power supply removal procedure.
5. Slide the support plate **B** into place between the riser card and power supply.
6. Secure the support plate with the two Phillips head screws **C** removed during the power supply removal procedure.
7. Install the power connector **D** into its socket on the logic board.
8. See "Reassembling the Network Station" on page 18.



Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card

Clearing the administrator password, and CMOS

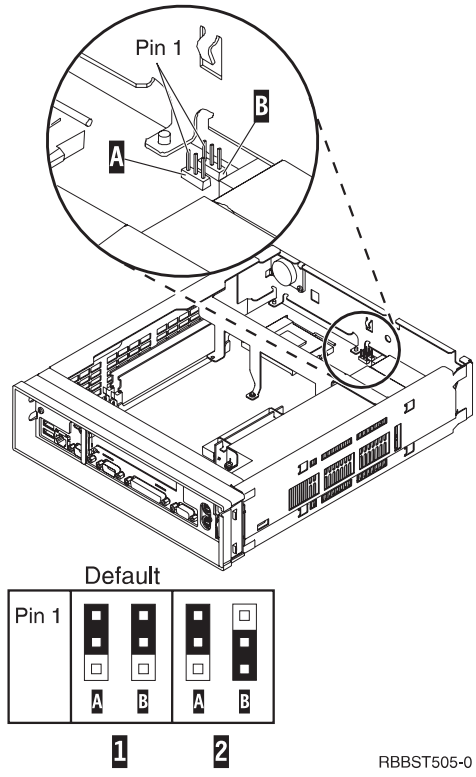
Network Stations configured for WSOD: This procedure clears **all** configuration settings on Network Stations that have been configured from the BIOS setup utility for the WorkSpace On-Demand operating system (hereafter referred to as WSOD). Refer to "Chapter 7. Selecting a setup utility" on page 39 when you have completed this procedure.

Network Stations configured for NS Boot: This procedure only clears the administrator password. This procedure does not **not** load factory default settings. If you want to load the factory default settings on a Network Station that has been configured from the NS Boot utility, perform the procedure "Loading the factory defaults" on page 50.

1. Perform the procedure, "Removing the logic unit to install parts" on page 18 before continuing.
2. Move the jumpers into configuration **2**.
   Note: All systems ship with jumpers installed in configuration **1**.
3. Power on the Network Station and wait a few moments.

   This requires you to reconnect the power cable to the logic unit. The system LED flashes green at this time, on Network Stations that are configured for WSOD. There are no system LED indications at this time, on Network Stations that are configured for NS Boot.
4. Power off the system.
5. Move the jumpers back into the default configuration **1**.

   If you do not move the jumpers back into configuration **1**, your Network Station may not function properly.
6. See "Reassembling the Network Station" on page 18.



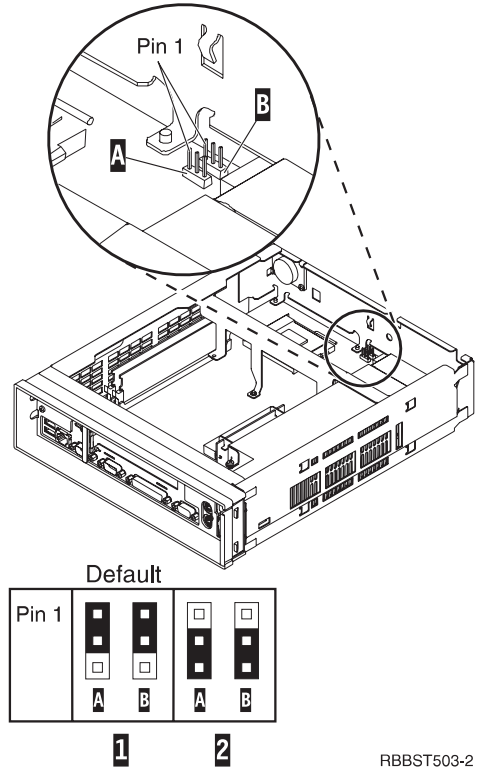
Creating a recovery CompactFlash card:

This procedure creates a copy of the Network Station firmware (hereafter referred to as flash image). The flash image that is stored on the CompactFlash card includes both NS Boot and BIOS images. You need a CompactFlash card to complete this procedure (see "Compatible CompactFlash cards" on page ix).
Note: Once you create a recovery CompactFlash card for a series 2800 (machine type 8364) Network Station, it can only be used to re-flash a series 2800 Network Station.

1. Complete the procedure, "Removing the logic unit to install parts" on page 18 before continuing.
2. Insert the CompactFlash card into the connector (see "Installing an optional CompactFlash card" on page 19).
3. Move the jumpers into configuration **2**.
   Note: All systems ship with jumpers installed in configuration **1**.
4. Power on the Network Station.

   This requires you to reconnect the power cable to the logic unit.
5. Wait for the system LED to flash green.
   Note: If the system LED flashes amber, the image was not created. Repeat the procedure, or see "Indicators of Network Station problems" on page 73 for problem determination.
6. Power off the Network Station.
7. Remove the CompactFlash card and store in a safe place.
8. Move the jumpers back into the default configuration **1**.

   If you do not move the jumpers back into configuration **1**, your Network Station may not function properly.
9. See "Reassembling the Network Station" on page 18.



Recovering the flash image

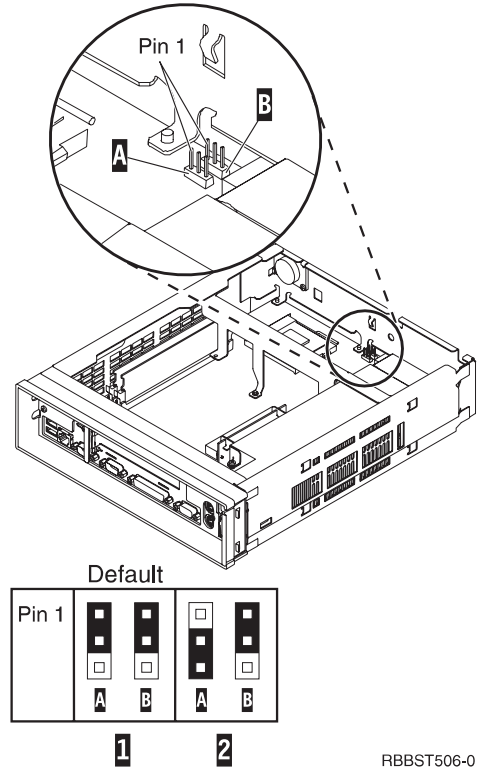
This procedure explains how to recover the flash image of a Network Station by reading from a recovery CompactFlash card. You need a CompactFlash card with a series 2800 (machine type 8364) flash image to complete this procedure. See "Creating a recovery CompactFlash card" on page 25 to create a recovery CompactFlash card.

1. Complete the procedure, "Removing the logic unit to install parts" on page 18 before continuing.
2. Insert the CompactFlash card into the CompactFlash connector (see "Installing an optional CompactFlash card" on page 19).
3. Move the jumpers into configuration **2**.
   Note: All systems ship with jumpers installed in configuration **1**.
4. Power on the Network Station.

   This requires you to reconnect the power cable to the logic unit.
5. When the flash image has been re-flashed, the LED will flash green.

   If the system LED is amber, or flashes amber, the flash image cannot be re-flashed. Try a different CompactFlash card with the series 2800 (machine type 8364) flash image stored on it, or recreate the recovery CompactFlash card (see "Creating a recovery CompactFlash card" on page 25) and then repeat this procedure. If you are still unable to recover the flash image, replace the logic unit (see "Replacing the logic unit" on page 9).
6. Power off the system.
7. Remove the CompactFlash card from the connector.
8. Move the jumpers back into the default configuration **1**.

   If you do not move jumpers back into configuration **1**, your Network Station may not function properly.
9. See "Reassembling the Network Station" on page 18.



Part 2. Software Overview

Chapter 5. IBM Network Station Manager software features for Network Station

Overview

The IBM Network Station Manager program is a browser-based application. You can configure the Network Station for the IBM Network Station Manager program from the NS Boot utility (see "Chapter 8. Configuring the Network Station from the NS Boot utility" on page 43). The IBM Network Station Manager program can be used to perform the following tasks:

- To construct the launch bar for the Network Station desktop:

  You can configure the types and number of folders and applications with the **Desktop—>Launch Bar** function of the application.
- To configure settings for:
  - The System - All IBM Network Station thin clients or all Network Station users.
  - A Group - A group of Network Station users.
  - A User - A specific Network Station user.
  - A Workstation - A specific Network Station.
- To configure or customize specific setup tasks:
  - Hardware, such as workstations and printers.
  - Applications, such as 5250 sessions, Netscape Communicator, or locally or remotely configured programs.
  - Desktop look and content, such as font size, icon placement, and desktop background.
  - Environment and Administration, such as network settings such as proxies, as well as language settings for messages and menus.

Refer to *Using IBM Network Station Manager* SC41-0690 for more information about IBM Network Station Manager. For the most recent version of this information, go to the following website:

`http://www.ibm.com/nc/pubs`

Chapter 6. Work Space On-Demand software features for Network Station

This chapter describes the software and licensed internal code features that are associated with the Network Station. The licensed internal code features discussed in this chapter have been configured in the Network Station setup utility.

The Network Station setup utility is the system administrator's tool for configuring the basic input and output system (BIOS). The system administrator can use the setup utility to set the system date and time, change default power management settings, and much more. The system administrator can also use the setup utility to obtain information about the system, and its installed features. See "Chapter 12. Startup sequence of Network Stations configured for WorkSpace On-Demand" on page 91 for information on configuring Network Station power management features, boot protocols, security features, and more.

The WorkSpace On-Demand server administrator controls the software that is downloaded in the client image. Use this book in conjunction with the *WorkSpace On-Demand Administrator's Guide* shipped with the server software.

Overview

WorkSpace On-Demand is an operating system that utilizes thin clients that are designed to be remotely loaded from a network server. The WorkSpace On-Demand client runs Java applications, a browser, and the Personal Communications Entry Level host access application. It also supports running DOS, Windows 3.1, and IBM Operating System 2 (IBM Operating System/2 (OS/2)) stand-alone applications.

WorkSpace On-Demand runs on an OS/2 Warp Server and provides enhanced server support and administrator functions to manage the Network Station. The WorkSpace On-Demand server downloads this software across the local area network (LAN) when you power on the Network Station. The client provides user logon capability and a simplified desktop with program objects, or icons, to run client applications.

For more information concerning WorkSpace On-Demand, refer to the *WorkSpace On-Demand Administrator's Guide*, shipped with the server software.

Boot protocols

The Network Station has the following boot protocol options:

- Remote Program Load (RPL)
- Dynamic Host Configuration Protocol (DHCP) and Preboot Execution Protocol (PXE)

Note: The Network Station's boot protocol's default configuration is RPL.

You can select the Network Station's boot protocol settings by entering the setup utility. For more information, refer to "Devices and I/O ports" on page 55.

RPL

Remote Program Load (RPL) is an IEEE (Institute of Electrical and Electronics Engineers) 802.2 LLC (logical link control) level boot protocol. The Network Station firmware (hereafter referred to as flash image) initializes the network adapter and broadcasts its network address over the network for a server connection.

DHCP and PXE

Dynamic host configuration protocol (DHCP) and Intel's Preboot Execution Environment (PXE) are boot mechanisms which take advantage of Transmission Control Protocol/Internet Protocol (TCP/IP) networks. The boot protocol code initializes the network adapter within the system.

Java virtual machine

The Java Virtual Machine (VM) for WorkSpace On-Demand is part of the licensed program. Java VM performs like a software version of a Central Processing Unit (CPU). This program interprets Java instructions and runs them on the hardware.

The Java VM runs compiled Java code, stand-alone Java applications, and downloaded applets for Web browsers. The Java VM provides additional tools for overcoming programming obstacles in the Java language that allow customers to create their own languages. Customer programs are accessible from any Java application, in any Java interpreter, on nearly any computer.

The Java Virtual Machine:

- Resolves run-time dynamic links to Java packages. The packages also store as *.class* files

- Runs byte-code operands in *.class* files.
- Creates instances of classes at runtime.
- Calls methods and accessing attributes within classes.
- Handles calls to Java packages and classes.
- Handles calls to stand-alone methods that are considered part of the Java library, but are not carried out directly in Java code.

Refer to the *WorkSpace On-Demand Administrator's Guide*, shipped with the server software, for more information on Java VM and its functions.

IBM server login

The Network Station's login window appears after the operating system has fully loaded. The client desktop will display after the server has authenticated the user's identification and password. The user's identification determines the applications which will be available on the client desktop. Refer to the *WorkSpace On-Demand Administrator's Guide* to configure user profiles on the server.

Web browser

The Network Station supports a Web browser. Refer to the information that shipped with the server software for information about adding applications such as the Web browser to users' profiles.

Printer management

The customer may configure network printers and Network Station-attached printers from the server software. The customer has access to all properly configured network printers from all Network Stations. The customer may configure network printers and Network Station attached printers from the server. However, some software applications are not compatible with all configured printers. Refer to the information that shipped with the server software for details on how to configure printers and software applications.

Application management

The network administrator may change an application on behalf of all users. For example, the administrator may want to configure the Web browser for all users. Administrator passwords prevent users from changing application configurations.

For more information about application management, refer to the information that shipped with the server software.

Wake on LAN

The Wake on LAN feature of the Network Station allows remote server access of the client during power-managed states. Wake on LAN is useful for administrating Network Stations during non-peak hours of operation.

Remote access from a LAN server allows a Network Station to perform system management routines, transfer files, track inventory, assets, and perform other tasks.

Servers with Wake on LAN technology can send wake-up frames over the network to a Wake on LAN-enabled Network Station. The Network Station will wake from its low power states when it receives one of these frames.

You can enable or disable the Network Station's Wake on LAN feature by entering the setup utility. For more information, refer to the BIOS screen summary for "Power management" on page 62.

Power management

The Network Station has many built in features that lower the total cost of ownership. One of these features is the system's ability to automatically enter power-managed states. The administrator can manage the system at the server when the system is in these states. This allows for total management of the system when the system is not in use, and is in a low power state. See "System-low-power states" on page 35, and "Monitor low-power states" on page 35 for detailed information on the Network Station's power managed states.

Power management is a feature of the Network Station basic input and output system (BIOS). When the Network Station recognizes a period of inactivity, this power management feature reduces the system's power consumption (see "Power consumption" on page 7 for details). The Network Station's local area network (LAN) connection remains active regardless of the power management state it is in.

The power management mode supported by the Network Station is the Automatic Hardware Power Managed (AHPM) mode. Features of the AHPM mode include the black-out of the screen while the system is not in use.

The system will enter this power management mode within the default setting of 30 minutes. You can set both the system and the system monitor to enter the power-managed mode automatically. Refer to “Power management” on page 62 for more information.

System-low-power states

The power management feature of the Network Station provides three low-power states for the system: suspend, soft-off, and power-off. The system enters these states after the delay time has elapsed. Refer to “Power management” on page 62 for information concerning the configuration of the system’s power management feature.

- **Suspend**: After a period of inactivity, the system enters the standby state. When a key is pressed or the mouse is moved, the monitor resumes normal operation and restores the screen image. See “Power management” on page 34 for more details.
- **Soft-off**: This state occurs if the period of inactivity continues in the suspend state. You cannot resume an application after exiting the system soft-off state. The system will restart, and re-establish communications with the server. This is a configurable setting in the BIOS setup utility, and the default value is for the system to remain on. The system will not automatically enter this power-managed state if the default setting is intact. The monitor screen remains blank, and the monitor’s power indicator light is similar to the standby state. The System LED will not operate in soft-off. This is an indication of the system’s power state. To exit soft-off, press the white power button.
- **Power-off state**: This state only occurs by setting the power supply switch that is located at the back of the Network Station. This severs the system’s network connection. The power supply switch must be on in order to exit this power state.

The default settings for the Network Station’s delay times are 30 minutes for the suspend state, and 1 hour for the monitor power-off state. Refer to “Power management” on page 34 for information regarding Network Station default settings.

Monitor low-power states

The power management feature of the Network Station provides three low-power states for the monitor: standby, suspend, and power-off. The monitor switches to the defined state after the delay time has elapsed. After this time has elapsed, the Network Station will switch to one of the three low-power states.

The following paragraphs describe how an IBM monitor that complies with the VESA DPMS standard responds to the Network Station's power management feature:

- **Standby state**: After a period of inactivity, the Network Station instructs the monitor to enter the standby state. The Network Station clears the monitor display and changes the appearance of the monitor's power indicator light. When a key is pressed or the mouse is moved, the monitor resumes normal operation and restores the screen image.
- **Suspend state**: If the period of inactivity continues in the standby state, the Network Station instructs the monitor to enter the suspend state. The default setting for this state is 30 minutes. The monitor screen remains blank, and the monitor's power indicator light is similar to the standby state. When a key is pressed or the mouse is moved, the monitor resumes normal operation and restores the screen image.
- **Power-off state**: After a period of inactivity in the suspend state, the Network Station instructs the monitor to enter the power-off state. The default setting for this state is 1 hour. The Network Station keeps the monitor screen blank and changes the appearance of the monitor's power indicator light. When a key is pressed or the mouse is moved, the monitor resumes normal operation and restores the screen image after a short delay.

The default settings for the Network Station's delay times are 30 minutes for the suspend state, and 1 hour for the power-off state. Refer to "Chapter 9. Configuring the Network Station from the BIOS setup utility" on page 51 for information on the setup utility, and configuring the Network Station.

Part 3. Configuring the Network Station

Chapter 7. Selecting a setup utility

You need to configure the Network Station hardware for the server that it will be interfacing with on the network. Three configuration options appear on the **Change Firmware Support** menu during the initial startup of the Network Station hardware:

- **BIOS for WorkSpace On Demand.**
- **NS Boot for Network Station Manager.**
- **Automatic selection.**

The **Change Firmware Support** menu only appears during the initial startup of the Network Station hardware, or after you have after you have reset the Network Station firmware configuration (see "Changing firmware configurations" on page 41).

The configuration option that you select determines the setup utility that you will use to configure the Network Station. When you allow the **Automatic selection** to be made, the Network Station hardware will attempt to communicate across the network in order to distinguish which setup utility to use. The BIOS and NS Boot setup utilities interact with the Network Station hardware differently during the startup sequence, and when reporting hardware problems and configuration errors.

- Refer to "Part 4. Resolving problems with hardware that is configured for IBM Network Station Manager" on page 65 for problem resolution when using the **NS Boot for Network Station Manager** configuration option.
- Refer to "Part 5. Resolving problems with hardware that is configured for WorkSpace On-Demand" on page 89 for problem resolution when using the **BIOS for WorkSpace On Demand** configuration option.

Selecting the NS Boot for Network Station Manager configuration

When you select the **NS Boot for Network Station Manager** option, the Network Station becomes configured for IBM Network Station Manager. IBM Network Station Manager is an operating system that can manage Network Station hardware, when installed on a network server. The NS Boot utility becomes the primary interface with the Network Station firmware once you have **NS Boot for Network Station Manager**.

When you select the **NS Boot for Network Station Manager** option, you can change the language setting of the utility. The **NS Boot Main Menu** displays after you select a language setting.

After you configure the Network Station and restart the system, it attempts to communicate with the network server. See "Chapter 11. Identifying problems with hardware that is configured for NS Boot" on page 69 for explanations of any common problem indicators you experience, such as:

- System LED indications.
- Error codes and text messages.
- Audio beep sequences.

See "Changing firmware configurations" on page 41 to change your firmware configuration option.

Selecting the BIOS for WorkSpace On-Demand configuration

When you select the **BIOS for WorkSpace On Demand** option, the Network Station becomes configured for WorkSpace On-Demand. Work Space On-Demand is an operating system that can manage Network Station hardware, when installed on a network server. The BIOS setup utility becomes the primary interface with the Network Station firmware once you have selected **BIOS for WorkSpace On Demand**.

After the Network Station has completed the configuration process, it attempts to communicate with the network server. See "Chapter 13. Identifying problems with hardware that is configured for BIOS" on page 93 for explanations of any common problem indicators that you experience, such as:

- System LED indications.
- Error codes and text messages.
- Audio beep sequences.

See "Changing firmware configurations" on page 41 to change your firmware configuration option.

The Automatic selection

The **Automatic selection** allows the Network Station to attempt to configure automatically, based on information that it has received from the network server. If you do not make a selection from the **Change Firmware Support** menu, the Network Station will default to the automatic selection. Once the Network Station completes the automatic configuration, you can configure the Network Station and restart the system. Refer to either "Chapter 11. Identifying problems with hardware that is configured for NS Boot" on page 69, or "Chapter 13. Identifying problems with hardware that is configured for BIOS" on page 93, depending upon the configuration that your

Network Station hardware performed, for explanations of any common problem indicators the you experience, such as:

- System LED indications.
- Error codes and text messages.
- Audio beep sequences.

Changing firmware configurations

You may decide that you want to change your firmware configuration. The following procedures explain how to change your firmware configuration from within the firmware utilities.

Switching from the NS Boot for Network Station Manager configuration

To return to the **Change Firmware Support** menu after you have chosen the **NS Boot for Network Station Manager** selection, perform the following procedure:

1. Press **Esc** during the Network Station startup sequence.
2. Highlight **Service aids** and press **Enter**.
3. Highlight **Change firmware support** and press **Enter**.
4. Highlight the firmware option of your choice, and press **Enter**.
5. Press **F10** to restart the Network Station.

Switching from the BIOS for WorkSpace On-Demand configuration

To return to the **Change Firmware Support** menu after you have chosen the **BIOS for WorkSpace On Demand** selection, perform the following procedure:

1. Press **F1** when the IBM Network Station logo displays.
2. When you see the prompt for the administrator password, enter `IBMNCD`.
3. Select the **Start Options** menu from the **Configuration/Setup Utility** menu and press **Enter**.
4. Scroll down to the **Firmware Selection** field.
5. Using the left arrow keys and the right arrow keys, select the **Other Operating Systems** option.
6. Press **Esc** to exit the **Start Options** menu.
7. Press **Esc** to exit the **Configuration/Setup Utility** menu.
8. Highlight the **Yes, save and exit the Setup Utility** option, and press **Enter**.

   The Network Station automatically restarts.

Chapter 8. Configuring the Network Station from the NS Boot utility

This chapter contains information about using the NS Boot utility of the IBM Network Station thin client (hereafter referred to as the Network Station). The NS Boot utility menu allows you to **View** or **Set** configuration settings for a particular Network Station. The primary function of the NS Boot utility is to communicate with network servers, and download the IBM Network Station Manager program.

You can find and correct Network Station configuration issues that affect how the Network Station accesses a network in the NS Boot utility. You can use the IBM Network Station Manager program to restrict user privileges in the NS Boot utility.

Identifying the NS Boot version

You can distinguish the NS Boot version of your Network Station the following two ways:

- Look for the **H20xxxxx (MM/DD/YY)** version that is indicated during the startup sequence of the Network Station. You may need to enable the verbose diagnostic mode to see this display (see "Enabling verbose diagnostic messages" on page 49).
- Enter the NS Boot utility by pressing **Esc** during the startup sequence, and select the **Display hardware information** option from the **NS Boot Main Menu**.

Update your Network Station to the latest NS Boot version by doing the following:

To manually update the NS Boot version of Network Stations with NS Boot version H2033190 (03/31/99), see "Appendix A. Updating the NS Boot version H2033190 (03/31/99)" on page 111.

To manually update the NS Boot version of Network Stations that are at any other NS Boot version, see "Manually updating the NS Boot code".

Manually updating the NS Boot code

To use the IBM Network Station Manager program to update the NS Boot version from the server, perform the following procedure:

Note: This procedure does not apply to Network Stations that have NS Boot version H2033190 (03/31/99). You must manually update Network Stations that have NS Boot version H2033190 (03/31/99) **before** you can perform the procedures in this chapter. See "Appendix A. Updating the NS Boot version H2033190 (03/31/99)" on page 111.

1. Select **Configure network settings** from the **NS Boot Main Menu**, and press **Enter**.
2. Set **Local (NVRAM)** to `First` in the **Network priority** field. You can select a boot method priority (first, second, and third) for the Network Station to follow during startup.

   Note: You can only set one boot option to `First` at a time. Disable **DHCP** and **BOOTP** if you do not want them prioritized.
3. Type the **IBM Network Station IP Address** in the appropriate field on menu 1 of 4.
4. Type the **Gateway IP Address** in the appropriate field on menu 1 of 4.
5. Type the **Subnet mask** in the appropriate field on menu 1 of 4.
6. Type at least one **Boot file server IP address** in the appropriate fields on menu 2 of 4.
7. Type the IP address of the boot file server in the appropriate field.
8. Cycle through the **Boot file server directory and file name**, until you have selected the empty field.
9. Refer to the following table and type the correct path for your server platform in the empty **Boot file server directory and file name** field:

For this platform:	Type this path:
AS/400	`/QIBM/ProdData/NetworkStationV2/x86/proms/bflash.2800`
Windows NT	`/NetworkStationV2/prodbase/x86/proms/bflash.2800`
RS/6000	`/usr/NetworkStationV2/prodbase/x86/proms/bflash.2800`

10. If you are not sure what protocol you have configured your server for, select **TFTP** as your primary **Boot file server protocol**.
11. Press **F3** to save your changes.
12. Restart the Network Station to complete the manual NS Boot version update.

Using the NS Boot utility

Note: This procedure does not apply to Network Stations that have NS Boot version H2033190 (03/31/99). You must manually update Network Stations that have NS Boot version H2033190 (03/31/99) **before** you can perform the procedures in this chapter. See "Appendix A. Updating the NS Boot version H2033190 (03/31/99)" on page 111.

Access the NS Boot utility by performing the following procedure:

1. Power on the Network Station.
2. Enter the NS Boot utility by pressing **Esc** during the startup sequence.

   Note: If you have enabled the password control from the IBM Network Station Manager program, you must enter the case-sensitive administrator password. You can specify the administrator password through the IBM Network Station Manager program in the **Setup Tasks** menu, by clicking **Hardware—>Miscellaneous Settings**.

A screen similar to the following appears:

```
MENU03                          IBM Network Station
                                 NS Boot Main Menu


      Change language setting
      Change keyboard setting
      Change display settings

      Configure network settings
        Change boot file server settings
        Change workstation configuration server settings
        Change authentication server settings

      Display hardware information
      Display boot log

      Change verbose diagnostic setting

      Service aids


                         Use cursor keys to select task.



Enter=Continue  F10=Reboot IBM Network Station
```

Notes:

1. If you have not set a password in the IBM Network Station Manager program, users can access the configuration settings in the NS Boot utility.
2. If you have set a password, users without the password can only view the NS Boot utility, but you cannot make any configuration changes.

3. If you changed the administrator password by using IBM Network Station Manager program, you need to restart the Network Station. This enables the new administrator password at the system unit.

If you limit user access from the IBM Network Station Manager program, users may not see the menu shown above. They may see a menu that only displays boot log information and hardware information.

IBM Network Station NS Boot tasks

You can perform the following NS Boot tasks:

Changing the language setting of the NS Boot utility

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Change language setting**.
__ 3. Press **Enter**.
__ 4. Select your language.
__ 5. Press **Enter** to save your changes, and exit the menu.

Selecting a keyboard language

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Change keyboard setting**, and press **Enter**.
__ 3. Select your keyboard language.
__ 4. Press **Enter** to save your changes, and exit the menu.

Setting the display resolution

You can select a different display resolution for the operating system. In some instances, this can improve the display quality of the monitor. See "Monitor

specifications for the IBM Network Station Manager program" on page 121 for more information on resolution options.

Notes:

1. Selecting a resolution that is not supported by your monitor can permanently damage the monitor.
2. For the best video image, power on the monitor before you start the logic unit.

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Change display settings** and press **Enter**.
__ 3. Select **Color palette**.
__ 4. Choose your setting.
__ 5. Select **Resolution and frequency**.
__ 6. Choose your setting.
__ 7. Press **Enter** to begin a screen test.
   a. If the test screen displayed correctly, press **Enter** to save your settings.
   b. If the test screen did not display correctly, press **F12** to restore the previous settings.

Configuring an IBM Network Station to boot from Local (NVRAM) settings

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select the **Configure network settings** menu and press **Enter**.
__ 3. Configure the following NS Boot utility fields correctly for a successful NVRAM boot:
   __ a. Set **Local (NVRAM)** to `First` in the **Network priority** field. You can select a boot method priority (first, second, and third) for the Network Station to follow during startup.

      Note: You can only set one boot option to `First` at a time. Disable **DHCP** and **BOOTP** if you do not want them prioritized.

   __ b. Type the **IBM Network Station IP Address** in the appropriate field on menu 1 of 4.
   __ c. Type the **Gateway IP Address** in the appropriate field on menu 1 of 4.
   __ d. Type the **Subnet mask** in the appropriate field on menu 1 of 4.
   __ e. Type at least one **Boot file server IP address** in the appropriate fields on menu 2 of 4.

__ f. Refer to the following table when selecting the correct **Boot file server directory and file name** on menu 2 of 4:

For this platform:	Select this choice:
AS/400	`/QIBM/ProdData/NetworkStationV2/x86/kernel.2800`
Windows NT	`/NetworkStationV2/prodbase/x86/kernel.2800`
RS/6000	`/usr/NetworkStationV2/prodbase/x86/kernel.2800`

__ g. Verify your **Boot file server protocol** settings on menu 2 of 4, and press **Enter**.

__ h. If your configuration server is not the boot server, enter the **Workstation configuration server IP address** on menu 3 of 4, and perform the following two steps:

__ 1) Verify the **Workstation configuration server directory** for your configuration server on menu 3 of 4.

__ 2) Verify the **Workstation configuration server protocol** settings on menu 3 of 4.

__ i. Press **Enter** to advance to menu 4.

__ j. If your authentication server is not the boot server, enter the **Authentication server IP address** on menu 4.

__ k. Press **F3** to save your Local (NVRAM) configurations, and return to the **NS Boot Main Menu**.

Displaying hardware information

To display the hardware information for your Network Station, perform the following procedure:

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.

__ 2. Select **Display hardware information**, and press **Enter**.

Displaying the boot log

The boot log is a collection of all information and error messages that are generated by the NS Boot utility during the current Network Station startup sequence. Displaying the boot log allows you to identify and resolve configuration issues and network issues. To display the boot log, perform the following procedure:

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.

__ 2. Select **Display boot log**, and press **Enter**.

You can page through the boot log by pressing **Enter**.

Enabling verbose diagnostic messages

You can enable and disable the display of verbose diagnostic messages on your Network Station display. The default setting is **Disabled**. When the verbose diagnostic messages are disabled, an image representing the communication between the Network Station and a server displays during the Network Station startup sequence.

When you change the verbose diagnostic setting to **Enabled**, informational and error messages display during the Network Station startup sequence.

Note: The verbose diagnostic messages save to the boot log, regardless of the verbose diagnostic setting.

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Change verbose diagnostic setting**, and press **Enter**.
__ 3. Enable the verbose diagnostic mode.
__ 4. Press **Enter** to save your changes, and exit the menu.

Working with Service Aids

You can perform the following procedures from the **Service Aids** menu:

- "Changing the local MAC address".
- "Changing the fast boot setting" on page 50.
- "Changing the retry settings" on page 50.
- "Changing the NS Boot themes setting" on page 50.
- "Loading the factory defaults" on page 50.

Changing the local MAC address

You can configure this option from the **Service Aids** menu. To change the local MAC address, perform the following procedure:

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Service aids**, and press **Enter**.
__ 3. Select **Change local MAC address**, and press **Enter**.
__ 4. Under **Enable local MAC address**, select **Enabled**.
__ 5. Under **Local MAC address**, type the local MAC address in the form of `00:00:00:00:00:00`, and press **Enter**.

Changing the fast boot setting

You can configure this option from the **Service Aids** menu. To change the fast boot setting, perform the following procedure:

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Service aids**, and press **Enter**.
__ 3. Select **Change the fast boot setting**, and press **Enter**.
__ 4. Select **Enabled** or **Disabled**, and press **Enter**.

Changing the retry settings

You can configure this option from the **Service Aids** menu. To change the retry settings, perform the following procedure:

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Service aids**, and press **Enter**.
__ 3. Select **Change retry settings**, and press **Enter**.
__ 4. Configure the retry settings, and press **Enter** to save your changes.

Changing the NS Boot themes setting

You can configure this option from the **Service Aids** menu. To change the NS Boot theme settings, perform the following procedure:

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Service aids**, and press **Enter**.
__ 3. Select **Change NS Boot theme settings**, and press **Enter**.
__ 4. Select an NS Boot theme, and press **Enter** to save your changes.

Loading the factory defaults

__ 1. Enter the NS Boot utility by powering on the Network Station and pressing **Esc** during the startup sequence.
__ 2. Select **Service aids**.
__ 3. Press **Enter**.
__ 4. Select **Load factory defaults**, and press **Enter**.
This restarts the Network Station.

Chapter 9. Configuring the Network Station from the BIOS setup utility

The Network Station setup utility is the system administrator's tool for configuring the Basic Input and Output System (BIOS). The information in this chapter includes the following:

Setup utility overview

The administrator can use the setup utility to set the system date and time, change default power management settings, and much more. You can also use the setup utility to obtain information about the system, and its installed features.

You can only access the setup utility with the administrator password. The default password shipped with the system is **IBMNCD**. The administrator can change this password in the Network Station setup utility. Refer to "Changing the administrator password" on page 58 for the procedure.

Without the administrator password, it is only possible to see system summary data and product data. You cannot change the system BIOS without the administrator password.

When you make configuration changes to the system, you will see arrows on the setup utility screens, indicating the locations of the changes.

Entering the setup utility

To set the system date and time, change default power management settings, or perform other configuration procedures, you must perform the following procedure:

1. Power up the Network Station.
2. Press the F1 key during the IBM Network Station's logo display, and after the keyboard LEDs flash.

Note: Pressing F1 during the system's keyboard test causes a **false** 301 Keyboard Error to display, and a prompt for the administrator password to appear.

3. Type the administrator password.

Note: If you want to enter the setup utility and do not know the password, perform the procedure, "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24.

After the system has validated the administrator password, the main setup utility screen will appear (see Figure 4 below). You can make changes to the Network Station's system defaults at this time.

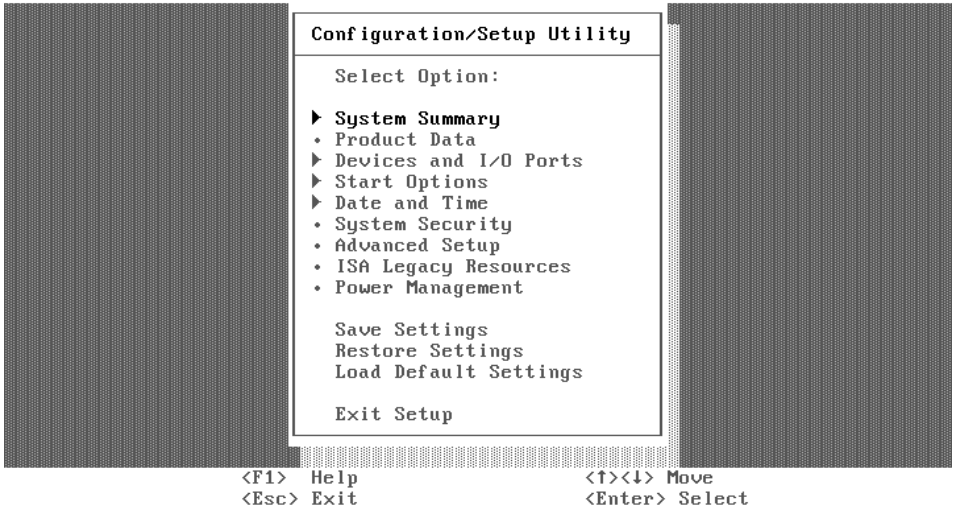


Figure 4. Configuration/setup utility screen

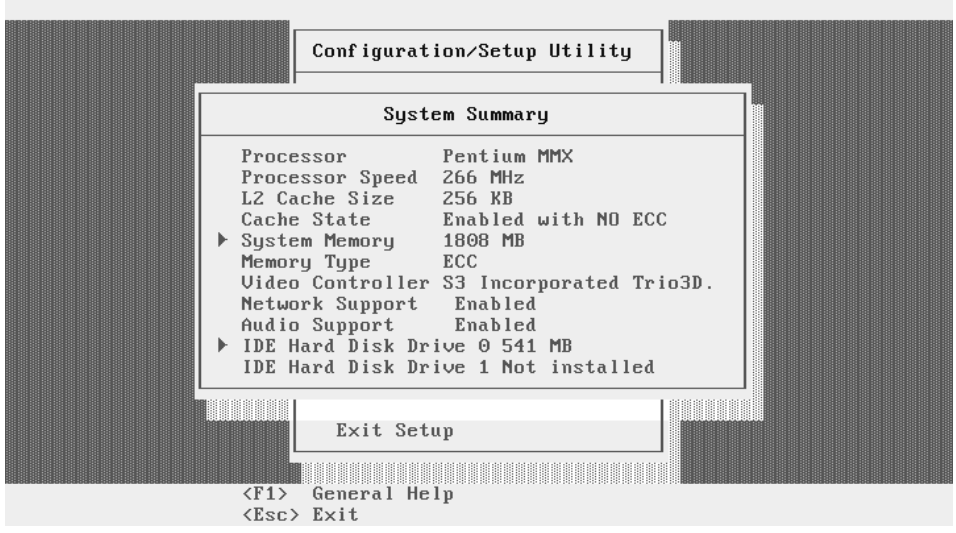
To see the primary setup utility screens, and some basic configuration procedures, refer to "Primary setup utility screens".

Primary setup utility screens

Note: Setup screen references may be different depending on the Network Station hardware, and date of manufacture.

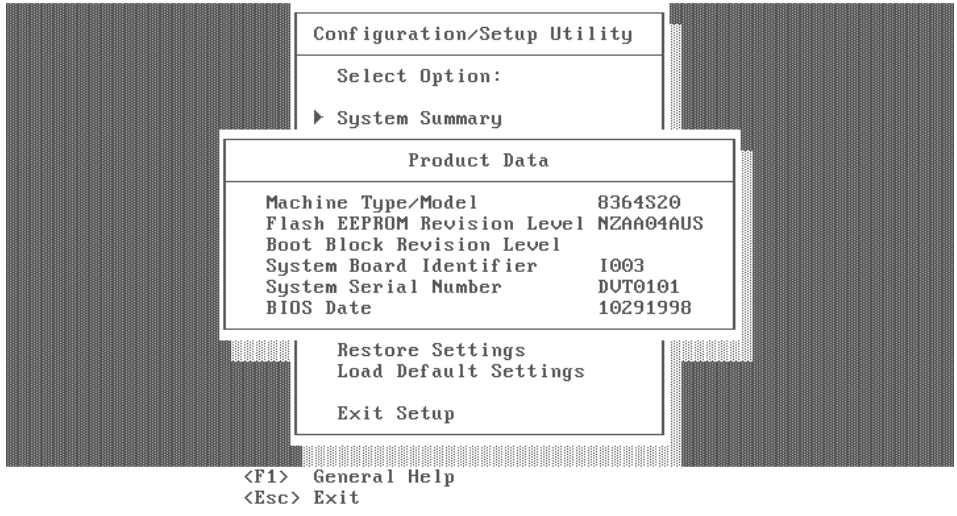
System summary

When you select the **System Summary** option from the **Configuration/Setup Utility** menu, a screen similar to the following appears:



Product data

When selected, this screen displays the machine type, model number, serial number, BIOS date, and BIOS revision level. The BIOS revision level indicates the read-only memory (ROM) level of the Network Station, and the last two entries in the revision level indicate the language. The boot block revision level and the system board identifier indicate the level of the boot block and logic board, respectively.



Determining the BIOS revision level

It may be necessary for the system administrator to determine the current BIOS level of Network Station hardware, when helping customers diagnose Network Station problems. Refer to the following procedure to determine the Network Station's BIOS level:

1. Power up the system.
2. After the IBM logo appears on the monitor, and the keyboard LEDs have flashed, press the F1 key to enter the setup utility.

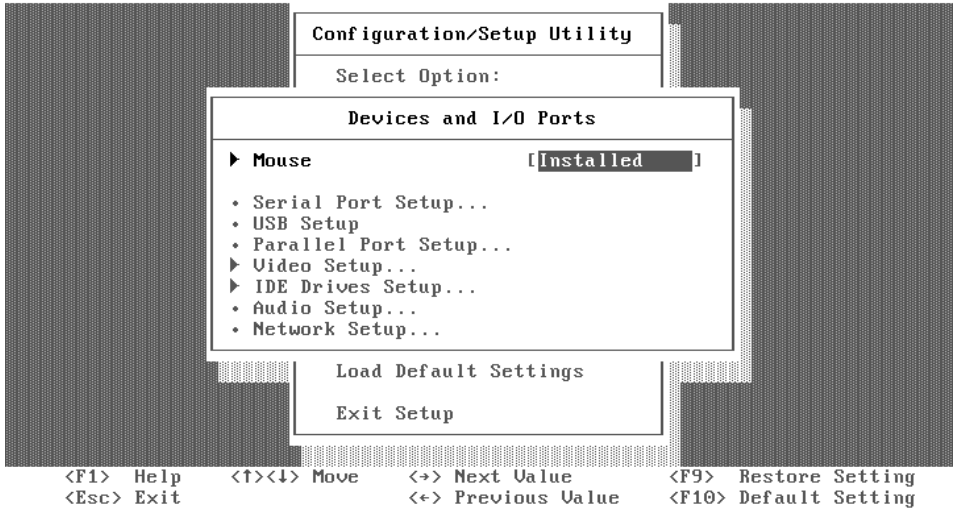
   Note: Pressing F1 during the system's keyboard test causes a **false** 301 Keyboard Error to display, and a prompt for the administrator password to appear.
3. Type the administrator password to enter the setup utility.

   Note: If you do not know the administrator password, press the ENTER key.
4. Once you have entered the setup utility, select the Product data menu.
5. The value listed in the Flash EEPROM revision-level field is the current BIOS level.

Devices and I/O ports

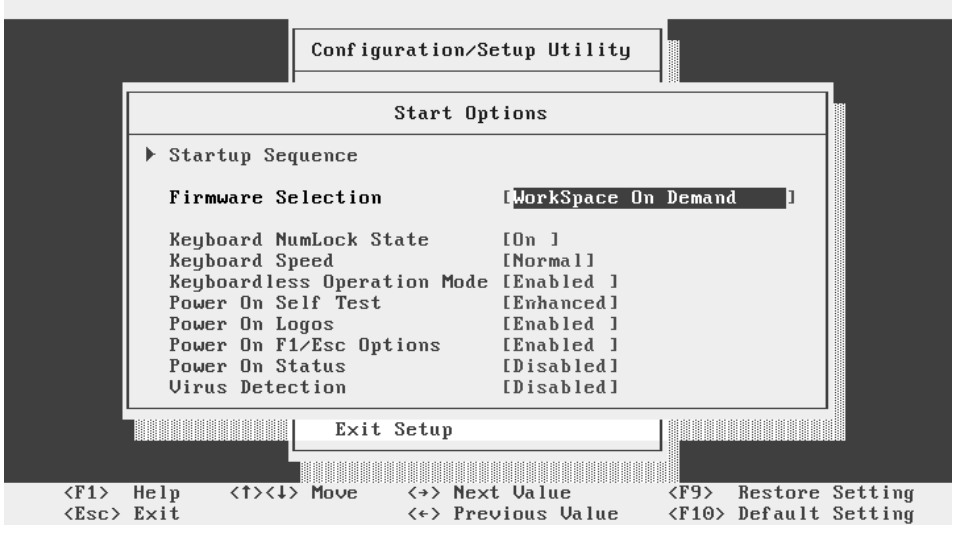
When selected, this screen allows the administrator to configure devices connected to the Network Station. Network Station serial and parallel port addresses, IRQ levels, setup, and support are accessible from this screen. The administrator is able to see the types and sizes of devices installed on the system. The Network Station boot protocols, message authentication code (MAC) address, and network setup are also accessible from this screen.

Note: The Network Station's boot protocol default configuration is RPL.



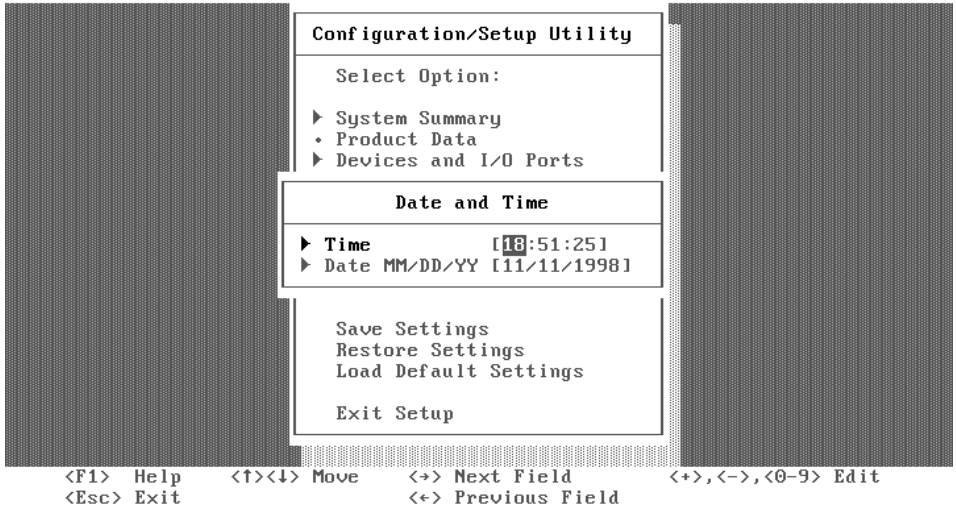
Start options

When selected, this screen allows the administrator to configure the Network Station startup sequence. The Network Station will always start from the network first. The ″Primary Start-up Sequence″ is used when the system is powered on. The ″Start-up Sequence″ is used when the system is powered on automatically through the ″Advanced Power Management″ menus. Enabling ″Power On Status″ displays the diagnostic checkpoints during the power on self test (POST). Refer to “Diagnostic checkpoints” on page 100 for a table of the diagnostic checkpoints.



Date and time

When selected, this screen allows the administrator to view or change the system date and time. See “Setting the date and time” for instructions.
Note: The operating system updates the Network Station system time, when the system is booted from the Server. The operating system will **not** synchronize date with the server.



Setting the date and time

You may need to change the date and time on the Network Station after replacing the lithium battery (see “Exchanging the lithium battery” on page 20). You can update the date and time through the Network Station BIOS. Follow the procedure below to change the date and time on the Network Station.

Setting the date and time:

1. Power up the system.
2. Press the F1 key during the IBM Network Station’s logo displays, and after the keyboard LEDs have flashed.

   Note: Pressing F1 during the system’s keyboard test causes a **false** 301 Keyboard Error to display, and a prompt for the administrator password to appear.
3. Type the administrator password when prompted.

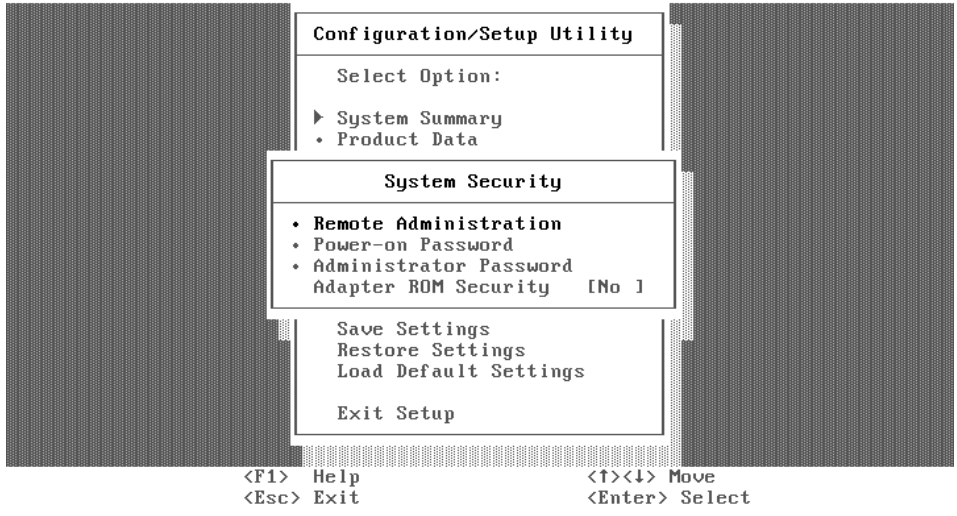
   Note: If you do not know the current administrator password, refer to “Clearing the administrator password and CMOS, creating a

recovery CompactFlash card, and reading a CompactFlash card" on page 24 for the procedure to reset the administrator password to the system default.

4. Press the Enter key.
5. Choose "Date and Time" from the main utility screen.
6. Enter the correct date and time in the space that is provided.
7. Exit the setup utility.

System security

When selected, this screen offers the administrator the options of remote administration, power-on passwords, and changing the administrator password. The default Network Station administrator password is **IBMNCD**. Refer to "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24, and "Changing the administrator password" for related procedures. There is also an option to enable "Adapter ROM Security." This disables the keyboard during adapter ROM initialization, and will not allow users to enter adapter configuration tools.



Changing the administrator password

Note: This procedure explains how to change the administrator password from the system default, or other value, which the system administrator has determined. Refer to "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24 for information on returning the administrator password's value to the system default.

The system administrator may choose to change the administrator password on the Network Station for security reasons. Follow the procedure below to change the administrator password.

1. Power on the system.
2. Press the F1 key during the IBM Network Station logo display, and after the keyboard LEDs have flashed.

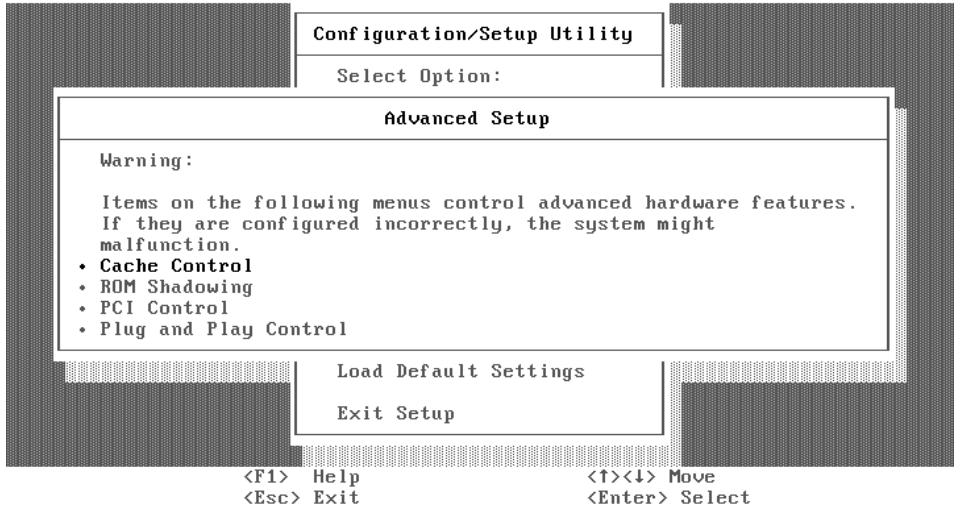
   Note: Pressing F1 during the system's keyboard test causes a **false** 301 Keyboard Error to display, and a prompt for the administrator password to appear.
3. Type the current administrator password when prompted.

   Note: If you do not know the current administrator password, refer to "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24 for the procedure to reset the administrator password to the system default.
4. Press the Enter key.
5. Choose "System Security" from the main setup utility screen.
6. Choose "Administrator Password" from the "System Security" screen.
7. Enter the new administrator password in the space that is provided.
8. Enter the new administrator password a second time in the space that is provided.
9. Choose "Change Administrator Password" from the "Administrator Password" screen.
10. Exit the setup utility.

Advanced setup

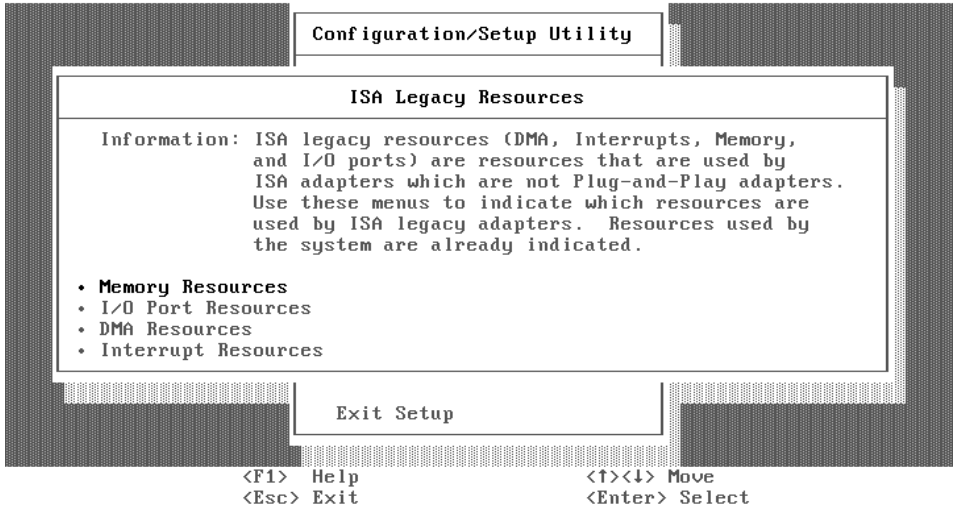
Note: If these features are configured improperly, the Network Station system may not work properly. See “Load default settings” on page 63 for information on correcting configuration errors.

When selected, this screen allows the system administrator to perform more advanced configuration tasks, such as enabling or disabling the cache, ROM shadowing, and PCI control.



ISA legacy resources

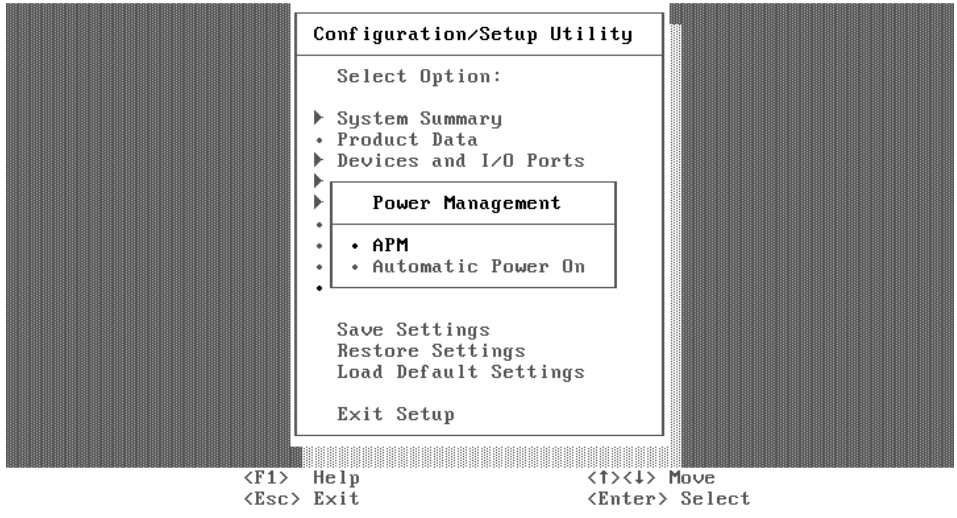
If selected, this screen will display the memory resource used by the system for planar devices, and other resource information, including I/O Port Resources, DMA resources, and interrupt resources used by the system for on board devices.
Note: If these features are configured improperly, the Network Station system may not work properly. See "Load default settings" on page 63 for information on correcting configuration errors.



Power management

This screen allows the administrator to choose which power management features the system will utilize. The administrator can disable power management or change automatic power-on features. The administrator can also set the delay time the Network Station will experience before the system will enter a low power state. See “System-low-power states” on page 35, and “Monitor low-power states” on page 35, for more information on the power management modes.

The administrator has the ability to choose what events can wake the system from a low power state from this screen, as well. The administrator can enable or disable Wake-On-LAN, modem ring, and set an alarm to wake the system, or enable and disable PCI Wake events from this screen as well. See “Wake on LAN” on page 34, and “Power management” on page 34 for related information.

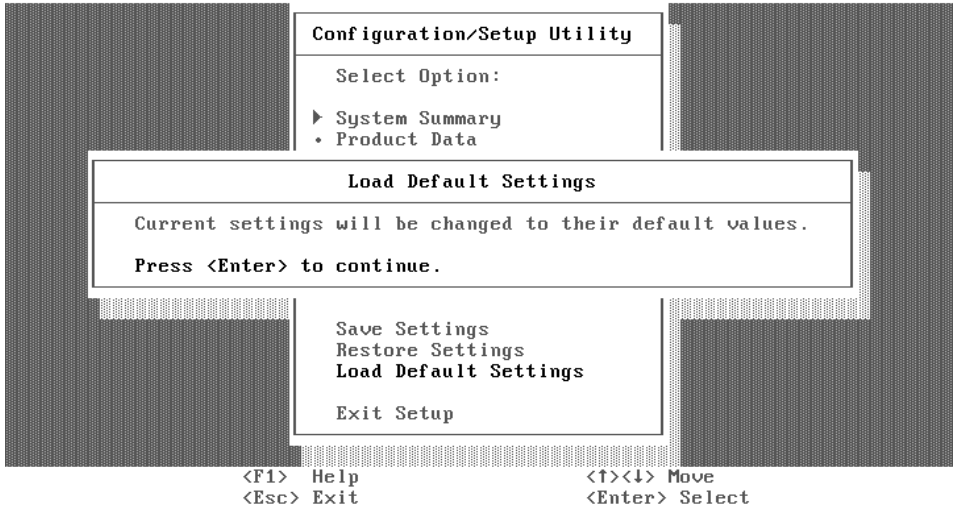


Load default settings

This option allows you to reset the setup utility configurations back to the system default values. This is useful when trying to diagnose configuration errors (see “Configuration errors” on page 105) in the system. Loading defaults will reset the administrator password to the default value (**IBMNCD**), and will also reset all customized settings to their default values. Refer to “Changing the administrator password” on page 58 to reconfigure the administrator password.

Note:

- If you load defaults from the setup utility and then power off, you will see the auto-configuration menu.
- If you load defaults from the setup utility and then save and exit, the Network Station will reboot and come up in the setup utility; and if it boots, it will stay in the setup utility after power off.



Part 4. Resolving problems with hardware that is configured for IBM Network Station Manager

Chapter 10. Startup sequence of Network Stations configured for the IBM Network Station Manager program

This is the detailed startup sequence of events for Network Station hardware that you have configured using the NS Boot utility. This startup sequence assumes that you have already selected the NS Boot utility for the IBM Network Station Manager operating system. If you have selected the BIOS for WorkSpace On-Demand configuration option for your Network Station, refer to the "Chapter 12. Startup sequence of Network Stations configured for WorkSpace On-Demand" on page 91. If you have not selected the Network Station firmware support yet, see "Chapter 7. Selecting a setup utility" on page 39.

1. Power on all of the devices that are attached to the Network Station, including the monitor, communication hubs, and printers.
2. Verify that the Network Station power cable is plugged into a working properly grounded electrical outlet, the voltage switch that is located on the bottom of the Network Station is set to the correct voltage for your location (see "Selecting the voltage for your location" on page 21), and that the power supply switch, located at the back of the Network Station, is in the **on** position (1).
3. Press the white power switch on the front of the Network Station.

   The system LED quickly flashes amber, and then remains steady green.
4. The installed Network Station system memory is detected and enabled.
5. The L1 cache is enabled and tested.
6. The L2 cache is enabled and tested.
7. The video initializes.

   If you have already selected the **NS Boot for Network Station Manager** option from the **Change Firmware Support** menu, skip to step 9 on page 68. If you have not yet selected the Network Station firmware support, continue with the following:
8. The **Change Firmware Support** menu displays on the screen.

   Note: This step only occurs in the following situations:
   - The initial startup of the Network Station hardware, after you install the hardware for the first time.
   - The initial startup of the Network Station hardware, after you reset the firmware configuration.

*The remaining steps in the Network Station startup sequence are true if you select***NS Boot for Network Station Manager** *from the* **Change Firmware Support** *menu.*

If you have selected the **BIOS for WorkSpace On Demand** *configuration option for your Network Station, refer to the "Chapter 12. Startup sequence of Network Stations configured for WorkSpace On-Demand" on page 91. See "Part 3. Configuring the Network Station" on page 37 for the procedure to return to the* **Change Firmware Support** *menu from the* **BIOS for WorkSpace On Demand** *configuration option.*

9. The IBM Network Station title, IBM copyright notice, and IBM logo display on the screen.
10. The keyboard controller initializes, and the keyboard LEDs flash.
11. The NS Boot utility runs the network initialization code.
12. The Network Station contacts the server.
13. The operating system kernel initializes.
14. The **IBM Network Station Manager Login** screen displays.

Chapter 11. Identifying problems with hardware that is configured for NS Boot

This chapter contains the procedures for identifying hardware problems that can occur to Network Station hardware that you have configured from the NS Boot utility. To learn more about selecting a setup utility for Network Station hardware, refer to “Part 3. Configuring the Network Station” on page 37. Continue with “Starting point for all problems” to identify Network Station hardware problems.

Note: For the Network Station hardware to function properly when connected to a network server, ensure that you have performed the following tasks before continuing with the “Starting point for all problems”:

- Install and configure the appropriate server software on the network server (go to `http://www.ibm.com/nc` for the latest installation information).
- Configure the Network Station hardware for the network server software (see “Part 3. Configuring the Network Station” on page 37).

You can obtain additional service support information on the World Wide Web at the following URL:

`http://www.ibm.com/nc`

In the left frame, click **Support**.

Starting point for all problems

Network Station hardware reports hardware problems and configuration errors when detected. The Network Station indicates problems in the following ways:

- System LED indications.
- Audio beep sequences.
- Error codes and text messages.

LED indications and audio beep sequences generally occur before the IBM Network Station logo displays. Error messages only appear on the monitor after the IBM Network Station logo displays. It is important that you record any system LED indications, audio beep sequences, error codes, or text messages that occur when you experience a problem.

Use the following procedures to identify any problems with Network Station hardware that you are experiencing.

__ 1. Did you set the Network Station voltage selector switch that is located on the bottom of the Network Station) to the correct voltage for your location?

Note: All Network Station hardware ships with the voltage selector switch preset to 230V.

Yes **No**

↓

- If you set the voltage selector switch to the 115V value in a 230V location, and power on the Network Station, the power supply can be damaged, and may need to be replaced. The power supply is a part of the complete logic unit assembly. Customers should replace the logic unit when directed to replace the power supply.

  For on-site service technicians, there is an option to order and replace the power supply only. See "Chapter 2. Replacing Network Station parts" on page 9 to order a replacement power supply, and then perform the procedure, "Replacing the power supply" on page 22.
- If you set the voltage selector switch to the 230V value in a 115V location, and power on the Network Station, the hardware may power on normally, but not function properly. Power off the Network Station, and perform the procedure, "Selecting the voltage for your location" on page 21.

__ 2. Did you connect all cables to the Network Station properly?

Yes **No**

↓

a. Tighten all system cable connections. See "Hardware layout" on page 4 for the location of each Network Station port and connector.
b. Verify that you have plugged the Network Station power cable into a properly grounded working outlet, and that you connected the power cable to the Network Station securely.

__ 3. Does the Network Station system LED quickly flash from amber to green when you power on the Network Station?

Note: Ensure that you move the power supply switch, located at the back of the Network Station, to the **on** position (1). If the system LED flashes amber once, and then does not perform any more indications, press the white power switch on the front of the

Network Station to begin the startup sequence. Refer to the "Chapter 10. Startup sequence of Network Stations configured for the IBM Network Station Manager program" on page 67 for a detailed explanation of the Network Station startup sequence.

Yes **No**

↓ See "Indicators of Network Station problems" on page 73.

__ 4. Is there a steady green indication from the system LED during the Network Station startup sequence? See "Hardware layout" on page 4 for the location of the system LED.

Yes **No**

↓ See "Indicators of Network Station problems" on page 73 for detailed information regarding system LED indications.

__ 5. Does **IBM Network Station** display on the monitor?

Yes **No**

↓

One of the following may be true:

a. Verify that the monitor is on, and tighten the monitor cable connections.
b. The Network Station has failed a self-test during the startup sequence. LED indications or beep sequences occur when this is true. Refer to "Indicators of Network Station problems" on page 73 for detailed information about Network Station problem indicators.
c. You have not configured the Network Station for the server operating system. The **Change Firmware Support** menu displays when this is true. See "Part 3. Configuring the Network Station" on page 37.
d. The monitor attached to the Network Station may not be working properly. Consider swapping the monitor with one that you know works properly.
e. The Network Station logic unit may be defective. Consider replacing the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9 for more information).

__ 6. Do any error codes or text messages display on the monitor?

Note: Error messages do not display before **IBM Network Station** displays on the monitor.

No **Yes**

↓ See "NS Boot error codes and text messages" on page 76.

__ 7. Does the Network Station contact the server and begin to download the kernel?

Notes:

a. Informational messages display on the screen when you enable verbose diagnostic mode.

b. Network Station images and network server images display on the monitor during the startup sequence when you disable the verbose diagnostic mode (default setting). A solid line connects the two images on the screen when the Network Station has contacted the network server. When the Network Station begins to download the kernel from the server, a dashed line connects the two images on the screen.

c. You can also view the boot log in the NS Boot utility for a history of the Network Station startup sequence.

Yes **No**

↓

a. Ensure that the network cable is not defective, and that you properly connected it to the Network Station.

b. Verify your network settings in the NS Boot utility.

c. Verify that you have configured the server correctly, and that there are no problems with the network.

__ 8. Does the **IBM Network Station Manager Login** window display on the monitor?

Yes **No**

↓

a. Verify your display settings in the NS Boot utility (see "Setting the display resolution" on page 46).

If the Network Station downloads the operating system from the server and displays a login window on the monitor, the Network Station hardware is functioning properly. If you encounter problems past this point, verify that you have configured the server correctly.

Indicators of Network Station problems

The Network Station indicates problems in the following ways:

- System LED indications.
- Audio beep sequences.
- Error codes and text messages.

LED indications and audio beep sequences generally occur before the IBM Network Station logo displays. Error messages only appear on the monitor after the IBM Network Station logo displays.

To determine the cause of a Network Station problem indicator, follow these steps:

__ 1. Record any problem indicators, such as LED indications, audio beep sequences, or error codes or messages, and a description of the problem.

__ 2. Locate the symptoms of the problem in one of the following tables, and follow the instructions that are provided:
   - Refer to Table 5 on page 73 for any LED indications, or audio beep sequences that you experience.
   - Refer to "NS Boot error codes and text messages" on page 76 for any error codes and text messages that you receive.

__ 3. To replace a defective Network Station part, see "Chapter 2. Replacing Network Station parts" on page 9 for related procedures.

__ 4. To perform exchanges of Network Station parts, or perform hardware upgrades, refer to "Chapter 4. Performing hardware procedures" on page 17.

The following table offers suggestions for some common Network Station problems.

Table 5. Problem indicators

Audio beep sequences	
If your Network Station is not functioning properly and it is emitting audio beep sequences, an error has occurred. Beep sequences can include short beeps, long beeps, and brief silent periods. Perform the steps below to ensure that any beep sequences are not being caused by an easily avoidable problem.	
Symptom	*What you should do*

Table 5. Problem indicators (continued)

You hear a beep sequence.	• Refer to the beep sequences listed in "NS Boot audio beep sequences" on page 75. If you do not find the beep sequences in the table, continue with the following options. • Ensure that all Dual Inline Memory Modules (DIMMs) are firmly seated in their sockets inside the logic unit. • Ensure that you connected the network cable to the Network Station network connector. • Ensure that all device connectors, such as the mouse and keyboard, are in the correct ports (see "Hardware layout" on page 4). • Ensure that you tightened the monitor connection, and that you properly seated the keyboard and mouse cable connections. • Ensure that you connected all device power cables to properly grounded working electrical outlets. • Reset the power to both the monitor, and the Network Station. • If the problem continues, swap the Network Station with one that you know works, or replace the Network Station logic unit (see "Servicing the Network Station" on page 9).

System LED indications

If your Network Station is not functioning properly and the system LED indicates anything other than a steady green color, an error has occurred. The system LED can indicate hardware problems in the following ways:

- A steady green indication.
- A flashing green indication.
- A steady amber indication.
- A flashing amber indication.

The system LED can also indicate a hardware problem by failing to function.
Note: The Network Station system LED quickly flashes from amber to green during a normal startup sequence.

Perform the steps below to ensure that any LED indications are not being caused by an easily avoidable problem.

Symptom	*What you should do*

Table 5. Problem indicators (continued)

There is no system LED indication.	Verify that the Network Station power cable is plugged into a properly grounded working outlet, and that the power supply switch that is located at the back of the Network Station is in the **on** position (1). If there is still no system LED indication, the Network Station power cable or power supply may be defective. Try swapping power cables, or replace the logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).
The system LED indicates amber, or flashing amber.	• Reset the power to the Network Station by pressing the white power switch. • If the symptom remains, power off the Network Station, perform the procedure "Removing the logic unit to install parts" on page 18, and ensure that the jumpers are in configuration **1** for normal operation of the Network Station (see "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24 for jumper locations). • If the symptom remains, replace the logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).

NS Boot audio beep sequences

The following table defines the possible NS Boot audio beep sequences that can occur during the startup sequence of the Network Station hardware. Network Station hardware that is configured within the NS Boot utility utilizes both audio and visual alerts when reporting hardware errors. The Network Station can emit audio beep sequences at any point prior to video initialization, in the event of a configuration error or hardware problem. After the video port initializes in the Network Station startup sequence, error codes and text messages appear on the screen, and the Network Station does not emit audio beep sequences. See "NS Boot error messages" on page 78 for more information about error codes and text messages that you can receive from Network Station hardware that you have configured from the NS Boot utility.

The following table includes the beep sequences that occur when some problems exist:

Notes:

1. These beep sequences are represented in a numeric format which indicates the sequence of the audio output.
2. No beep sequences occur after the video output becomes active.

Table 6. NS Boot audio beep sequences

Beep sequence	LED status	Problem location: Problem resolution
1-3-1	Flashing amber	Memory error: Check or replace memory (see "Exchanging the memory" on page 20).
2-3-2	Flashing amber	Video memory error: Replace the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).

NS Boot error codes and text messages

The following table defines the possible error messages that can occur during the startup sequence of Network Station hardware that has been configured from the NS Boot utility. These errors appear on the screen during the startup sequence. Improper configurations in the setup utility cause these errors. For more information about setting configurations in the NS Boot utility, see "Chapter 8. Configuring the Network Station from the NS Boot utility" on page 43.

NS Boot error messages include a prefix and a five-digit numeric code. The prefix for NS Boot error messages is `NSB`. The numeric code that follows the prefix indicates the group, sub group, message number, and message origin. For example, NS Boot error message `NSB12530` indicates an NS Boot error message from group 1, sub group 2, message number 53, and a message origin of 0.

Group

NS Boot messages can be in the following groups:

- Group 0 indicates general messages.
- Group 1 indicates memory-related messages.
- Group 2 indicates multimedia messages.
- Group 3 indicates input device messages.
- Group 4 indicates USB device messages.
- Group 5 indicates storage messages.
- Group 6 indicates local area network (LAN) messages.
- Group 7 indicates network priority messages.
- Group 8 indicates network communication messages.

Sub group

NS Boot messages are classified by the following subgroups:

- Group 1 includes the following subgroups:
  - Common memory messages (sub group 0).
  - DIMM memory messages (sub group 1).
  - Local (NVRAM) memory messages (sub group 2).
- Group 2 includes the following subgroups:
  - Common multimedia messages (sub group 0).
  - Audio messages (sub group 1).
  - Video messages (sub group 2).
- Group 3 includes the following subgroups:
  - Common input device messages (sub group 0).
  - Keyboard messages (sub group 1).
  - Mouse messages (sub group 2).
- Group 4 includes common USB device messages (sub group 0).
- Group 5 includes the following subgroups:
  - Common storage messages (sub group 0).
  - CompactFlash card messages (sub group 1).
- Group 6 includes the following subgroups:
  - Common LAN messages (sub group 0).
  - Token-ring messages (sub group 1).
  - Ethernet messages (sub group 2).
- Group 7 includes the following subgroups:
  - Common network priority messages (sub group 0).
  - DHCP messages (sub group 1).
  - BOOTP messages (sub group 2).
  - Local NVRAM) messages (sub group 3).
- Group 8 includes the following subgroups:
  - Common network communication messages (sub group 0).
  - Trivial File Transfer Protocol (TFTP) messages (sub group 1).
  - NFS messages (sub group 2).
  - Boot file server messages (sub group 3).
  - Gateway messages (sub group 4).
  - Network Station IP address messages (sub group 5).
  - Subnet mask messages (sub group 6).
  - Internet Protocol (IP) address messages (sub group 7).

Remote packet messages (sub group 8).

Message number

Message numbers indicate the type of NS Boot message. For example, NS Boot messages NSBXX00X to NSBXX49X are informational NS Boot messages. NS Boot messages NSBXX50X to NSBXX99X are NS Boot warning and error messages.

Origin

A message origin can be 0, 5, or 9. The NS Boot message NSBXXXX0 indicates a high probability of a Network Station problem. The NS Boot message NSBXXXX5 a high probability of a network server problem. The NS Boot message NSBXXXX9 indicates that the problem can be either client or server related.

To solve configuration errors, enter the NS Boot utility and reset all configuration options to default values (see "Loading the factory defaults" on page 50). To resolve hardware-related problems, refer to "Chapter 2. Replacing Network Station parts" on page 9.

NS Boot error messages

Error code	Error message	What you should do
General messages (NSB0xxxx)		
NSB00030	Canceled by user.	Press any key to enter the NS Boot utility.
Battery messages (NSB01xxx)		
NSB01500	Battery dead.	Replace the lithium battery (see "Exchanging the lithium battery" on page 20).
Main memory messages (NSB10xxx)		
NSB11500	On board memory failure.	Ensure that the memory is installed properly, or replace memory (see "Exchanging the memory" on page 20).
NSB11510	Slot %d memory failure.	Ensure that the memory is installed properly, or replace the memory (see "Exchanging the memory" on page 20).
Non-volatile memory messages (NVRAM) (NSB11xxx)		
NSB12500	Checksum failure for nonvolatile memory.	Re-enter NS Boot configuration data, if different from the default values.

Error code	Error message	What you should do
NSB12510	Not able to access nonvolatile memory.	Replace the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB12520	Setting nonvolatile memory to manufacturing defaults.	Re-enter NS Boot configuration data, if different from the default values.
NSB12530	Detected reset jumper.	The password has been cleared,.
NSB12540	New nonvolatile memory structure detected.	Re-enter NS Boot configuration data, if different from the default values.
Audio messages (NSB21xxx)		
NSB21500	Audio failure.	Replace the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).
Input, keyboard and mouse messages (NSB3xxxx, NSB31xxx, and NSB32xxx)		
NSB30500	No input device detected. NS Boot will continue in 10 seconds.	Check the keyboard and mouse cable connections.
NSB31500	Keyboard did not respond.	Check the keyboard cable connection.
NSB31510	Keyboard controller did not respond.	Check the keyboard and mouse cable connections. If the symptom remains, replace the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB31520	Keyboard was not recognized.	Check the keyboard cable connection.
NSB32500	Mouse did not respond.	Check the mouse cable connection.
USB messages (NSB4xxxx)		
NSB40500	USB failure.	Disconnect any USB devices from the Network Station and restart the system. If the symptom remains, replace the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB40510	USB initialization failure.	Disconnect any USB devices from the Network Station and restart the system. If the symptom remains, replace the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).

Error code	Error message	What you should do
CompactFlash card messages (NSB51xxx)		
NSB51500	File not found on flash card.	Check the contents of the CompactFlash card.
NSB51510	Cannot close file on flash card.	Check the contents of the CompactFlash card.
Token Ring messages (NSB61xxx)		
NSB61500	Token Ring PCI device not detected.	Restart the Network Station. If the symptom remains, replace the Network Station logic unit, or the PCI Token-ring card.
NSB61510	Token Ring PCI device soft reset failed.	Restart the Network Station. If the symptom remains, replace the Network Station logic unit, or the PCI Token-ring card.
NSB61520	Token Ring PCI device initialization timed out.	Restart the Network Station. If the symptom remains, take any actions recommended by the text messages that accompany this message. If you still cannot resolve the problem, replace the Network Station logic unit, or the PCI Token-ring card.
NSB61530	Token Ring PCI device initialization not complete.	
NSB61569	Token Ring open command canceled due to failure.	Adapter failed to insert into ring. Perform any actions recommended by the messages that accompany this error.
NSB61610	Token Ring flash contents not valid.	EEPROM microcode corruption. Replace the Network Station logic unit (see “Chapter 2. Replacing Network Station parts” on page 9).
NSB61620	Token Ring flash contents not valid.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61639	Token Ring error in loop back test phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61639	Token Ring error in ring insertion phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.

Error code	Error message	What you should do
NSB61649	Token Ring error in address verification phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61659	Token Ring error in neighbor notification phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61669	Token Ring error in request parameters phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61679	Source address received is not equal to neighbor source address.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see “Chapter 2. Replacing Network Station parts” on page 9).
NSB61689	Claim token received.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see “Chapter 2. Replacing Network Station parts” on page 9).
NSB61699	Ring purged token received .	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see “Chapter 2. Replacing Network Station parts” on page 9).
NSB61709	Standby monitory frame received.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see “Chapter 2. Replacing Network Station parts” on page 9).
NSB61719	Full duplex insert denied.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see “Chapter 2. Replacing Network Station parts” on page 9).

Error code	Error message	What you should do
NSB61729	Full duplex heartbeat received too early.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB61739	Beacon received before open completed.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB61740	Insertion timer expired.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB61750	Loop back test failed.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB61760	Heartbeat failed.	Full duplex error. Contact the system administrator regarding network problems, or, switch to half duplex. If this does not resolve the problem, replace the Network Station logic unit it (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB61770	Unexpected Token Ring interrupt.	Stray error. If the Network Station does not automatically restart, restart the Network Station.
NSB61809	Token Ring error in full duplex request phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61819	Token Ring error in full duplex loop back phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.

Error code	Error message	What you should do
NSB61829	Token Ring error in full duplex duplicate address phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61839	Token Ring error in station query phase.	Indicates stage of Token-ring adapter insertion. Watch for any messages that accompany this message.
NSB61840	Error - open function failure.	Adapter failure. Replace the Network Station logic unit, or the PCI Token Ring card (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB61850	Error - signal loss.	Verify network connection.
NSB61860	Error - wire fault.	Verify network connection.
NSB61870	Error - ring speed mismatch.	Manually set the ring speed in the Local (NVRAM) settings of the NS Boot utility, or in the IBM Network Station Manager program.
NSB61880	Error - time-out.	Adapter failure. Replace the Network Station logic unit, or the PCI Token Ring card (see "Chapter 2. Replacing Network Station parts" on page 9).
NSB61890	Error - ring failure.	Verify that there are no problems with the network, and restart the Network Station.
NSB61900	Error - ring beaconing.	Verify that there are no problems with the network, and restart the Network Station.
NSB61910	Error - duplicate MAC address.	Verify that the MAC address of the Network Station is correctly defined (see "Changing the local MAC address" on page 49).
NSB61930	Error - remove received.	Ensure that you are not blocked from entering the ring.
NSB61940	Error - no active network monitor.	Manually set the ring speed in the Local (NVRAM) settings of the NS Boot utility, or in the IBM Network Station Manager program.
NSB61950	Error - active network monitor contention.	Verify that there are no problems with the network, and restart the Network Station.

Error code	Error message	What you should do
NSB61960	Error - full duplex protocol error.	Manually set the ring speed in the Local (NVRAM) settings of the NS Boot utility, or in the IBM Network Station Manager program.
NSB61970	Unknown Token Ring error code.	Verify that there are no problems with the network, and restart the Network Station. If this does not resolve the problem, replace the Network Station logic unit, or PCI adapter card (see "Chapter 2. Replacing Network Station parts" on page 9).
Ethernet messages (NSB62xxx)		
NSB62500	Line speed automatic negotiation failed.	Verify that you connected the network cable to the Network Station correctly.
NSB62510	No network device found.	Replace the Network Station logic unit (see "Chapter 2. Replacing Network Station parts" on page 9).
Network priority messages (NSB7xxxx)		
NSB70500	DHCP, BOOTP, and Local (NVRAM) network priority not set.	Verify that at least one network priority is enabled in the NS Boot utility.
DHCP messages (NSB71xxx) Most errors associated with DHCP are server configuration errors, contact the system administrator and report your error		
NSB71509	DHCP option %d boot server name %s failed DNS.	Verify that the DHCP server settings are correct.
NSB71515	Missing DHCP option %d from server.	Verify that the DHCP server settings are correct.
NSB71525	Missing DHCP client IP address.	Verify that the DHCP server settings are correct.
NSB71535	Missing DHCP client directory and file name.	Verify that the DHCP server settings are correct.
NSB71545	DHCP OFFER XID different than DHCP DISCOVER XID.	Verify that the DHCP server settings are correct.
NSB71555	DHCP options exceed the maximum allowable DHCP option length.	Verify that the DHCP server settings are correct.

Error code	Error message	What you should do
NSB71605	DHCP offer from server %s not valid.	Verify that the DHCP server settings are correct.
BOOTP messages (NSB72xxx)		
NSB72505	BOOTP options exceed the maximum allowable BOOTP option length.	Verify that the BOOTP server settings are correct.
Network communication messages (NSB8xxxx)		
NSB80509	Destination unreachable, return code ˜%d.	Verify that there are no problems with the network, and restart the Network Station.
NSB80519	Failed ICMP mask request.	Verify that there are no problems with the network, and restart the Network Station.
NSB80529	Failed ICMP router solicitation.	Verify that there are no problems with the network, and restart the Network Station.
NSB80539	Domain Name Server (DNS) error, return code %d.	Verify that there are no problems with the network, and restart the Network Station.
NSB80549	Cannot fragment data packet, data not sent.	Verify that there are no problems with the network, and restart the Network Station.
NSB80550	Transfer terminated by user.	Restart the Network Station.
TFTP messages (NSB81xxx)		
NSB81509	Time-out waiting for TFTP reply.	Restart the Network Station. If this does not solve the problem, verify that you connected the network cable to the Network Station.
NSB81519	TFTP error - %d %s.	
Boot file server messages (NSB83xxx)		
NSB83509	Unable to load file via boot file server protocol.	Ensure that the boot protocol agrees with your server settings in the NS Boot utility.
NSB83519	Cannot access boot file from any server.	Verify your configuration settings in the NS Boot utility, and confirm the server configuration.
NSB83529	Cannot contact boot file server ˜%s.	Verify that the boot server settings are configured correctly.

Error code	Error message	What you should do
NSB83539	Cannot PING boot server ˜ %s.	Verify your configuration settings in the NS Boot utility, and confirm the server configuration.
NSB83549	Unable to open file.	Confirm the server configuration.
NSB83560	Boot file name or directory not valid.	Verify your configuration settings in the NS Boot utility, and confirm the server configuration.
NSB83579	Failed to boot after 1 attempt.	Verify your configuration settings in the NS Boot utility, and confirm the server configuration.
NSB83589	Failed to boot after %d attempts.	Verify your configuration settings in the NS Boot utility, and confirm the server configuration.
NSB83590	Unrecognized boot file server protocol.	Verify your configuration settings in the NS Boot utility.
NSB83600	Boot file server protocol not specified.	Verify your network configuration settings in the NS Boot utility.
NSB83619	Address resolution failed, boot file server ˜%s.	Verify your configuration settings in the NS Boot utility, and confirm the server configuration.
Gateway messages (NSB84xxx)		
NSB84509	Gateway address not valid.	Verify your network configuration settings in the NS Boot utility.
NSB84519	Address resolution failed, gateway ˜ %s.	Verify your network configuration settings in the NS Boot utility.
Client IP address messages (NSB85xxx)		
NSB85509	Duplicate IP address ˜ %s, that is owned by %s.	Verify your network configuration settings in the NS Boot utility, and the DHCP or BOOTP server configuration settings.
NSB85519	IBM Network Station IP address not valid.	Verify your network configuration settings in the NS Boot utility.
Subnet mask messages (NSB86xxx)		
NSB86509	Subnet mask not valid.	Verify your network configuration settings in the NS Boot utility.
IP address messages (NSB87xxx)		
NSB87509	Address resolution failed, IP address ˜ %s.	Verify your network configuration settings in the NS Boot utility.

Error code	Error message	What you should do
NSB87519	Address resolution failed. IP address ¯ %s not valid.	Verify your network configuration settings in the NS Boot utility.
NSB87529	IP address %s not in ARP cache.	Verify your network configuration settings in the NS Boot utility.
Remote packet messages (NSB88xxx)		
NSB88500	Stopping DLL packet replication.	Reload the factory default settings on the Network Station (see "Loading the factory defaults" on page 50), and then configure the network settings in the NS Boot utility.

Part 5. Resolving problems with hardware that is configured for WorkSpace On-Demand

Chapter 12. Startup sequence of Network Stations configured for WorkSpace On-Demand

This is a typical startup sequence of events for Network Station hardware that you have configured from the basic input and output system (BIOS) setup utility. This startup sequence assumes that you have already selected the BIOS setup utility for the WorkSpace On-Demand operating system. If you have selected the NS Boot for Network Station Manager configuration option for your Network Station, refer to the "Chapter 10. Startup sequence of Network Stations configured for the IBM Network Station Manager program" on page 67. If you have not selected the Network Station firmware support yet, see "Chapter 7. Selecting a setup utility" on page 39.

1. Power on all of the devices that are attached to the Network Station, including the monitor, communication hubs, and printers.
2. Verify that the Network Station power cable is plugged into a working properly grounded electrical outlet, the voltage switch that is located on the bottom of the Network Station is set to the correct voltage for your location (see "Selecting the voltage for your location" on page 21), and that the power supply switch, located at the back of the Network Station, is in the **on** position (1).
3. Press the white power switch on the front of the Network Station.

   The system LED quickly flashes amber, and then remains steady green.
4. The configuration of the installed memory begins.
5. The testing of the serial ports and parallel ports begins.
6. The testing of the Level 2 cache begins.
7. The Network Station verifies the real time clock and CMOS memory.
8. The video initializes.

   If you have already selected the **BIOS for WorkSpace On Demand** option from the **Change Firmware Support** menu, skip to step 10 on page 92. If you have not yet selected the Network Station firmware support, continue with the following:
9. The **Change Firmware Support** menu displays on the screen.

   Note: This step only occurs in the following situations:
   - The initial startup of the Network Station hardware.
   - The initial startup of the Network Station hardware, after you reset the firmware configuration.

The remaining steps in the Network Station startup sequence are true if you selected **BIOS for WorkSpace On Demand** *from the* **Change Firmware Support** *menu.*

If you have selected the **NS Boot for Network Station Manager** *configuration option for your Network Station, refer to the "Chapter 10. Startup sequence of Network Stations configured for the IBM Network Station Manager program" on page 67. See "Part 3. Configuring the Network Station" on page 37 for the procedure to return to the* **Change Firmware Support** *menu from the* **NS Boot for Network Station Manager** *configuration option.*

10. **IBM Network Station** appears on the screen.
11. The testing of the keyboard device begins.
12. The keyboard LEDs flash.
13. The Network Station runs the network initialization code.
14. The Network Station initializes the first device in the startup sequence.
15. The Network Station contacts the server.
16. The Network Station requests the code to download the operating system kernel from the server.
17. The operating system kernel initializes.
18. The WorkSpace On-Demand user login initializes and displays on the screen.

Chapter 13. Identifying problems with hardware that is configured for BIOS

This chapter contains the procedures for identifying hardware problems that can occur to Network Station hardware that you have configured from the BIOS setup utility. To learn more about selecting a setup utility for Network Station hardware, refer to "Part 3. Configuring the Network Station" on page 37. Continue with "Starting point for all problems" to identify Network Station hardware problems.

Starting point for all problems

Network Station hardware reports hardware problems and configuration errors when detected. Use the following procedures to isolate and identify any problems with Network Station hardware that you are experiencing.

Note: For the Network Station hardware to function properly when connected to a network server, ensure that you have performed the following tasks:

- Install and configure the appropriate server software on the network server (go to `http://www.ibm.com/nc` for the latest installation information).
- Configure the Network Station hardware for the network server software (see "Part 3. Configuring the Network Station" on page 37).

Record any displayed message numbers and message descriptions that pertain to the problem. Make sure that this information is readily available to help solve the problem.

Refer to "Hardware layout" on page 4 for diagrams of the Network Station hardware when asked to verify connections. It is also helpful to exchange questionable hardware with hardware that you know functions properly.

__ 1. Does the Network Station system LED quickly flash from amber to green when you power on the Network Station?

Note: Ensure that you flip the power supply switch, located at the back of the Network Station, to the **on** position (1). If the system LED flashes amber once but does not indicate green afterward, press the white power switch on the front of the Network Station to begin the startup sequence.

Yes **No**

↓ See "Isolating hardware problems" on page 95.

__ 2. Does **IBM Network Station** display on the monitor?

Yes **No**

↓ One or more of the following may be true:

a. Verify that the monitor is on, and tighten the monitor cable connections.

b. The Network Station may have failed a self-test during the startup sequence. Note any LED indications or beep sequences that occur, and refer to "Isolating hardware problems" on page 95.

c. You have not configured the Network Station for the server operating system yet. The **Change Firmware Support** menu displays when this is true. See "Part 3. Configuring the Network Station" on page 37.

d. The monitor attached to the Network Station is not working properly. Consider swapping the monitor with one that you know works properly.

e. Consider replacing the Network Station logic unit.

__ 3. Do any error codes and text messages display on the monitor?

Note: Error messages do not display before **IBM Network Station** displays on the monitor.

No **Yes**

↓ See "Configuration errors" on page 105.

__ 4. Does the Network Station make contact with the server and begin downloading the kernel?

Yes **No**

↓

a. Ensure that the network cable is not defective, and that you properly connected it to the Network Station.

b. Verify your configuration settings in the BIOS setup utility (see "Load default settings" on page 63 to reset the BIOS configuration to factory default values).

c. Verify that you have correctly configured the server, and that there are no problems with the network.

__ 5. Does a login screen display on the monitor?

Yes **No**

↓

a. Verify that you have correctly set your monitor resolution (see "Monitor specifications for WorkSpace On-Demand" on page 122).

If the Network Station downloads the operating system from the server and displays a login window on the monitor, the Network Station hardware is functioning properly, and has been configured correctly for the server. If you encounter problems past this point, verify that you have correctly configured the server.

Isolating hardware problems

This procedure helps you isolate Network Station hardware problems.

__ 1. Is the Network Station voltage selector switch (located on the bottom of the Network Station) set to the incorrect voltage for the customer's location?

Note: All Network Stations ship with 230V selected.

No **Yes**

↓

- If the voltage selector switch is incorrectly set to the 115V value in a 230V location, and the customer has tried to power on the Network Station, the power supply is damaged, and needs to be replaced. The power supply is a part of the complete logic unit assembly. Customers should replace the logic unit when they are directed to replace the power supply. For on-site service technicians, there is an option to order and replace the power supply. See "Chapter 2. Replacing Network Station parts" on page 9, and order a replacement power supply. Perform the procedure, "Replacing the power supply" on page 22.
- If the voltage selector switch is incorrectly set to the 230V value in a 115V location, and the customer has tried to power on the Network Station, the hardware may appear to power on normally, but not function properly. Instruct the customer to perform the procedure, "Selecting the voltage for your location" on page 21.

__ 2. Did the customer fail to connect any cables to the Network Station properly?

No **Yes**

↓ Instruct the customer to tighten all system cable connections. See “Hardware layout” on page 4 for the location of each Network Station port and connector.

__ 3. Is the power supply switch on the back of the Network Station in the **off** position (0)?

No **Yes**

↓ Move the power supply switch to the **on** position (1). If the Network Station still does not power on correctly, so that the system LED indication is steady green, you need to replace the power supply. The power supply is a part of the complete logic unit assembly, and customers should replace the logic unit. For on-site service technicians, there is an option to order and replace the power supply. See “Chapter 2. Replacing Network Station parts” on page 9, and order a replacement power supply. Perform the procedure, “Replacing the power supply” on page 22.

__ 4. Is the system LED indication green during the Network Station startup sequence? See “Hardware layout” on page 4 for the location of the system LED.

Yes **No**

↓ See “Indicators of Network Station problems” on page 73 for basic problem analysis steps regarding LED indications.

__ 5. Does the IBM Network Station logo fail to display on the monitor?

Note: If the **Display Logo** default has been disabled in the BIOS setup utility, the IBM Network Station logo will not appear. See “Load default settings” on page 63 for information about correcting configuration errors in the BIOS setup utility.

No **Yes**

↓

- Reset the power to the Network Station by rocking the power supply switch on the back of the Network Station to the **off** (0) and **on** (1) positions. Observe any system LED indications, and error codes to appear in the upper **right** corner of the screen. Refer to the “BIOS error messages” on page 103 for problem diagnosis.
- For any error codes in the upper **left** corner of the screen, refer to the “Configuration errors” on page 105.
- If the system LED indication is green, the screen is blank, and you do not hear any beep sequences:

a. Ensure that the monitor and monitor cable are working properly. Power off the Network Station and swap monitors and cables. Then restart the Network Station.
b. Ensure that you installed any Dual Inline Memory Modules (DIMMs) correctly, and that they are not defective. Power off the Network Station and swap memory DIMMs. Then restart the Network Station.
c. Ensure that the Network Station logic unit is not defective. If possible, power off the Network Station and exchange it with one that you know functions properly. Power on the Network Station and verify that the problem still exists. If the problem does not occur with the swapped Network Station, you need to replace the defective logic unit. See "Chapter 2. Replacing Network Station parts" on page 9 for information.

Indicators of Network Station problems

The Network Station indicates problems in the following ways:

- System LED indications.
- Error codes and text messages.
- Audio beep sequences.

LED indications and audio beep sequences generally occur before the IBM Network Station logo displays. Error messages only appear on the monitor after the IBM Network Station logo appears.

To determine the cause of a Network Station problem indicator, follow these steps:

__ 1. Record any problem indicators, such as LED indications, audio beep sequences, or error codes or messages, and a description of the problem.
__ 2. Locate the symptoms of the problem in one of the following tables, and follow the instructions that are provided:
   - "Indicators of Network Station problems" on page 97.
   - "Configuration errors" on page 105.
   - "Diagnostic error table" on page 101.
   - "BIOS error messages" on page 103.
__ 3. To replace a defective Network Station part, see "Chapter 2. Replacing Network Station parts" on page 9 for related procedures.

__ 4. To perform exchanges of Network Station parts, or perform hardware upgrades, refer to "Chapter 4. Performing hardware procedures" on page 17.

The following table offers suggestions for some common Network Station problems.

Table 7. Problem indicators

Audio beep sequences	
If your Network Station is not functioning properly and it is emitting audio beep sequences, an error has occurred. Beep sequences can include short beeps, long beeps, and brief silent periods. Perform the steps below to ensure that any beep sequences are not being caused by an easily avoidable problem.	
Symptom	*What you should do*
You hear a beep sequence.	• Refer to the beep sequences listed in "BIOS error messages" on page 103. If you do not find the beep sequences in the table, continue with the following options. • Ensure that all Dual Inline Memory Modules (DIMMs) are firmly seated in their sockets inside the logic unit. • Ensure that you connected the network cable to the Network Station network connector. • Ensure that all device connectors, such as the mouse and keyboard, are in the correct ports (see "Hardware layout" on page 4). • Ensure that you tightened the monitor connection, and that you properly seated the keyboard and mouse cable connections. • Ensure that you connected all device power cables to properly grounded working electrical outlets. • Reset the power to both the monitor, and the Network Station. • If the problem continues, swap the Network Station with one that you know works, or replace the Network Station logic unit (see "Servicing the Network Station" on page 9).
System LED indications	

Table 7. Problem indicators (continued)

If your Network Station is not functioning properly and the system LED indicates anything other than a steady green color, an error has occurred. The system LED can indicate hardware problems in the following ways:

- A steady green indication.
- A flashing green indication.
- A steady amber indication.
- A flashing amber indication.

The system LED can also indicate a hardware problem by failing to function.
Note: The Network Station system LED quickly flashes from amber to green during a normal startup sequence.

Perform the steps below to ensure that any LED indications are not being caused by an easily avoidable problem.

Symptom	*What you should do*
There is no system LED indication.	See "Isolating hardware problems" on page 95. If there still is no system LED indication, replace the logic unit (see "Servicing the Network Station" on page 9).
The system LED indicates amber, or flashing amber.	• Reset the power to the Network Station by pressing the white power switch. • If the system LED indicates amber, a serious error has occurred. See the "BIOS error messages" on page 103 for definitions of BIOS-related LED indications. • If the symptom remains, power off the Network Station, perform the procedure "Removing the logic unit to install parts" on page 18, and ensure that the jumpers are in configuration **1** for normal operation of the Network Station (see "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24 for jumper locations). • If the symptom remains, replace the logic unit (see "Servicing the Network Station" on page 9).

Error codes and text messages

If your Network Station is not functioning properly, and there is a code or text message on your screen, an error has occured. Error codes and text messages can appear in different areas on your screen, depending upon where the errors originate from. It is important that you record both the location and content of any errors that you receive. Try to determine the cause and solution of the problem from the description in the message text.

Symptom	*What you should do*

Table 7. Problem indicators (continued)

You receive an error code or text message on your screen.	• Record any error messages, audio beep sequence, or LED indications, and a description of the problem. • Perform any action or actions indicated within the error message. • Look for the error in the following sections: – "Diagnostic error table" on page 101. – "BIOS error messages" on page 103. – "Configuration errors" on page 105.

Diagnostic checkpoints

Service personnel use diagnostic checkpoints to determine where the system has stopped responding. You can activate these diagnostic checkpoints from the Basic Input Output System (BIOS) setup utility, or by pressing **Esc** (escape) during the system Power-On Self Test (POST). See "Start options" on page 56 for more details.

The system administrator can activate the diagnostic messages from the **Start Options** menu of the BIOS setup utility (see "Start options" on page 56). In addition, the user can follow the instructions in "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24, and activate the diagnostic checkpoints.

"Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24 is the primary problem analysis procedure, and should be the first attempt that is made to solve the problems that are listed in "Diagnostic error table" on page 101. The "Diagnostic error table" on page 101 lists the following secondary problem recoveries in the third column:

- "Replacing the logic unit" on page 9.
- "Installing an optional PCI card" on page 19.
- "Exchanging the memory" on page 20.
- Replacing the keyboard.
- Replacing the mouse.

For example, if the system fails at the ″3b″ checkpoint (refer to "Diagnostic error table" on page 101), the checkpoint displays on the monitor. This checkpoint indicates that the system cache is probably bad. The first recovery step is to clear CMOS (see "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24

page 24). If the problem continues, then the secondary recovery step is to replace the logic unit (see "Replacing the logic unit" on page 9).

Diagnostic error table

Table 8. Diagnostic error table

BIOS checkpoint	BIOS checkpoint name	Recovery action (perform if clearing CMOS does not resolve the problem)
3B	SignOn	Replace logic unit
3C	TestTimerTick	Replace logic unit
43	TestTimer2	Replace logic unit
44	PasswordNotEntered	Replace logic unit
49	TCPC_Errors	Replace logic unit
5D	CacheConfig	Replace logic unit
39	InitUsbLegacy	Replace logic unit
5F	AudioInit	Replace logic unit
4D	SMB_SetEMCC1k	Replace logic unit
51	SetWarmBootFlag	Replace logic unit
53	E_FLOB	Replace logic unit
54	EnableSystemInterrupts	Replace logic unit
57	TestRTC	Replace logic unit
58	CheckForNPX	Replace logic unit
59	reset_hdct1	Replace logic unit
50	USBDisablePeriodicSMI	Replace logic unit
5C	InitA20	Replace logic unit
81	SetupEDID	Replace logic unit
5E	HDSetup	Replace logic unit
5F	GiveUpIRQ15	Replace logic unit
62	VerifyCMOSConfig	Replace logic unit
69	UsbAllocateInterrupt	Replace logic unit
61	SR_Init	Replace logic unit
64	DriveInit	Replace logic unit
6B	InitTimeOfDay	Replace logic unit
6D	InitEnableNMI	Replace logic unit
6E	SetBootSpeed	Replace logic unit

Table 8. Diagnostic error table (continued)

BIOS checkpoint	BIOS checkpoint name	Recovery action (perform if clearing CMOS does not resolve the problem)
74	apm_init	Replace logic unit
50	USBEnablePeriodicSMI	Replace logic unit
76	BOOT_STRAP_1	Replace logic unit
60	PnP_AssignCardSelect Numbers	Replace PCI device/Replace logic unit
67	PnP_AssignResources	Replace PCI device/Replace logic unit
69	PCIConfigure	Replace PCI device/Replace logic unit
40	CSET_BFR_SIZMEM	Replace memory DIMMs
41	SizeMemoryAbove640k	Replace memory DIMMs
42	CSET_AFT_SIZMEM	Replace memory DIMMs
4F	AllocateEBDA	Replace memory DIMMs
50	xfer_ebda_vars	Replace memory DIMMs
38	ExtendedSMIInitialize	Replace memory DIMMs
4b	MemTestPrompt	Replace memory DIMMs
4C	TestMemory	Replace memory DIMMs
1B	EnableParity	Replace memory DIMMs
4E	CSET_AFT_MTEST	Replace memory DIMMs
65	PMM_Initialize	Replace memory DIMMs
66	CSET_BFR_OPROM	Replace memory DIMMs
68	CSET_AFT_OPROM	Replace memory DIMMs
72	MoveErrorLogToEBDA	Replace memory DIMMs
75	InitDmiBiosExtensions	Replace memory DIMMs
45	TestPS2Mouse	Replace mouse
46	CheckForMouseButtons	Replace mouse
73	InitDisableMouse	Replace mouse
47	InitKBDFlags	Replace keyboard
48	TestKBD	Replace keyboard
56	InitKBD	Replace keyboard
70	CheckForSetupHotKey	Replace keyboard
00	PW_Lockkybd	Replace keyboard

Table 8. Diagnostic error table (continued)

BIOS checkpoint	BIOS checkpoint name	Recovery action (perform if clearing CMOS does not resolve the problem)
00	PW_UNLockkybd	Replace keyboard
6C	CheckForLockedKBD	Replace keyboard
6F	SetKBDLEDs	Replace keyboard
70	CheckForSetupHotKey	Replace keyboard
71	InitFlushKBD	Replace keyboard

BIOS error messages

The following table defines the possible BIOS error checkpoint messages that can occur during the startup sequence of Network Station hardware that has been configured within the BIOS setup utility. These errors appear in the upper **right** corner of the screen during the startup sequence. The Network Station hardware utilizes both audio and visual alerts for BIOS errors. The Network Station can emit audio beeps at any point prior to video initialization, in the event of a BIOS error. After the video port initializes, error codes will appear on the screen.

The following table includes the beep sequences that occur when some problems exist:

Note: These beep sequences are represented in a numeric format which indicates the sequence of the audio output.

Table 9. BIOS error messages table

Beep sequence	LED status	BIOS error checkpoint (upper right corner)	Problem location: Problem resolution
1-2-2	Flashing amber	Not applicable	Timer failure: Replace logic unit
1-2-2	Flashing amber	Not applicable	DMA initialization failure: Replace logic unit
1-2-3	Flashing amber	Not applicable	DMA page register test failure: Replace logic unit
1-2-4	Flashing amber	Not applicable	Memory test: Replace memory DIMMs
1-3-0	Flashing amber	Not applicable	Video monitor detect: Check monitor cable

Table 9. BIOS error messages table (continued)

1-3-1	Flashing amber	Not applicable	Memory test: Check or replace memory DIMMs
1-3-2	Flashing amber	Not applicable	Memory test: Replace memory DIMMs
1-4-3	Flashing amber	Not applicable	Timer failure: Replace logic unit
1-4-4	Flashing amber	Not applicable	NMI port test failure: Replace logic unit
2-0-0	Steady green	Not Applicable	Configuration Error: See "Configuration errors" on page 105.
2-1-1	Flashing amber	Not applicable	DMA test failure: Replace logic unit
2-1-2	Flashing amber	Not applicable	DMA test failure: Replace logic unit
2-1-3	Flashing amber	Not applicable	Interrupt mask register failure: Replace logic unit
2-1-4	Flashing amber	Not applicable	Interrupt mask register failure: Replace logic unit
2-2-2	Flashing amber	Not applicable	Keyboard controller: Replace logic unit
2-3-2	Flashing amber	Not applicable	Video memory: Replace logic unit
2-3-3	Flashing amber	Not applicable	Screen retrace test failure: Replace logic unit
3-1-1	Flashing amber	Not applicable	Interrupt failure: Replace logic unit
3-1-2	Flashing amber	Not applicable	Timer 2 failure: Replace logic unit
3-1-4	Flashing amber	Not applicable	TOD failure: Replace logic unit
3-2-4	Flashing amber	Not applicable	CMOS memory miscompare: Clear CMOS.
3-3-1	Flashing amber	Not applicable	Memory size mismatch: Replace memory DIMMs
****There are no beep sequences after this point: Video output is active**** All BIOS errors will appear in the upper right corner of the screen.			
LED status		**BIOS error checkpoint**	**Problem location: Problem Resolution**
Not applicable		D0	Record cache state: Replace logic unit

Table 9. BIOS error messages table (continued)

Not applicable	D1	Initialize the cache: Replace logic unit
Not applicable	D2	Restore cache status: Replace logic unit
Not applicable	D3	Configure the cache: Replace logic unit
Not applicable	D4	Flush cache: Replace logic unit
Not applicable	D5	Enable cache: Replace logic unit
Not applicable	D6	Disable cache: Replace logic unit
Not applicable	D7	Set up cache: Replace logic unit
Not applicable	E1	Set up system for video: Replace logic unit
Not applicable	E2	Video BIOS too large: Replace logic unit
Not applicable	E3	Video BIOS too large: Replace logic unit
Not applicable	E5	System management failure: Replace memory.
Not applicable	F1	System management failure: Replace memory.
Not applicable	F2	SMI Waiting for Power Off: Replace logic unit
Not applicable	40	pointing device interface failure: Replace mouse

Configuration errors

The following table defines the possible configuration error messages that can occur during the startup sequence of the Network Station. These errors appear in the upper **left** corner of the screen during the startup sequence. Improper configurations in the setup utility cause these errors. For more information regarding the Network Station setup utility, see "Chapter 12. Startup sequence of Network Stations configured for WorkSpace On-Demand" on page 91. The Network Station displays error codes on the monitor when it encounters configuration errors.

To solve configuration errors, you can enter the setup utility and reset all configuration options to default values (see "Load default settings" on page 63), or clear CMOS (see "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash

card" on page 24). Both procedures will reset the administrator password to the default value, **IBMNCD**. To change this setting, refer to "Changing the administrator password" on page 58.

Attention: All configuration error codes appear in the upper left corner of the screen.

Table 10. Configuration errors

Error code	Error message	Cause	Suggested actions
114, 1805, 1885	Adapter ROM Error	An option ROM has failed	Restart the Network Station; or, Replace the logic unit (see "Replacing the logic unit" on page 9).
161	Bad CMOS Battery	CMOS was corrupted	Perform the procedure, "Exchanging the lithium battery" on page 20.
162	Configuration Error	Configuration has changed from previous boot	Action is not necessary.
165	Date and Time Incorrect	Battery has failed	Perform the procedure, "Exchanging the lithium battery" on page 20.
164	Memory Size Error	Memory size has changed	Action is not necessary.
1101	System Board Failure	Unknown failure	Clear CMOS (see "Clearing the administrator password and CMOS, creating a recovery CompactFlash card, and reading a CompactFlash card" on page 24); or, replace the logic unit (see "Replacing the logic unit" on page 9).
201	Memory Error	Memory test failed	Ensure that any memory DIMMs are correctly installed; or, replace the memory DIMM (see "Exchanging the memory" on page 20).
301, 303	Keyboard Error	Keyboard test failed	Restart the Network Station and do not press any keys; or, verify that you connected the keyboard cable to the correct port on the back of the Network Station. If the problem continues, replace the keyboard.

Table 10. Configuration errors (continued)

Error code	Error message	Cause	Suggested actions
178X	Hard Disk Error	Hard disk could not be configured or failed	Restart the Network Station; or, replace the logic unit (see "Replacing the logic unit" on page 9).
2401	Video Error	Video failed to configure or video failed test	Ensure that the monitor cable is connected properly to the Network Station; or, swap monitors and cables; or, replace logic unit (see "Replacing the logic unit" on page 9).
8603, 8601	Pointing Device Error	Mouse test failed	Power off the Network Station, and ensure that the mouse is installed in the correct port (see "Hardware layout" on page 4); or, replace the mouse.
1962	Boot Sequence Error	Boot sequence failed	Restart the Network Station; or, perform the procedure, "Clearing CMOS" on page 24. **Note:** Ethernet systems can receive a beep and a 1962 configuration error if the system is unable to boot from the network. Restart the Network Station, and watch for any error codes or text messages that display before the 1962 error code. Perform any actions indicated the error codes or text messages.
18XX	PCI Configuration Error	PCI adapter failed	Perform the procedure, "Clearing CMOS" on page 24; or, enter the BIOS setup utility and ensure that you configured the PCI device correctly. If the problem continues, replace the PCI adapter.

Part 6. Appendixes

Appendix A. Updating the NS Boot version H2033190 (03/31/99)

Important

You can find the latest updates to this procedure by reading **Running V2R1 on Series 2800** in the latest V2R1 information on the web:

1. Go to `http://www.ibm.com/nc/`
2. In the left frame, click **Support**.
3. In the **Search** field, type **Running V2R1 on Series 2800**.

For Windows NT, you can also refer to **Running V2R1 on Series 2800** in the `readme.txt` file on the IBM Network Station Manager CD.

For RS/6000, you can also refer to **Running V2R1 on Series 2800** in the `README` file on the IBM Network Station Manager CD.

You can update the H2033190 (03/31/99) NS Boot version by booting the Series 2800 (Type 8364) Network Station (hereafter referred to as the Series 2800 Network Station) two ways:

- From a DHCP server that has been properly configured for the IBM Network Station
- Manually by configuring the NVRAM settings

Both of these update methods may require you to select the operating system for the Network Station. Once you have selected the operating system for the Network Station, you can update the NS Boot version.

Selecting the operating system for the Network Station

1. The Network Station may display the **Select Operating System** menu the first time you power on the Network Station:

Select the **Other** option by pressing **2** immediately after the **Select Operating System** screen displays.

Notes:

a. If you selected the **WSOD** option by mistake, perform the procedure in "Switching from the BIOS for WorkSpace On-Demand configuration" on page 41.

b. If you selected the **Auto** option by mistake, restart the Network Station and continue with step 1 on page 111.

2. If you do not see the **Select Operating System** screen, restart the Network Station and wait for the IBM logo to display:
   - If the IBM logo displays in the upper **left** corner of the screen, press **Esc** during the startup sequence and continue with step 3.
   - If the IBM logo displays in the upper **right** corner of the screen, press **F1** during the startup sequence.

     A password prompt displays if you press **F1** before the Network Station completes the power-on sequence. If no password prompt displays, restart the Network Station and repeat this step.

     Once the password prompt displays, continue with step 3 of the procedure "Switching from the BIOS for WorkSpace On-Demand configuration" on page 41.
3. If you are using NVRAM settings to boot your Network Station, continue with the procedure, "Updating the H2033190 (03/31/99) NS Boot version from NVRAM settings".

   If you are booting from a DHCP server, continue with the procedure, "Updating the H2033190 (03/31/99) NS Boot version from a DHCP server" on page 114.

Updating the H2033190 (03/31/99) NS Boot version from NVRAM settings

1. From the **Network Computer Setup Utility** screen, press **F3** to select the **Set Network Parameters** option:

```
SCRN02                          Network Computer
                                 Setup Utility



F2  = View Hardware Configuration
F3  = Set Network Parameters
F4  = Set Boot Parameters









Return=Reboot
```

2. Highlight **NVRAM** and enter the following configuration values in the appropriate fields:
   - The IBM Network Station Internet Protocol (IP) Address.
   - The Boot Host IP address.
   - The Gateway IP Address.
   - The Subnet mask.
3. Press **Enter** to save your configuration.
4. Press **F4** to select the **Set Boot Parameters** option.
5. Type `bflash.2800` in the **Boot File** field.
6. Refer to the following table, and type the correct path for your server platform in the **Boot Directory** field:

For this platform:	**Type this path:**
AS/400	`/QIBM/ProdData/NetworkStationV2/x86/proms/`
Windows NT	`/NetworkStationV2/prodbase/x86/proms/`
RS/6000	`/usr/NetworkStationV2/prodbase/x86/proms/`

7. If you configured your server for the Trivial File Transfer Protocol (TFTP) protocol, select **TFTP** as your primary **Boot file server protocol**.
8. If you configured your server for the NFS protocol, select **NFS** as your primary **Boot file server protocol**.

   If you are using the NFS protocol, do not add a forward slash (/) at the beginning of the option 67 path. For example, type `usr/NetworkStationV2/prodbase/x86/proms/` for an RS/6000 server.
9. Press **Enter** to save your configuration.

   The Network Station returns to the **Network Computer Setup Utility** menu.
10. Press **Enter**.

The Network Station restarts and prompts you to change the language setting.

You have completed the update of the H2033190 (03/31/99) NS Boot version, using NVRAM settings. See "Using the NS Boot utility" on page 45.

Updating the H2033190 (03/31/99) NS Boot version from a DHCP server

This procedure updates the H2033190 (03/31/99) NS Boot version on Series 2800 Network Stations from a DHCP server. You need to perform these steps in addition to the normal DHCP configurations that are required for the Series 2800 Network Station to boot from your DHCP server.

Note: If you do not have Series 2800 Network Stations at the H2033190 (03/31/99) NS Boot version that boot from your DHCP server, you should not perform this procedure.

1. Add the following class to your DHCP configuration: `IBM Network Station`

   This class applies to, and can only be recognized by Series 2800 Network Stations with the H2033190 (03/31/99) NS Boot version.

2. Include options 66, 67, and 211 within the **IBM Network Station** class, with the following values:

For this option:	On this platform:	Type this value:
66	All platforms	The IP address of the server that the IBM Network Station Manager program is installed on, in string format: `d.d.d.d`
67	AS/400	`/QIBM/ProdData/NetworkStationV2/x86/proms/bflash.2800`
	Windows NT	`/NetworkStationV2/prodbase/x86/proms/bflash.2800`
	RS/6000	`/usr/NetworkStationV2/prodbase/x86/proms/bflash.2800`
211	All platforms	If you configured your server for the TFTP protocol, type `tftp` for this option. If you configured your server for the NFS protocol, type `nfs` for this option, and do not add a forward slash (/) at the beginning of the option 67 path. For example: `usr/NetworkStationV2/prodbase/x86/proms/bflash.2800`

Notes:

a. Ensure that other class settings do not override your class settings. For example, setting option 67 at the client level overrides an option 67 setting at the global level.

b. You may need to add other DHCP options to your DHCP configuration. For example, you may need to add the gateway and subnet mask options, if they have not been added at the global or subnet level.

3. Once you have updated all of the Series 2800 Network Stations from the H2033190 (03/31/99) NS Boot version, you can remove the **IBM Network Station** class and the included options from your DHCP server. Updated Network Stations do not recognize the **IBM Network Station** class.

   You have completed the update of the H2033190 (03/31/99) NS Boot version, using a DHCP server. See "Using the NS Boot utility" on page 45.

Appendix B. Connector pin information

The following tables define the connector pins that are used with the Network Station.

Table 11. Monitor Connector

Pin	Signal	Signal Direction
1	Red Video	Out
2	Green Video	Out
3	Blue Video	Out
4	Monitor Detect 2	In
5	Ground	– - -
6	Red Video Ground	- - -
7	Green Video Ground	- - -
8	Blue Video Ground	- - -
9	Not connected	- - -
10	Ground	- - -
11	Monitor Detect 0	In
12	Monitor Detect 1 / DDCSDA	In / Out
13	Horizontal Sync	Out
14	Vertical Sync	Out
15	Monitor Detect 3 / DDCSCL	In / Out
Connector shell	Protective Ground	- - -

Table 12. Keyboard and Mouse Connectors

Pin	Signal
1	Data
2	Reserved
3	Ground
4	+5V dc
5	Clock
6	Reserved

Table 13. Parallel Connector

Pin	Signal	Signal Direction
1	Strobe	In
2	Data 0	In
3	Data 1	In
4	Data 2	In
5	Data 3	In
6	Data 4	In
7	Data 5	In
8	Data 6	In

Table 13. Parallel Connector (continued)

Pin	Signal	Signal Direction
9	Data 7	In
10	ACKNLG	Out
11	BUSY	Out
12	PE	Out
13	SELECT	Out
14	AUTOFEEDXT	In
15	ERROR	Out
16	INIT	In
17	SELECTIN	In
18 - 25	Ground	- - -

Table 14. RJ-45 Twisted Pair Connector

Pin	Name	Function
1	TPOP	Transmit +
2	TPON	Transmit -
3	TPIP	Receive +
4/5	Not used	- - -
6	TPIN	Receive -
7/8	Not used	- - -

Table 15. USB connector

Pin #	Direction	Description
1	Power	Power (5V) for USB0
2	Bidir	Data positive for USB0
3	Bidir	Data negative for USB0
4	Power	Ground for USB0
5	Power	Power (5V) for USB1
6	Bidir	Data positive for USB1
7	Bidir	Data negative for USB1
8	Power	Ground for USB1

Table 16. Power supply connector

Pin #	Voltage+5V dc
1	+5V dc
2	+5V dc
3	+3.3V dc
4	+3.3V dc
5	+3.3V dc
6	+12V dc
7	Power Good
8	Ground
9	Ground
10	Ground

Table 16. Power supply connector (continued)

Pin #	Voltage+5V dc
11	Ground
12	Ground
13	Ground
14	-12V dc

Appendix C. Monitor specifications

A basic VGA-class monitor that meets the VESA standards of refresh rate and resolution can function with the IBM Network Station. The IBM Network Station supports VESA Display Power Management Signaling (DPMS) and VESA Display Data Channel (DDC2B). Monitors attached to the IBM Network Station do not require either standard. The resolution in each case is configured at the client/OS level.

DDC2B is a bi-directional data channel that is based on the I2C bus. The DDC2B protocol allows basic configuration information to pass between a system unit and its attached monitor. This allows a DDC2B-enabled IBM Network Station to configure the graphics controller to drive a DDC2B-capable monitor in its optimum display mode. Refer to "Power management" on page 34 for more information about DPMS.

All resolutions and refresh rates may not be supported by the monitor attached to the Network Station, or the operating system kernel that the Network Station downloads from the network server.

Monitor specifications for the IBM Network Station Manager program

A Network Station that you have configured for the IBM Network Station Manager program can support the following resolutions and refresh rates:

Table 17. Network Station monitor support for the IBM Network Station Manager program

High color (16 bit) and 256 color (8 bit)	
Resolution (pixels)	**Refresh Rate (Hz)**
640x480	60, 75, 85
800x600	60, 75, 85
1024x768	43, 60, 75, 85
1280x1024	60, 75, 85
1600x1200	48, 60, 75, 85

Monitor specifications for WorkSpace On-Demand

The WorkSpace On-Demand administrator configures the display mode for each Network Station at the server, based on the monitor that is attached. A Network Station that you have configured for WorkSpace On-Demand, and has 4MB of video memory can support the following resolutions and refresh rates:

Table 18. Network Station monitor support for WorkSpace On-Demand

Resolution	Colors (bits)	Refresh Rate (Hz)
640x480	8	60, 72, 75, 85
640x480	16	60, 72, 75, 85
640x480	24	60, 72, 75, 85
800x600	8	56 Interlaced, 60, 72, 75, 85
800x600	16	56 Interlaced, 60, 72, 75, 85
800x600	24	56 Interlaced, 60, 72, 75, 85
1024x768	8	43 Interlaced, 60, 70, 75, 85
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Glossary of abbreviations

B

BIOS. Basic Input/Output System

C

CMOS. Complementary Metal Oxide Semiconductor

CPU. Central Processing Unit

CRU. Customer-Replaceable Unit

D

DHCP. Dynamic Host Configuration Protocol

DIMM. Dual In-line Memory Module

DMA. Direct Memory Access

DOS. Disk Operating System

DPMS. Display Power Management Signaling

E

EEPROM. Electrically Erasable Programmable Read-Only Memory

F

FRU. Field Replaceable Unit

I

IBM. International Business Machines

IRQ. Interrupt Request

L

LAN. Local Area Network

LED. Light Emitting Diode

LLC. Logical Link Control

M

MAC. Medium Access Control

MB. Megabyte

MHz. Megahertz

MMX. Multi-Media Instructions

O

OS. Operating System

P

PCI. Peripheral Component Interconnect

PMR. Problem Management Record

POST. Power On Self Test

PXE. Preboot Execution Environment

R

RAM. Random Access Memory

RAP. Remote Authentication Protocol

ROM. Read-Only Memory

RPL. Remote Program Load

S

SDRAM. Synchronous Dynamic Random Access Memory

SGRAM. Synchronous Graphic Random Access Memory

T

TCP/IP. Transmission Control Protocol / Internet Protocol

U

USB. Universal Serial Bus

V

VESA. Video Electronics Standards Association

VM. Virtual Machine

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IBM Network Station Service
Information Type 8364
(Models Exx, Txx) September 1999

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