



Network Operations Systems

**DNC-50, DNC-100,
DNC-500
Dynamic Network Control
Systems**

A Guide to System Administrative Services

Network Operations Systems

DNC-50, DNC-100, DNC-500* **Dynamic Network Control Systems**

A Guide to System Administrative Services

Publication number: 450-1011-301

Product Release: NSR27 02

Document Release: Standard

Date: May 12, 1989

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Revision history

May 12, 1989

Release 27 02

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1. Introduction

This manual describes System Administrative Services (SAS) and the associated procedures for the DNC-50, DNC-100, and DNC-500 Dynamic Network Control Systems. It also supports Meridian MS-1* Meeting Services.

System administration consists of configuring and updating the DNC database, running maintenance diagnostics and tests on DNC hardware and software and performing other administrative functions. This manual assumes that the reader is familiar with the DNC systems, as described in 450-1011-100.

Document Release Information

The information in the upper right-hand corner of the cover page provides the release information for this issue of this document. The information includes the 10-digit identification number for the practice, plus the following additional information:

- (a) **Issued:** This is the date the document was released for reproduction or printing. It is not intended to be the same as the software or product release date.
- (b) **Vintage:** The vintage code represents the software or product release number associated with the current issue of the document, plus the issue number of the document. The format is NSRaa bb, where:
 - NSRaa is the Network Software Release number
 - bb is a sequential issue number for the document that indicates how many times the document has been released with the specified software release.
- (c) **Rating:** A rating code of Draft, Preliminary, or Standard is assigned to the document, reflecting the current status of the document.

Changes since the NSR26 Standard Issue

This version of the document includes updates relating to NSR27 software and hardware. The major changes are:

- (a) The Save and Restore feature now allows you to specify the tape device that is to be used for backup or restore operations. You can use any tape device that is available to the system, including a Nine-track Tape Unit, if the system is so equipped. See Part 22, 'Data Contents Save and Restore', for details.

* Meridian and MS-1 are trademarks of Northern Telecom.

- (b) A new disk storage SRU, the 1/4 Shelf Disk/Tape SRU, is available. It is equipped with a cartridge tape drive and an 80-megabyte disk. You can configure this SRU as one of the storage devices connected to a File Processor.
- (c) The Generic Tape Generator feature enables the DNC to read and write magnetic tapes that have either ANSI Level-2 standard tape labels or IBM standard tape labels. This makes it possible to transfer information between the DNC and an external system that uses standard tape labels. This feature runs on a Nine-track Tape Unit attached to a SCSI bus. See Part 32 for details.
- (d) You can now reboot the DNC without powering it down. You can do a software reboot by starting up the Softboot program in the Helix Command Interpreter. Softboot allows you to specify an immediate reboot, or a reboot after a delay. Alternatively, if your system is equipped with the Primary Processor XP 68020-7, and if that SRU was ordered with the optional reset switch, you can reboot by pressing the switch. For details, see 'Rebooting the System' in Part 3.
- (e) The Initialization File Printing feature lets you print the initialization files that are associated with various Program Resource Units (PRUs) running in the DNC system. (An initialization file contains parameter values that govern the operation of a PRU.) The feature provides a menu-driven interface that allows you to select the initialization files to be printed, and to designate the printer queue to be used. See Part 31 for details.
- (f) It is possible to define shadow disks when configuring the disk storage devices connected to a File Processor. A shadow disk is associated with a so-called primary disk. On the shadow disk, the system stores data identical to that stored on the primary disk. If the primary disk fails, the shadow disk is available as a backup. For details on defining shadow disks, see 'Defining a Physical Disk' in Part 12.

Note: The Business Network Management (BNM) application does not support the shadow disk capability in NSR27 release.

DNC Applications' Usage of Base-software Features

Each DNC system contains application software and base software. The base DNC software is built on a platform technology of hardware and software called DVS (Data Voice System). DVS supports a wide range of products and architectures, including DNC.

There are several DNC applications, but an individual DNC system runs only one application. The DNC applications are:

- Business Network Management (BNM)
- DMS Service Control Point (DMS-SCP)

In addition, Meridian MS-1 Meeting Services runs on the common-family DVS hardware and uses the base DNC and DVS software.

The base DNC and DVS software is integrated so that it appears to the user as a single base of features and services. These features and services can be selectively enabled, depending on the needs of the application. Consequently, some of the base-software features may not be used by the DNC application running on your system.

The application's software is in turn integrated with the base DNC and DVS software as appropriate. However, because the base DNC and DVS services provide administration and utility programs, most users of the applications (with the exception of system administrators) interact with only a few of the base DNC and DVS features.

Table 1-A summarizes the usage of base software features by the various DNC applications.

**Table 1-A
BASE DNC/DVS SERVICES USED BY DNC APPLICATIONS**

DNC Base Services	DNC Applications		
	Business Network Management	DMS Service Control Point	Meridian MS-1 Meeting Services
3274 Emulation	X		
Alarms MMI	X	X	X
ASCII Device Services	X	X	X
Backup Management System	X	X	X
DataNet (twisted pair)		X	
Logs MMI	X	X	X
MAP Passthru	X		
OMs MMI		X	
Printer Queues	X	X	X
Remote File Transfer		X	
Save and Restore	X	X	
Telephone Services			X
X.25 Gateway	X	X	X
X.3 PAD	X		

450-0595 (28)

This manual documents most of the base software services listed in Table 1-A. The following features are documented in other publications:

- **MAP Passthru.** For Business Network Management, see ‘MAP Passthru’ in NTP 450-1021-311.
- **OMs MMI.** This feature is documented in NTP 450-1061-114.
- **Telephone Services.** This feature is documented in NTP 555-6011-311.

Additional Reference Documentation

If a DNC application configures or modifies a base feature in a specific way, the application's documentation highlights this. You should always become familiar with the specific requirements of your particular application before using the base DNC documentation.

Notational Conventions Used in This Manual

The DNC user interface is based on commands and screen displays. The user enters commands either by pressing hardkeys, whose functions are fixed, or by pressing softkeys, whose functions vary according to the user's working context.

The screen displays are of two types: menus and data forms. A menu displays a list from which the user chooses an entry. A data form has fields where the user enters data. Where data is to be entered by the user, the following conventions are used:

- **A range of numbers** is denoted by giving the lower and upper limits of the range (for example, 0-3 denotes that the user can enter 0, 1, 2, or 3 as required).
- **Letter Groups** denote that the response depends on the situation. Some common examples are:
 - (a) aaa... denotes alphanumeric input
 - (b) nnn... denotes numeric-only input
 - (c) hhmm denotes the time (hours and minutes) using the 24-hour clock (0000 - 2359)
 - (d) mm dd yy denotes date (month, day, and year)
- **Names of Keys in caret marks** denote the name of a softkey, for example, <Add>, <Delete>, or <Change>. Softkeys change function according to the screen display. Softkey functions are shown at the bottom of the screen, in box-like icons that correspond to the row of softkeys at the top of the keyboard.
- **Names of Keys in UPPERCASE** denote the name of a hardkey, which is a labeled key on the keyboard. Hardkeys always perform the same function.

Note: The terminal maintains uppercase and lowercase input, but the system is not case- or blank-sensitive, except where noted.

System Administrators

Each user of the system is a member of a numbered user group. User group zero is the system administrators' group. By virtue of being a member of group zero, you have special privileges so that you can carry out administrative duties.

The Super User

The superuser is a specially privileged member of user group 0. There are certain options in the System Administrative Services interface that are available only to the superuser. The superuser is the only user who can access the UTILITIES service of SAS. This means that only the superuser can perform file processor administration, configure ASCII device services, or broadcast messages to the terminals of users

who are currently logged on. (See Parts 12, 13, and 27 for information on these topics.)

Duties of System Administrators

Once the system is initialized, the system administrator is responsible for keeping its configuration database up to date. The administrator also monitors the system's operation, and has access to an on-line maintenance service for performing system diagnostics.

Configuring the System Database. The system administrator's responsibilities for the configuration of the system are:

- When the system has been initialized, to configure (or verify the information in preconfigured systems) the system map using the Configuration Service of System Administrative Services (SAS). The configuration is specified on worksheets stored in the document titled Site Records (NTP 450-1011-152).
- To ensure that the hardware and software has been correctly installed in the locations specified in the system map.
- To set the current date and time in SAS.
- To reset the administrator's password from the system default to one of the administrator's choosing.
- To set up the System Log Recording Options.
- To complete the Core Configuration.
- If voice services are present, to establish the telephone directories and phone number plan.
- To make a backup tape of the configuration database.

Maintenance. When the system is fully operational, the system administrator continues to perform the above duties as required, and is also responsible for system maintenance. The Maintenance Service in SAS provides automated diagnostics, including notification of faulty software and hardware units. The administrator can also run the diagnostics on request.

Routine maintenance tasks are limited to the periodic cleaning of tape heads in the tape drives, and cleaning or replacing the air filters.

The System Administrative Services Main Menu

System Administrative Services is accessed by signing on to the system and selecting SYSTEM ADMINISTRATIVE SERVICES on the main menu. The System Administrative Services Main Menu may vary somewhat depending on the software installed on the system, but the following menu options are common to most DNC applications:

- **SET TIME AND DATE.** This service enables the system administrator to set the date and time in the system clock as required. The system date and time should be reset each time the system is rebooted (initialized).

- **MAINTENANCE.** You use Maintenance Services to view the status of the active system components, to run diagnostic tests on components, to take components out of service, and to restore components to service.
- **CONFIGURATION.** You use Configuration Services to enter information about the system's hardware components into the system map.
- **UTILITIES.** This option is used to manage the system disk and tape facilities, to manage file processors, and to configure ASCII device services.
- **SYSTEM LOG.** Provides access to the DVS log system.
- **CALL DETAILS.** Reserved for future use.
- **DV-1 MEASUREMENTS.** Reserved for future use.

The use of these menu options is discussed in detail in later parts of this manual.

2. Overview of the DNC's User Interface

System administrators must acquaint themselves with the physical characteristics of their terminals, the ways the system administrative software interacts with those terminals, and the basic rules of the user interface.

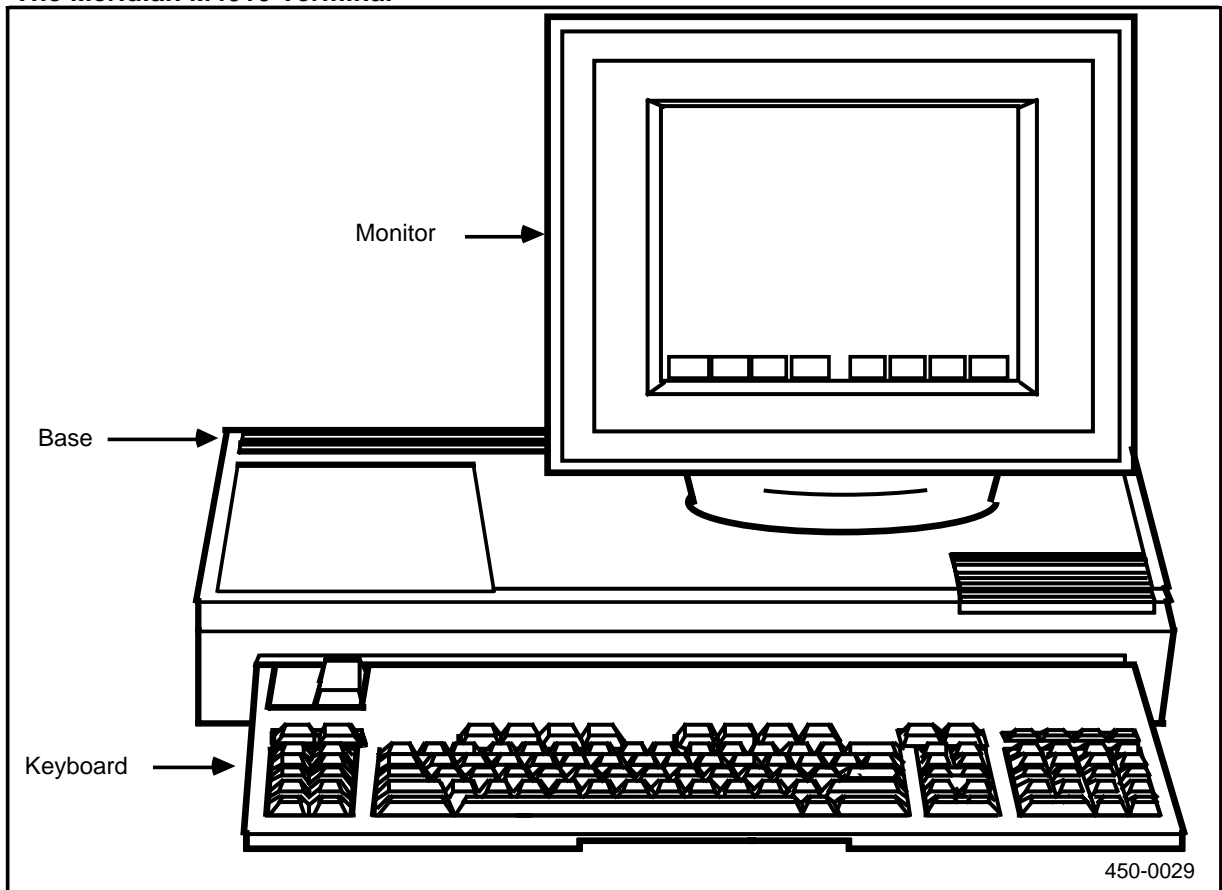
System administrators can use either a Northern Telecom M4000-series terminal or an ASCII terminal compatible with Digital Equipment Corporation's VT100* .

Using an M4000-series Terminal

An M4000-series terminal (see Fig. 2-1) connects to the DNC over twisted-pair telephone wiring, using Northern Telecom's proprietary LANlink interface. This interface does not require modems or other interconnection devices, but has a maximum distance limitation between the DNC and the M4000-series terminal of 610 m (2000 ft).

* VT100 is a trademark of Digital Equipment Corporation.

Figure 2-1
The Meridian M4010 Terminal



The M4000 is usually used as the system administrator's terminal, as it is collocated with the DNC. However, system administrators can also access the system using ASCII terminals, either on-site or remotely over dial-up facilities.

Powering up the Screen

There is no ON/OFF switch on an M4000-series terminal. As long as the terminal is receiving power, data can be active on the terminal, even if the screen is dark.

The M4000 screen darkens when it has been out of use for four minutes, and the display disappears entirely after ten minutes. A darkened screen will light up if the system sends a message or data to the terminal, or if you press any key on the keyboard. (This may take a few seconds, if the screen has been dark for a while.) To illuminate a darkened screen, press a key that will not cause data entry or modification, such as the SHIFT key.

Adjusting the Screen's Brightness

To increase the brightness of the characters displayed on the screen, press and hold down the ALT and SHIFT keys and, at the same time, press the up-arrow key repeatedly.

To decrease brightness, press and hold down the ALT and SHIFT keys and, at the same time, press the down-arrow key repeatedly.

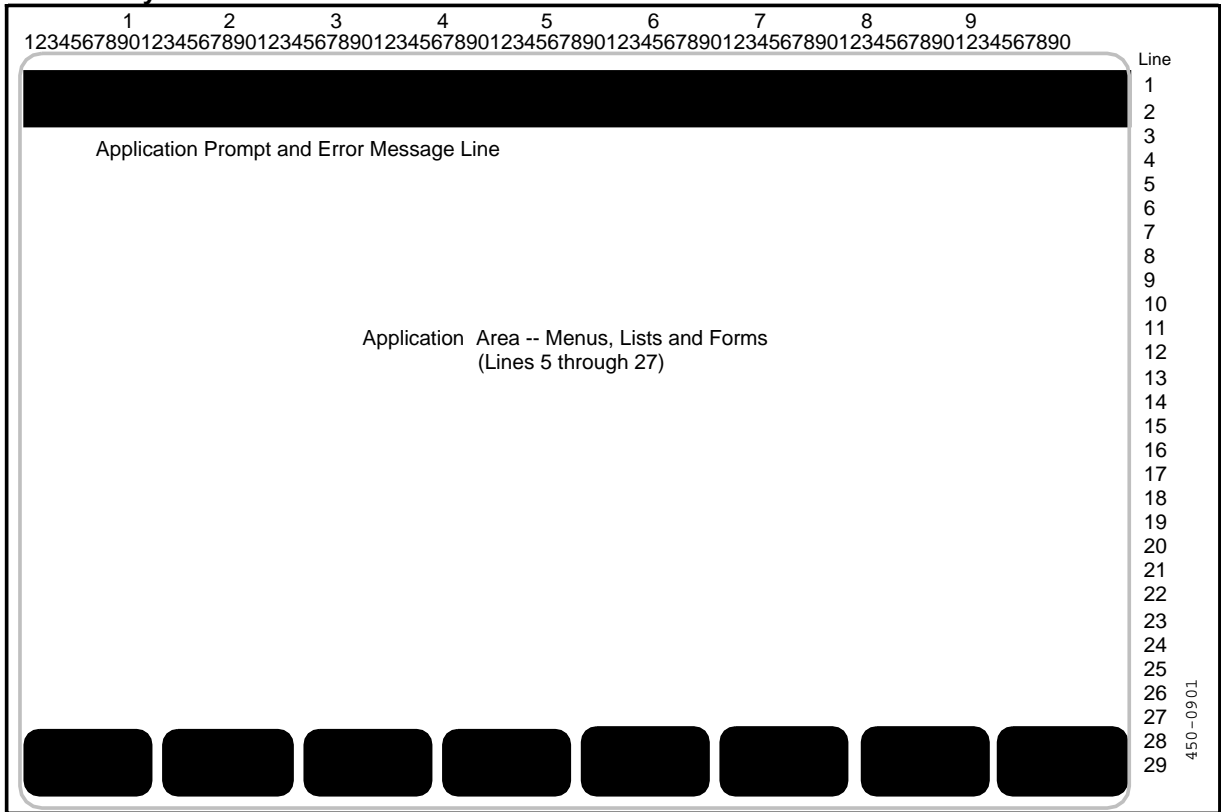
Adjusting the Screen's Contrast

To increase the contrast between the characters displayed on the screen and the screen's background, press and hold down the ALT and SHIFT keys and, at the same time, press the left-arrow key repeatedly.

To decrease contrast, press and hold down the ALT and SHIFT keys and, at the same time, press the right-arrow key repeatedly.

The M4000-series terminal screen consists of 29 lines and 90 columns. Figure 2-2 shows the screen layout.

Figure 2-2
Screen Layout for a Meridian M4000 Terminal



The layout is as follows:

Lines	Content
1 and 2	Notification messages, window number and name
3 and 4	Prompts and error messages
5 to 27	Application area
28 and 29	Softkeys

Using an ASCII Console

The DNC systems support terminals that use the ANSI X3.64 standard and are compatible with Digital Equipment Corporation's VT100. A list of compatible terminals is provided in 450-1011-151. These terminals can be colocated with the DNC or located remotely. Local terminals require a null modem cable or modem eliminator to connect to the system. Remote terminals require a modem for dial-up links.

3 Screen Display

The screen layout for an ASCII terminal has a display window of only 24 lines and 80 columns. Although the ASCII displays approximate the M4000 displays as closely as possible, the ASCII character format, different screen size, and other display limitations do result in some difference in displays. Figure 2-3 shows the screen layout for an ASCII terminal.

Another difference between the M4000 and an ASCII is that whereas the M4000 has a cursor for each open window, the ASCII has only one cursor. Thus, if more than one window on an ASCII is active, only one of them will display a cursor. (For a discussion of windows, see 'Operating Windows', later in this part.)

The layout is as follows:

LINES	CONTENT
1 and 2	Notification messages, window number and name
3 and 4	Prompts and error messages
5 to 22	Application area
23 and 24	Softkeys

There is no date field in the ASCII screen layout.

VT100 Keyboard

Figure 2-4 shows the standard keys on the VT100 keyboard. The VT100 emulation program provided by the DNC is mapped to this keyboard, although other compatible ASCII terminals have different keyboard layouts. When using an ASCII terminal other than a VT100, make sure it is configured for VT100 mode (if applicable) and use its keys as they correspond to the VT100 keyboard.

Figure 2-3
Screen Layout for an ASCII Terminal

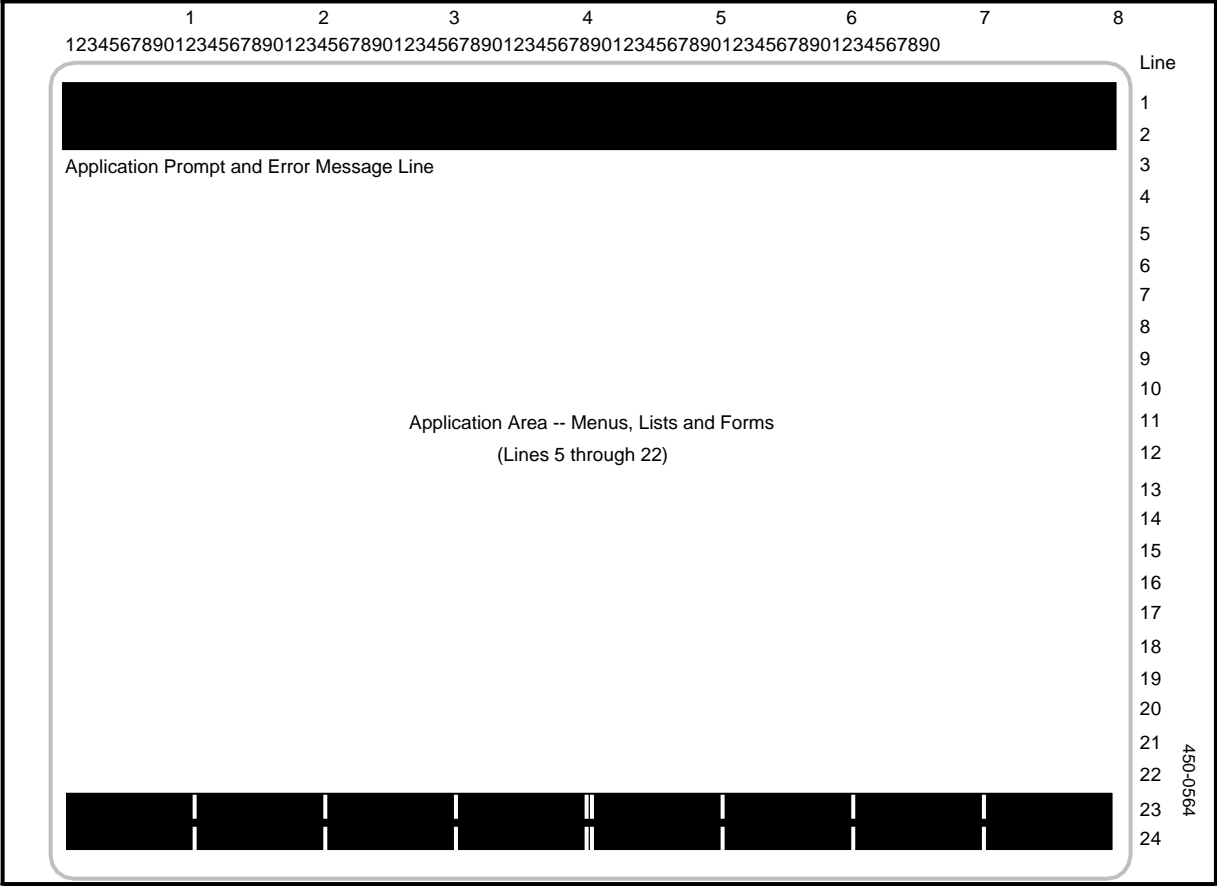
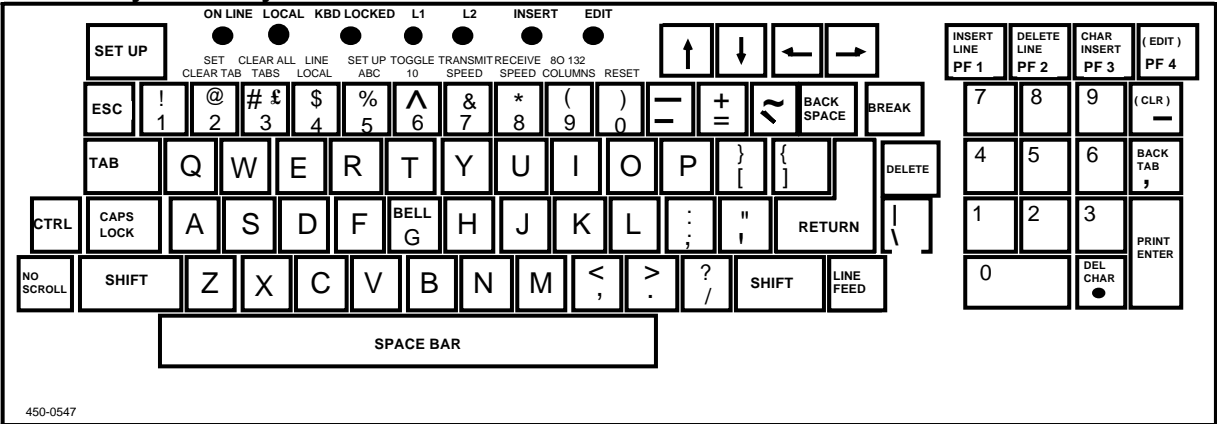


Figure 2-4
VT100 Keyboard Layout



On the VT100 (and with the DNC VT100 emulation program), the RETURN key functions as a standard ENTER key, not as a RETURN key. The cursor arrows on this keyboard are equivalent to the M4000 arrow-key functions. The INSERT key and the delete BACKSPACE keys are not supported by VT100 emulation.

Unlike the M4000, which has keys labeled and designated for use with a DNC-type user interface, ASCII terminals require an attention key sequence to enter hardkey

and softkey commands. An attention key tells the system to act on the next key entered as a command key.

Table 2-A lists the key sequences required on an ASCII terminal to emulate specific softkeys and hardkeys provided by the M4000-series terminals. The table also lists equivalent VT100 key sequences for miscellaneous terminal functions.

Table 2-A
VT100 KEYBOARD FUNCTIONS

M4000 KEY	EQUIVALENT VT100 KEY SEQUENCE (See Note 2)
Softkeys	
Softkey 1	ATTN 1 or PF1
Softkey 2	ATTN 2 or PF2
Softkey 3	ATTN 3 or PF3
Softkey 4	ATTN 4 or PF4
Softkey 5	ATTN 5
Softkey 6	ATTN 6
Softkey 7	ATTN 7
Softkey 8	ATTN 8
Hardkeys	
ACCEPT	ATTN a
ADJUST	ATTN d
CANCEL	ATTN x
CLOSE	ATTN l
COMMAND	ATTN c
HELP	ATTN h
MAIN MENU	ATTN m
MEETING	ATTN t
PHONE	ATTN p
SHARE	ATTN s
WINDOW	ATTN n
Miscellaneous Functions	
ALT+HELP (service description help)	ATTN v
ATTN key code (see Note 2)	ATTN ATTN
BACKTAB	ATTN b
ENTER	ATTN e or ATTN RETURN
INSERT	ATTN i
RESET	ATTN r
SHIFT+HELP (help in data fields)	ATTN ?
SHIFT+WINDOW (window menu)	ATTN w
XOFF	CTRL s (see Note 3)
XON	CTRL q (see Note 3)
Note 1: These key sequences do not apply when using the 3274 Emulation service. See Tables 18-E and 18-F for the 3274 key sequences.	
Note 2: To enter a DNC command, press and release the ATTN key, then press the key that represents the command. The key that is to be used as the ATTN key is specified in the terminal configuration. (See Part 13, 'Configuring ASCII Device Services', for more information.) Pressing the ATTN key twice enters the key's normal function. For example, if ESC is defined as the ATTN key, press ESC twice to send the key's normal ESC code.	
Note 3: XON and XOFF are flow control characters. Pressing CTRL s on an ASCII terminal causes the terminal to stop accepting input from the LAN Interface unit that connects it to the DNC.	

User Interface

The DNC user interface is both menu- and command-driven. Services are selected and accessed from menus, and specific tasks are executed using softkey and hardkey commands. Also, the system displays prompts and system messages as appropriate to the user's current actions.

Softkey functions are displayed in icons in the bottom two lines of each screen. The functions change as the user's context changes. The function indicated in the softkey icon is triggered when the corresponding key on the keyboard is pressed. Hardkey commands retain the same function, regardless of the user's context.

The DNC is equipped with a help system that provides different levels and types of help. Not all applications offer all levels of help, but the system can provide service-level and field level help, plus help on help (which explains the help system itself).

The screens of the user interface are organized in a hierarchy of menus, lists, and forms. There are also utility screens. Menus list a number of features, services, or capabilities from which you can select. Lists are similar to menus, but list items or system components from which you can select and perform actions associated with the active service. Data forms are the screen displays with detailed information entered by the user or displayed by the system that relate to the item selected from the list.

The system provides for multi-windowing. A user can initiate up to six separate concurrent activities. With this feature, the user can move back and forth between windows without having to return to a menu and following the entire screen hierarchy each time.

Selecting a Menu or List Item

In a menu or list display, the selected item is indicated by the cursor position. On M4000 terminals, the cursor position is indicated by a highlighted bar; on ASCII terminals, it is a greater-than sign (>). When the system first displays the screen, the first item is usually highlighted.

To select another entry, press the arrow key for the direction in which the highlight is to be moved. Use the up and down arrows to change rows and the left and right arrows to change columns. When the required item is highlighted, it is selected, and the user can perform a function on it by pressing the ENTER key or a softkey.

Softkeys

Softkeys are pre-programmed function keys. When using the screens, you use softkeys to enter commands. Softkey functions are displayed in the icons at the bottom of each screen display. The displayed softkey set depends on the current system and activity context.

Table 2-B lists the softkeys that you will encounter the most frequently.

Table 2-B
Commonly Used Softkeys in System Administrative Services

Softkey	Function
---------	----------

<Add>	This softkey is displayed with lists when you are allowed to create items of the type belonging to that list. Pressing <Add> usually results in the display of a form which you can fill out to create a new item of that type. An instance of that item will be added to the parent list when the form is saved.
<Insert>	This is similar to <Add>.
<Select>	When the system displays a list from which you must choose an item, you indicate your choice by using the arrow keys to highlight the item of your choice, and then pressing <Select>. You then return to the previous screen. In some cases, the system requires you to define the chosen item's attributes before returning to the previous screen.
<Change>	When the system is displaying a list, you can change the displayed information by using softkeys such as <Change Address>. The system then prompts for new input. The changes refer to the list item that is currently highlighted.
<Delete>	Using this softkey, you can delete the currently highlighted item from a list. As a safety measure, the system requires you to press the softkey a second time to confirm the deletion.
<Next Level>	In cases where entities are in a hierarchical relationship, pressing this softkey calls up a screen listing the lower-level entities that are related to the currently selected item. For example, after selecting an Applications Processor from a list of hardware items, you can press this softkey to call up a list of the programs that reside on the Applications Processor.
<Item Details>	This softkey calls up a screen that displays detailed information about the currently highlighted list item.
<Next Page>	If a list is too long to fit on a single screen, this softkey displays the next page of the list.
<Previous Page>	If a list is too long to fit on a single screen, this softkey displays the previous page of the list.
<Edit>	This softkey calls up a screen on which you can change the attributes of the currently highlighted list item.

Table 2-B Continued
Commonly Used Softkeys in System Administrative Services

Softkey	Function
<Exit>	This softkey moves you from the screen that you are currently on to the screen that is immediately higher in the screen hierarchy. In some cases, after you press this softkey, the system displays the <Save and Exit> and <Ignore and Exit> softkeys, and requires you to press one or the other to return to the higher-level screen.
<Save and Exit>	After you have entered new configuration information on a screen, you press this softkey to proceed with updating the information, and to exit to the immediately higher-level screen. (Note that pressing this softkey does not commit the new information. You may have to exit through several levels of screens to make the system commit the new information.)
<Ignore and Exit>	After you have entered new configuration information on a screen, you press this softkey to abandon the changes and exit to the immediately higher-level screen.
<Resume>	This softkey usually occurs with <Save and Exit>. You use it if you are about to save and exit, but discover an error in the newly entered information. After pressing <Resume>, you can correct the error, then press <Exit>, and then press <Save and Exit>.

Entering Data on a Screen

To enter or change data in a form display, type new data over the old (if necessary) and press the RETURN key to advance to the next field. When the data is correct, you usually press a softkey to enter the data to the system. In certain contexts, the ENTER key is used to enter data to the system.

Prompts and Error Messages

Lines 3 and 4 on the screen (counting from the top) are reserved for system prompts and messages. Prompts suggest what action you may want to perform next. Messages indicate an error on your part or a system condition related to the operation you need to perform.

Field Types

On the screens there are three kinds of fields: entry fields, selection fields, and display-only fields.

Entry Fields

To fill out an entry field, just type in a valid entry. In some cases, the system provides a default value, thereby allowing you to pass over the field without making an entry.

Selection Fields

Selection fields do not require you to type in an entry. Instead, you turn the field on or off. To do so, place the cursor in the field and press the space bar. The indication that a selection field has been turned on is a checkmark if you are using an M4000 terminal and an "x" if you are using an ASCII terminal.

The default entry for some fields is "on", while for others it is "off". Pressing the space bar once changes the field to the opposite state.

Display-only Fields

Display-only fields appear when items are saved. They have system-generated values.

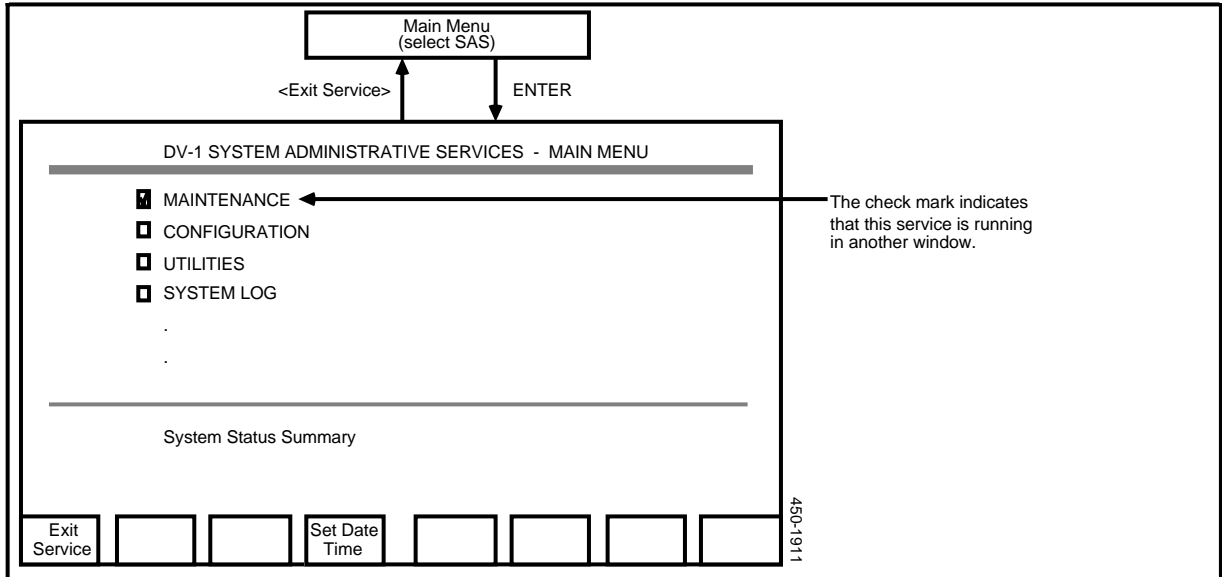
On-line Help

A HELP key is available on all terminals used with the DNC. This is a hardkey on M4000-series terminals and is provided by the ATTN sequences on ASCII terminals.

The help system is organized as follows:

- a) **Help on the Main Menu.** To display this help panel on an M4000-series terminal, press the HELP key while the main menu is displayed. On an ASCII terminal, hold down the attention key and press H. The system displays the help panel in the application area of the terminal screen, overlaying the main menu. The panel lists softkeys for moving within the help system. To exit from the help panel, press <Exit Help>.
- b) **Service Description Help.** (This type of help is available only with some applications.) These are high-level, one-panel descriptions that outline the services accessed by selecting each of the items that appear on the main menu. The service description help panels overlay the current application window. To display service description help on an M4000-series terminal, hold down the ALT key and press the HELP key. On an ASCII terminal, hold down the attention key and press V. The system displays the help panel for the service you are using. If you are on the main menu, the system displays the help panel for the currently selected menu item. To exit from service description help, press <Exit Help>.
- c) **Service Operation Help.** (This type of help is available only with some applications.) This help briefly outlines the principal functions and menu hierarchy of a service, and tells where to find additional information. To display service operation help on an M4000-series terminal, press the HELP key while using a service, or while displaying the service description. On an ASCII terminal, hold down the attention key and press H. The help panel overlays the currently displayed application window. To exit from service operation help, press <Exit Help>.
- d) **Field Help.** This help is available for menu items, list components, and input fields on data forms. To access field help on an M4000-series terminal, hold down the SHIFT key and press the HELP key. On an ASCII terminal, press and release the attention key, and then press the ? key. The system displays a pop-up panel of up to 11 lines. The panel describes the currently selected menu item, list component, or data field. To exit from field help, press the same key combination again.

Figure 2-5
System Administrative Services Main Menu, Showing a Service Running in Another Window.



- e) **Help on Help.** This help describes the help system itself. You can access it only while the system is displaying Main Menu Help or Service Operation Help. On an M4000-series terminal, press the HELP key. On an ASCII terminal, hold down the attention key and press H.

Operating Windows

An M4000-series terminal can have up to six activities operating on it, all at the same time. When the system starts a task such as accessing a menu item, it creates a window for the task. If several tasks are active on the terminal, you can switch between them using the WINDOW key. Each window remains in existence until you exit to the main menu using the <Exit> softkeys. (While the CLOSE hardkey also terminates windows, it may have unpredictable effects.)

Creating a New Window

To allow a task to continue to run while creating a new window, exit from the task by pressing MAIN MENU key. This action returns you to the main menu, where you can initiate a different service or another instance of the same service. By initiating the service, you create a new window.

Multiple-window SAS

You can run as many as six instances of System Administrative Services (SAS) concurrently, with one window for each instance. Note that there are restrictions on this feature. First, multiple windows must be initiated from a single terminal. Second, this feature does not allow you to initiate multiple concurrent instances of a single SAS service. If a SAS service such as Configuration is already running in one window, the system will not open a new window to run a second instance of that service. When the system displays the System Administrative Services Main

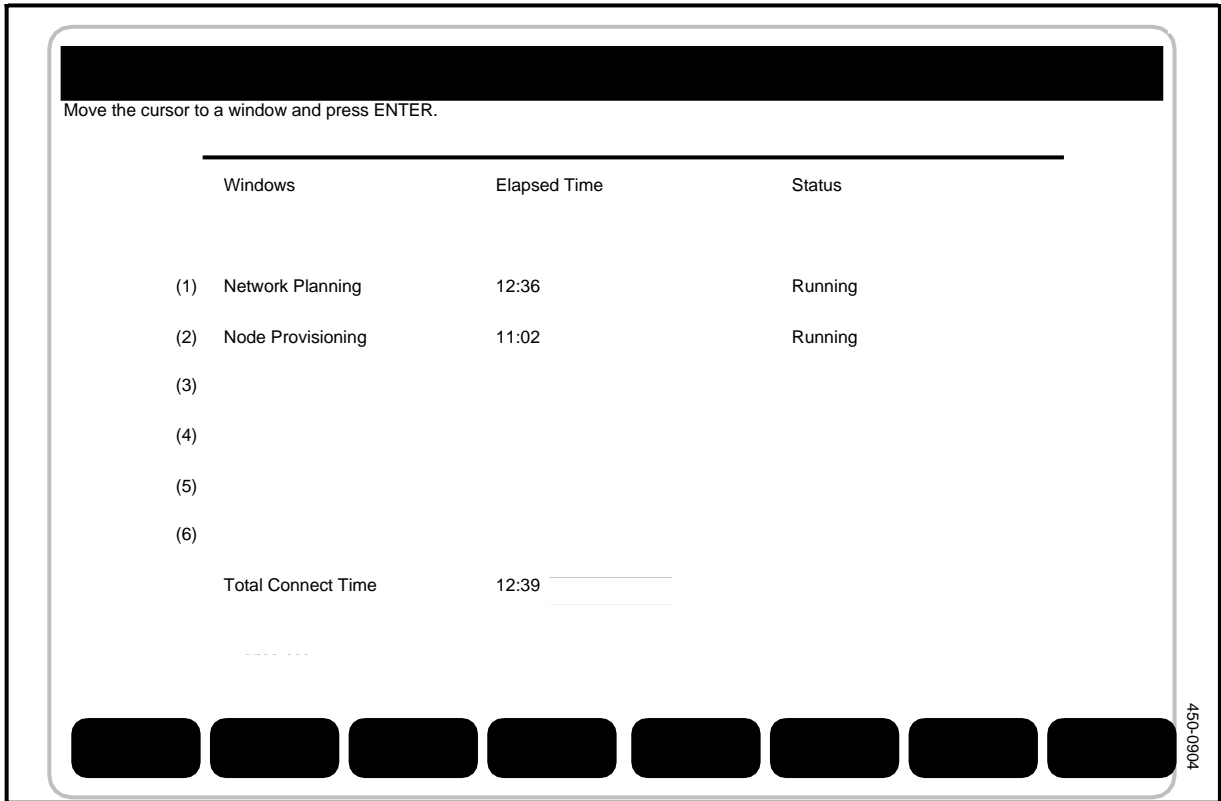
Menu, it displays a check mark beside the name of any service that is running in another window. (See Figure 2-5.)

Changing to Another Window

To change to another window, press the WINDOW key. The system displays the window that is next in numerical sequence. To display a menu listing all windows, press SHIFT and WINDOW together. From the window menu, you can select the window to be displayed.

Figure 2-6 shows the Window Menu.

Figure 2-6
The Window Menu



Saving Changed Data

After you have changed an aspect of the system, you must press a softkey such as <Save and Exit> to indicate that you want to commit the new information. Then, to ensure that the changes are saved on disk, you must use the <Exit> softkeys to exit through the menu layers until you arrive at the System Administrative Services Main Menu. the System Administrative Services Main Menu.

When certain items are changed, the changes do not take effect until the next time the DNC is rebooted. (See 'Rebooting the System', in Part 3.)

Getting Started: Signing on and off

This procedure describes how to sign on and sign off the DNC. You must sign on to the system before being allowed to perform any functions or use the terminals.

To sign on as a system administrator, you must know the System Administrator's sign-on name and password. You sign on as described below, and the system allows you to access System Administrator functions.

Signing on

To sign on, proceed as follows:

- (1) The screen should be displaying an introductory logo, and should be prompting for a sign-on name. Type in your sign-on name and press ENTER.

The system prompts for a password.

- (2) Type in your password and press ENTER.

The main menu appears on the screen. You are now signed on.

Signing off

To sign off, proceed as follows:

- (1) Return the screen display to the system main menu by pressing the <Exit> softkey of the various menu layers.
- (2) Press <Sign Off>, then press ENTER, to confirm the sign-off.

Changing UserID

To sign off as one user and sign on as another user, press <Change ID>, and then type in the sign-on name and password of another user to complete the reentry sign-on.

Note: This function will not close any active windows. This means that when signed on under the new sign-on name, you can access any windows you left open under the previous sign-on name, regardless of the access rights associated with the new sign-on name.

3. System Start-up, Loading, and Shutdown

Before loading a new or existing system, you must know how to:

- clean the tape heads
- install, remove, and retension a cartridge tape
- turn the system power on and off
- change the system time and date.

These procedures are explained here, followed by the steps for loading a new system and an existing system.

Using the Cartridge Tape Drive

If the DNC uses the SASI interface, the cartridge tape slot is located in the Mass Storage SRU. If the DNC uses the SCSI interface, the cartridge tape slot is located in the Cartridge Tape SRU or in the 1/4 Shelf Disk/Tape SRU. (The 1/4 Shelf Disk/Tape SRUs are used only with NSR27 and later software).

- CAUTION -

The cartridge tape is used for copying existing system files or loading system software. A tape should be placed in the cartridge slot **ONLY** when the administration procedures contain explicit instructions to that effect. The cartridge slot must otherwise be empty at all times.

Note 1: Before a tape is inserted, the tape heads must have been cleaned.

Note 2: If the cartridge tape is new, it must be retensioned prior to use.

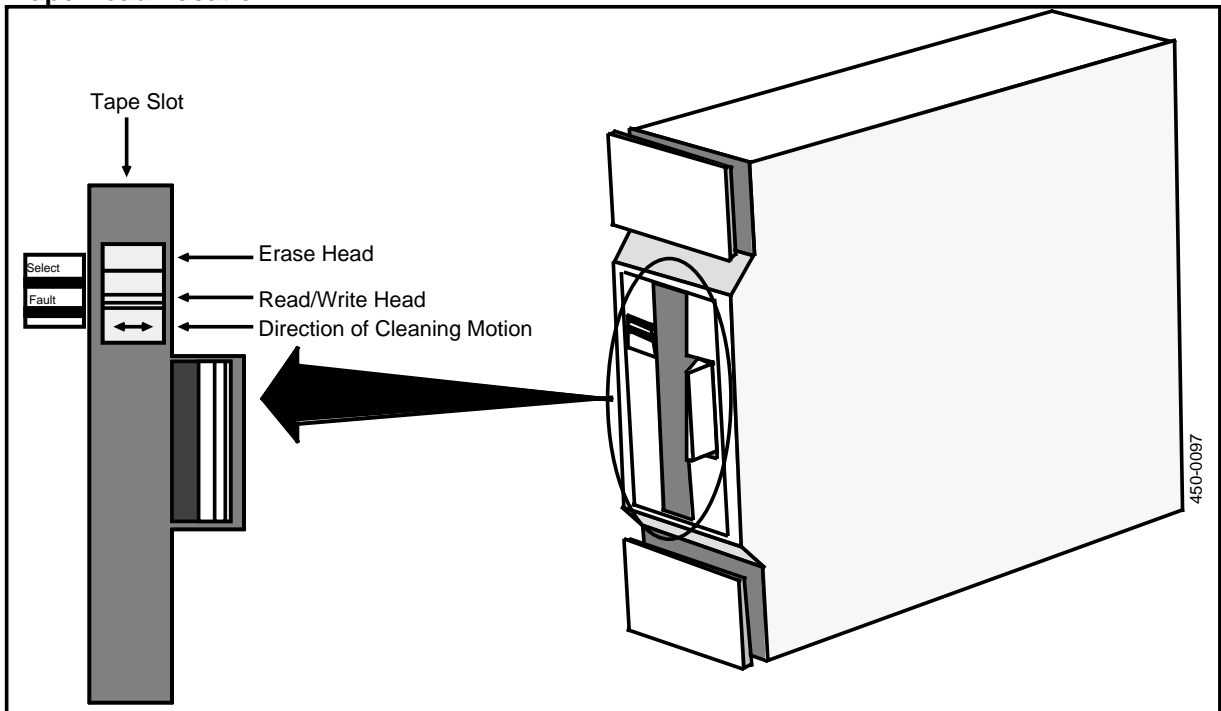
Cleaning the Tape Heads

This procedure describes how to clean the tape heads of the Mass Storage SRU or the Cartridge Tape SRU to ensure proper operation. The procedure must be followed at least once a week, and is also required immediately prior to dumping or loading data.

Tools:

- denatured (isopropyl) alcohol cleaning agent
 - foam swabs, at least 6 in. long.
- (1) Dampen (don't soak) one foam swab with denatured alcohol. Use it to clean the tape head. The head is located inside the cartridge slot, at the front of the Mass Storage SRU or Cartridge Tape SRU (see Figure 3-1).
Use a cleaning motion at right angles to the direction of tape travel.
 - (2) With a dry swab, wipe any excess alcohol from the tape head, also using a motion at right angles to the tape travel.

Figure 3-1
Tape Head Location



Loading the Tape Cartridge

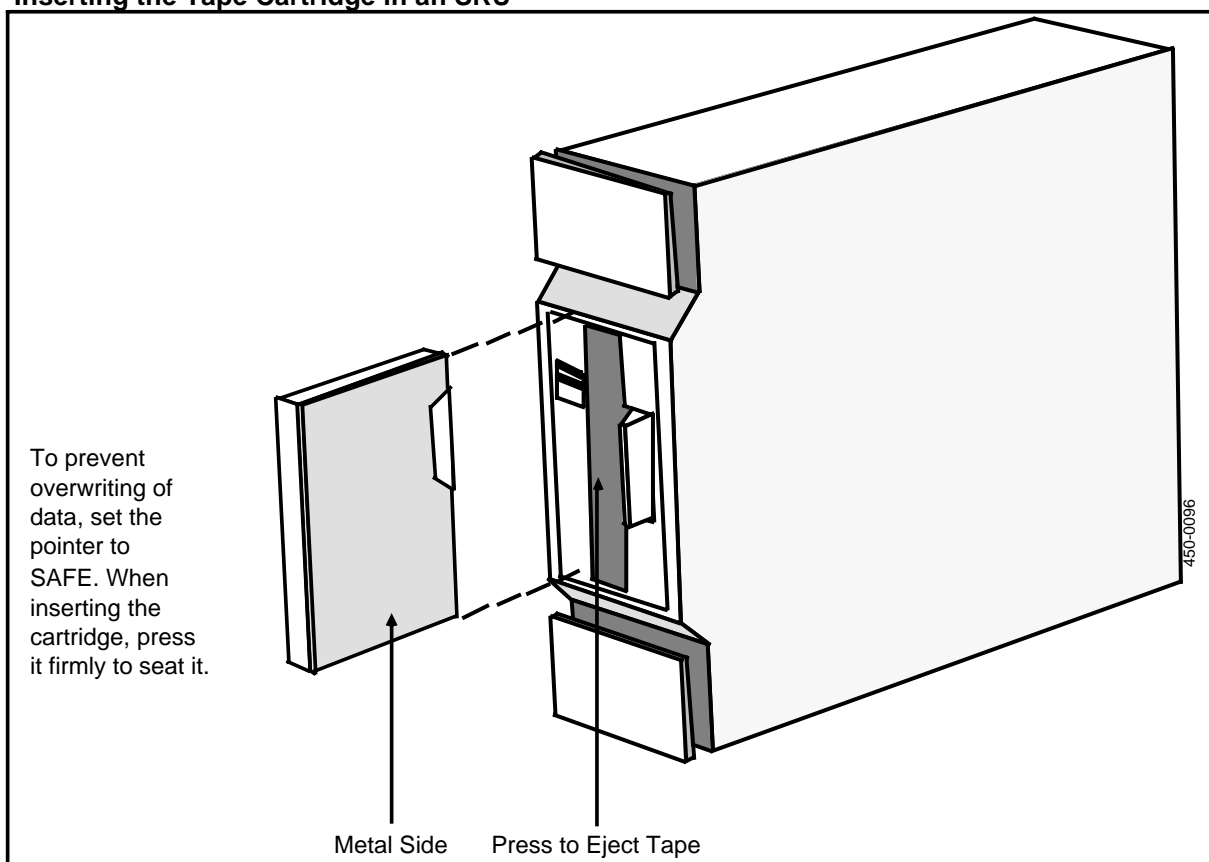
The system is equipped with one or more SRUs with slots for cartridge tapes. A DNC using the SASI interface has a tape slot in the Mass Storage SRU. A DNC using the SCSI interface has one or more Cartridge Tape SRUs, each with a slot. Tapes are used to load new software releases, perform backups of programs and data, and restore programs and data in the event of equipment failures.

Note: If you intend to download data to a tape, ensure that it is blank or that any data on it may be overwritten.

Load the cartridge tape into the slot as follows:

- (1) Set the SAFE pointer on the tape as required:
 - If you are downloading data from the system hard disk to tape, set the pointer away from SAFE.
 - If you are uploading data from the tape to the system hard disk, set the pointer toward SAFE.
- (2) Open the door of the cabinet containing the SRU with the cartridge tape slot, typically cabinet 2 in the lineup (second from the left, as viewed from the front).
- (3) Hold the tape cartridge being installed with the metal side facing toward the right, and the keyed slots at the rear, as shown in Figure 3-2.

Figure 3-2
Inserting the Tape Cartridge in an SRU



- (4) Guide the tape cartridge into the grooved slot of the SRU.
- (5) Push the cartridge firmly until solid contact is made and the tape is latched in place. The red light on the SRU should light.
- (6) After the system loads for the first time, you should clean the tape heads according to the procedure above.

Removing a Tape

After uploading from or downloading to the tape, remove the tape from the SRU as follows:

- (1) Push the latch tang at the edge of the tape slot inward (see Figure 3-2). The tape cartridge then ejects.
- (2) Remove the tape cartridge from the slot.
- (3) Store the tape cartridge in a safe place, free from dust, extreme temperatures, high humidity, and sources of electrical or magnetic interference.

Retensioning a Tape

If you are the superuser, you can retension a tape. (Only the superuser can access the Utilities Services _ Main Menu, as required by this procedure.) Retensioning consists of spooling the tape end-to-end and back, and requires an installed system.

Note: New tapes should be retensioned three times prior to use; otherwise, data errors may occur.

- (1) Sign on as the superuser.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select Utilities and press ENTER.
The Utilities Service - Main Menu appears.
- (4) Select Helix Command Interpreter, and then press ENTER.
The system prompt appears. (It is usually '>'.)
- (5) Insert the new cartridge tape in the SRU. (See Figure 3-2.)
- (6) Enter the command
TRET
and press RETURN.
The tape spools from end to end.
- (7) Repeat the above step twice more.
- (8) Enter the command
EXIT
and press RETURN.
The System Administrative Services Main Menu appears.

Powering the System Up and Down

If your system has input jumper assembly NT4G42CA or later, it has an on/off switch located on the jumper assembly, which is on the righthand side of cabinet one (viewed from the rear).

If your system is one that does not have an on/off switch, it must be powered down and up by unplugging and reattaching the ac input cord at the input jumper assembly at the rear of cabinet 1 (the right-most cabinet, as viewed from the rear).

- CAUTION -

You should not insert a cartridge tape into a Mass Storage SRU or a Cartridge Tape SRU unless you are performing a procedure that contains specific instructions to insert a tape.

There are various situations in which you may have to power the system down. Some DNC systems can be rebooted only by powering down and then powering up. You must power down before altering the connections to the SCSI bus. If a Power Supply SRU fails but the system continues to operate, you must power the system down before taking any action that will restore that power source. (In contrast, a failed Loft Power Supply can be replaced and switched on without powering the system down.)

Initialization of the M4000

The initial screen image on the M4000-series terminal during system start-up is a set of icons. These represent the elements of the system that are tested during initialization. As each test is passed, a checkmark is displayed in a box beside the icon of the element being tested. Following initialization of the terminal, the system displays a series of activity symbols for each icon, indicating the occurrence of each boot activity. These symbols and their corresponding activities are as follows:

- ? A connection is being established between the system and the terminal.
- [] (icon of a DNC cabinet). A valid connection has been made.
- z (lightning sign, flashing). The software to drive the terminal is being transferred from system to the terminal (arrow symbol blinks).
- NSRxx.an (logo). Software transfer is successful, and the software designation of the loaded software is shown.

Software Designation is in the format NSRxx.an (for example, NSR02.A1) where:

NSR denotes Network Systems Release

xx denotes the release number. Normally, each NSR release introduces new features to the DNC system.

a denotes a particular load of software within a release. Each load supercedes the previous one and adds new features to bring the feature content up to that specified for the release.

n is the increment within a particular load.

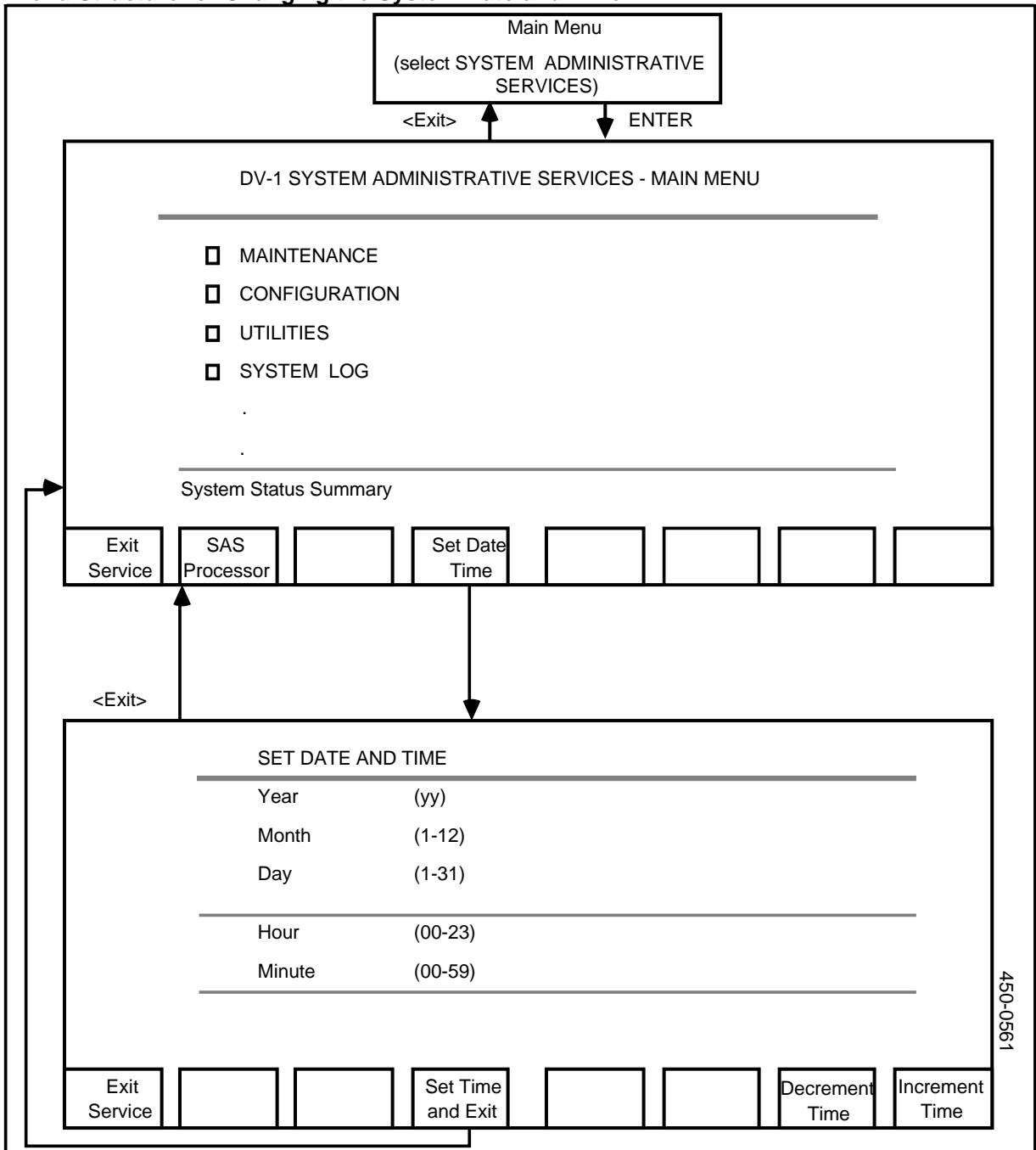
Changing the System Date and Time

This procedure describes how to set the time and date on the DNC. This procedure must be followed whenever the system is initialized or rebooted. (When DNC is powered up, the date and time are picked from the last DNC system log message.)

The menu structure is shown in Figure 3-3. To change the system date and time, proceed as follows:

- (1) Sign on as a system administrator.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main system menu.
The System Administrative Services Main Menu appears.
- (3) Press <Set Date Time>.
The Set Date and Time screen appears.
- (4) When the date/time screen appears, check the date and time that appear on the screen.
 - If the date and time are both accurate, you can exit to the main menu by pressing <Exit Service> twice.
 - If either the date or time is not accurate, follow the steps below to enter the correct values.
- (5) Press RETURN to move the cursor to the field for Year, and type the two digits for the current year, as in 88.
Note: For each field, either type in the correct value, or press <Decrement Time>, or <Increment Time> to move through the field's allowable range.
- (6) Repeat the same selection procedure for each of the remaining items: month (1-12), day (1-31), hour (00-23), and minutes (00-59).
- (7) Press <Set Time And Exit>.
The System Administrative Services Main Menu appears.
Note: To exit without setting new date and time, press <Exit Service>.
- (8) Press <Exit Service>.
The main menu reappears.

Figure 3-3
Menu Structure for Changing the System Date and Time



Loading a New System

This procedure describes how to load a new DNC system using the DVS 3.00 environment. (DVS is the underlying software of DNC systems.) A new system should be loaded only when:

- this installation is the first one for the system
- a new storage SRU is being used or added

- the existing disk has become corrupted.

For information on loading a new system, see the DVS Initialization Release Notes (450-1011-302).

Note: Only authorized NT personnel should initialize the system. When initializing a system, refer to the DVS Initialization Release Notes.

Reloading an Existing System

If the system already has a 3.00.xx configuration installed, the software can be upgraded without disturbing the existing configuration. This is called a secure upgrade. In a SECURE upgrade, the system need only be taken out of service momentarily, in order to reboot the system with the new release. Because the existing release is not overwritten, it can be reactivated if the new release fails to operate properly.

If there is not enough disk space to perform a secure upgrade, then the disk must be reformatted as if it were a new system. All files that are to be transferred to the new system must be copied to tape before the new release is installed, as the reformatting will erase them. The previous release cannot be reactivated if the new release fails.

Note 1: Only authorized NT personnel should perform an upgrade.

Note 2: An upgrade should be SECURE whenever possible; subject to the restrictions given in the release notes.

Note 3: If the disk was formatted using a software release preceding 2.06.05, then an upgrade is not possible. The system must be installed as a new system. If the disk was formatted using release 2.06.05 or later, then an upgrade is possible.

Determining the Free Space on the Disk

If the disk becomes full, a system crash may occur. If you are the superuser, you can check the available disk space. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.)

Proceed as follows:

- (1) Sign on as the superuser.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select Utilities and press ENTER.
The Utilities Service - Main Menu appears.
- (4) Select Helix Command Interpreter, and then press ENTER.
The system prompt appears. (It is usually '>'.)
- (5) Type in the following command

FSADMIN :LOCAL F

and then press ENTER.

- (6) Type in the following command

STATUS :LOCAL

and then press ENTER.

- (7) Repeat Step 6 until the line 'Time of Last Audit' shows the current date and time. With a large disk, this step may take more than 15 min.

- (8) Check the volume in the 'current free space' line.

If the 'current free space' is more than 30,000 blocks, you can perform a SECURE upgrade.

If the 'current free space' is less than 30,000 blocks, the system must be loaded as if it were a new system.

- (9) To exit, type in

EXIT

and then press ENTER.

Preparing to Load the New Software

To prepare for an upgrade, proceed as follows:

- (1) Determine whether the Primary Processor SRU is:

- a SASI version (68010-4, 68010-5).
- a SCSI version (XP 68010-6, XP 68020-7)

The SRU type is labelled on the front of the SRU. The 68010-4 version is not used with NSR26 and later software.

- (2) Clean the tape heads in the tape drive. (See the procedure earlier in this part.)

Note: This step is very important. Dirty tape heads cause many errors.

Rebooting the System

There are three ways to reboot a DNC:

- using the software reboot feature
- pressing the Reset button on the Primary Processor SRU (if the system is equipped with a 68020 primary processor)
- powering down and then powering up again.

Using Software Reboot

If you are the superuser, you can reboot the system by using the software reboot feature. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure. Take the following steps:

- (1) Sign on as the superuser.

The main menu appears.

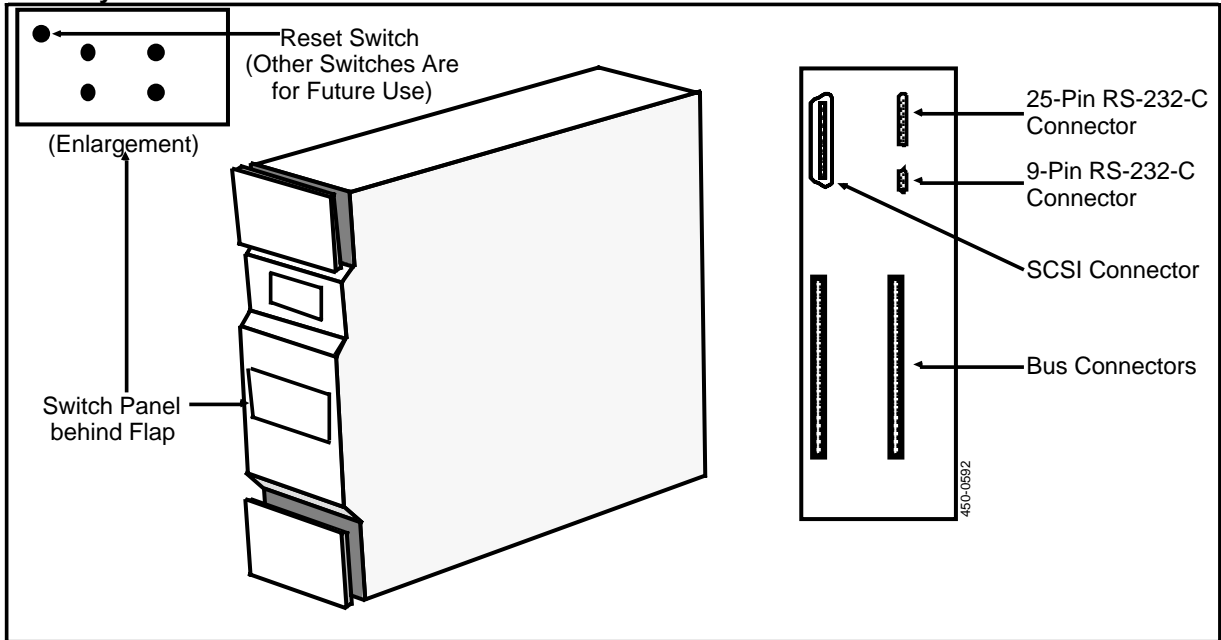
- (2) Select **SYSTEM ADMINISTRATIVE SERVICES** and press **ENTER**.
The System Administrative Services - Main Menu appears.
- (3) Select **UTILITIES** and press **ENTER**.
The Utilities Services - Main Menu appears.
- (4) Select **Helix Command Interpreter** and press **ENTER**.
The system prompt appears. (It is usually '>'.)
- (5) Type in the command **:LOCAL:UUTILS:SOFTBOOT** (in capital letters, lowercase letters, or a mixture), and then press **ENTER**.
The system prompts you to specify whether you want to quit the **SOFTBOOT** program, reboot immediately, or reboot after a delay.
To reboot immediately, follow Step 6.
- (6) If you want to reboot immediately, type in **1** and press **ENTER**.
On your terminal screen, the system displays a message stating that it is resetting all processors. Users' terminals beep, and display a message stating that the system is rebooting at the administrator's request.
To reboot after a delay, follow Steps 7 and 8.
- (7) Type in **2** and press **ENTER**.
The system prompts you for the number of minutes it is to wait before rebooting. You can specify a whole number in the range 1 to 9.
- (8) Type in a whole number in the range 1 to 9 and press **ENTER**.
The system acknowledges by displaying the message: "Wait n minutes (from hh:mm) for reboot," where n is the whole number you specified, and hh:mm is the current time. Users' terminals beep and display a message stating that the system will reboot in n minutes at the administrator's request.
When the specified delay has elapsed, users' terminals beep again, and display a message stating that the system is rebooting at the administrator's request.

Using the Reset Switch

If the Primary Processor SRU in your system is model XP 68020-7, you can use the reset switch on the front of the SRU to reboot the system. Proceed as follows:

- (1) Open the front door of the cabinet containing the Primary Processor SRU.
- (2) Open the panel on the front of the SRU. To open the panel, pull the top edge outward. (See Figure 3-4.)
- (3) Press the Reset switch.
The system reboots.

Figure 3-4
Primary Processor XP 68020-7



Powering Down and Powering Up

This procedure describes how to reboot the system without formatting and initializing the hard disk. Rebooting is a last-resort method of remedying an error condition. be powered down and then powered up for recovery. Proceed as follows:

- (1) Power down the DNC. (If your system has input jumper assembly NT4G42CA or later, use an on/off switch located on the jumper assembly. This is on the rear of cabinet 1 when viewed from the rear. If your system does not have an on/off switch, unplug the ac input cord at the input jumper assembly at the rear of cabinet 1. Cabinet 1 is the right-most cabinet, as viewed from the rear).
- (2) Wait at least 30 s, to allow the Power SRU time to discharge.
- (3) Power up the DNC.
- (4) When prompted (after approximately five minutes), enter the date and time.

4. Overview of Configuration Services

Configuration Services is a set of utilities used to define, display, and alter the configuration information that reflects the hardware and software of an installed system.

As a system administrator, one of your responsibilities is to maintain the configuration information in the system map. The map contains the definitions of all the hardware devices and software elements in the system, as well as definitions of all system users. The map tells the DNC which hardware and software entities exist in the system, and which users and user groups are known to the system.

To use one or the other of the utilities in Configuration Services, you must move through several levels of menus in the screen hierarchy of the user interface.

Accessing Configuration Services

The menu structure for this section is shown in Figure 4-1.

To access configuration services, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears. The main menu is the starting point for all system services and applications. When you sign on, the system displays the main menu that is associated with you or with your user group.

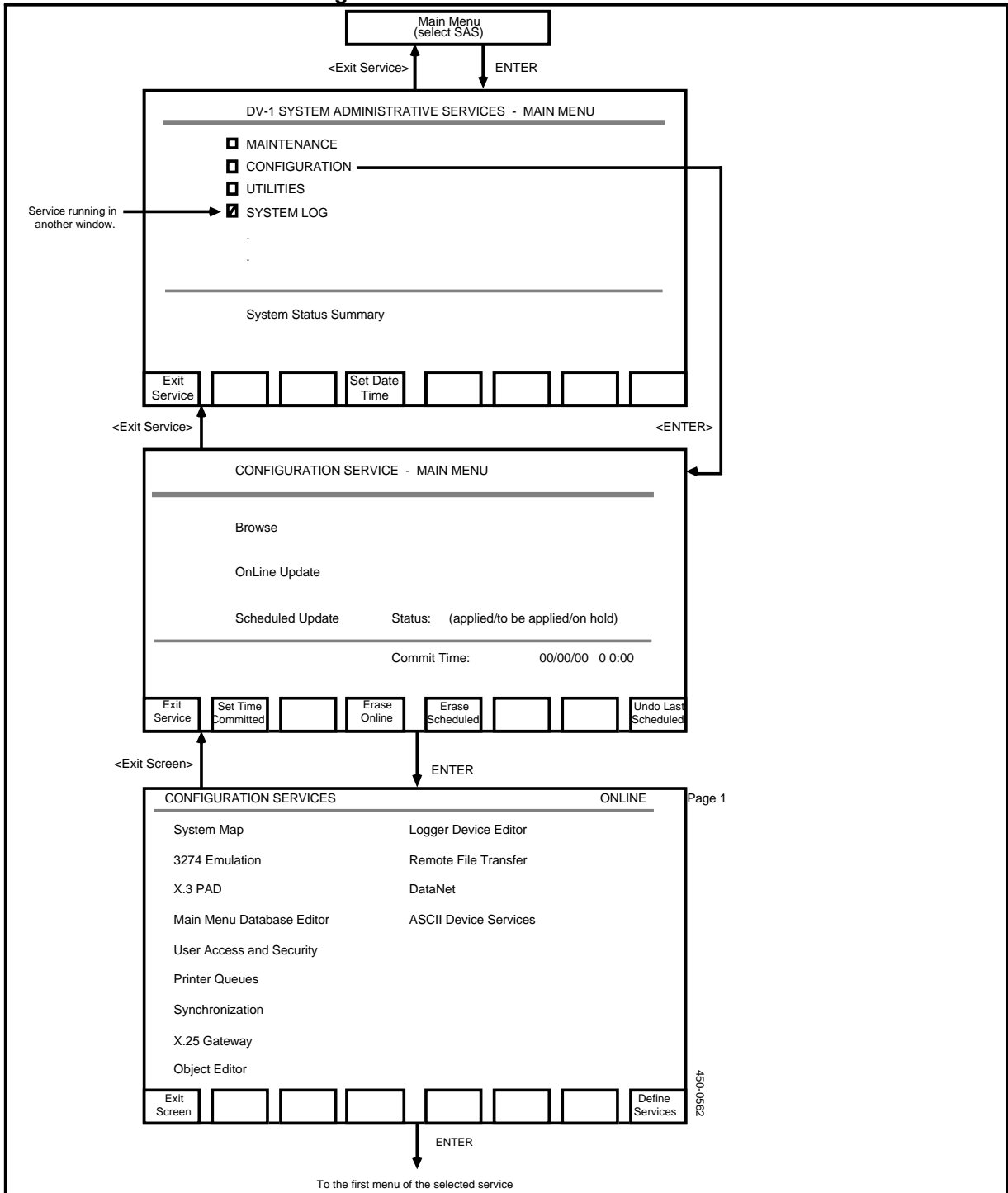
- (2) Use the arrow keys to select SYSTEM ADMINISTRATIVE SERVICES and then press ENTER.

The System Administrative Services Main Menu appears. This menu is the entry point for all the services you use to configure and maintain your system.

- (3) Use the arrow keys to select CONFIGURATION and then press ENTER.

The system displays the Configuration Service - Main Menu.

Figure 4-1
Screens Used to Access Configuration Services



- (4) The purpose of this menu is to inform the system how you want to use the configuration services screens. You have three choices: Browse, Online Update, and Scheduled Update. If you only want to inspect the information currently in the system map, select Browse. If you want to update the system map, select either Online Update or Scheduled Update. (If you select Scheduled Update, you must specify the date and time when the changes are

to take effect.) When you press ENTER, the system displays the Configuration Services Menu.

- (5) The options listed on this menu are the configuration services. To use one of the services, use the arrow keys to select it, and then press ENTER.

Online Updates and Scheduled Updates

When you want to put new definitions into the system configuration, or change the existing definitions, you must choose either Online Update or Scheduled Update on the Configuration Service - Main Menu. If you choose an online update, the configuration information is added to system configuration and becomes effective no later than the time when you exit to the main menu. In contrast, if you choose a scheduled update, then the configuration information is added to the system configuration only at a time in the future which you must specify.

Specifying an Online Update

To specify an online update, proceed as follows:

- (1) On the Configuration Service - Main Menu, use the arrow keys to select Online Update.
- (2) Press ENTER.

The system displays the Configuration Services Menu.

Specifying a Scheduled Update

To specify a scheduled update, proceed as follows:

- (1) When you are at the Configuration Service - Main Menu, use the arrow keys to select Scheduled Update.

At this point, the Status field shows the current status of the most recent Scheduled Update:

- **Applied** means the scheduled update has already taken place.
- **To Be Applied** means the scheduled update is set to take place in the future.
- **On Hold** means the scheduled update could not be completed at its appointed time for some reason. The update is on hold until the system is free to perform the update.

- (2) Press <Set Time Committed>.

All softkey labels except <Quit> disappear, and the cursor moves to the Commit Time field.

- (3) Enter the year, month, day, hour and minute (24-hour clock) at which the update is to take place. Single digits should be preceded by '0', for example, '05'. To back up to the previous field, hold down the SHIFT key and press the TAB key. After you have filled all the data fields (year, month, day, hour, and minute), the rest of the softkey labels reappear. To cancel the process, press <Erase Scheduled>.
- (4) When the date and time are correct, press ENTER.

The system displays the Configuration Services Menu, with 'UPDATE' in the upper right of screen. This message means that any reconfiguration done between now and when you exit to the System Administrative Services Main Menu will not be applied until the time specified.

Canceling a Previously Scheduled Update

To cancel a previously scheduled update, proceed as follows:

- (1) Access the System Administrative Services Main Menu.
- (2) Select Scheduled Update.
 - If the status is APPLIED, it can be undone by pressing <Undo Last Scheduled>.
 - If the status is TO BE APPLIED or ON HOLD, it can be undone by pressing <Erase Scheduled>.
- (3) At this point, you can
 - specify another scheduled update
 - select either Browse or Online
 - exit the screen by pressing <Exit Service>.

Exiting

After accessing the Configuration Services screens in the user interface, there are various ways to exit:

- You can press the <Exit> softkeys until you arrive at the main menu.
- You can use one of the windowing functions to go to another window. For example, you can press the WINDOW key, which takes you directly to another active window.
- You can press the MAIN MENU key. This returns you to the main menu. The window that you were in remains open, but is in the background.
- You can press the CLOSE key. This closes the window you are in, saves any changes on disk, and returns you to the main menu.
- You can hold down the ALT key and press the CLOSE key. This closes the window you are in without saving the changes, and returns you to the main menu. Note that if a task is in progress, this method of exiting can have unpredictable results.

5. Overview of the System Map Utility

The System Map Utility is one of the group of utilities included in configuration services. You use the utility to maintain the map's information concerning the hardware and software components of the system.

Every system has a preconfigured basic map. The preconfigured map includes information about the system's core hardware and software. You use the System Map Utility when you are adding to the basic system, or when you are modifying previous changes.

The system map contains the location and status of:

- all software components in the system
- all hardware components except Power Supply SRUs, Mass Storage SRUs, and Cartridge Tape SRUs.

The location of a hardware module is its physical address, that is, the cabinet and slot in which the component is installed. The location of a software module is the address of the hardware module in which it resides. The system uses the address information to direct information to system components via the backplane bus.

Using the System Map Utility

The screens of the System Map Utility allow you to progress through the system's structure until you reach a screen listing the individual hardware or software components that you want to work with. Using the screens, you can look at the the current configuration, and modify it if necessary. You must modify the configuration when you add, delete, or move components. You can also update the configuration by changing the name assigned to a component, or by changing the state of a component (active or defined).

If you are familiar with the menu flow of the System Map Utility, you will be better able to inspect and update the configuration information.

The System Map Utility uses two types of list screens:

- 'map' lists, showing the currently configured components
- 'selection' lists, showing the components that you can add to the associated map list.

The map lists are arranged in a hierarchy, as shown in Figure 5-1. The highest level is the **cabinet level**. At this level there are Hardware Map Screens, which list the hardware components that are currently configured in each cabinet. These hardware components are called shared resource units (SRUs). From any Hardware Map screen, you can go to the associated Selection List screen, which lists the SRUs that can be configured in the cabinet.

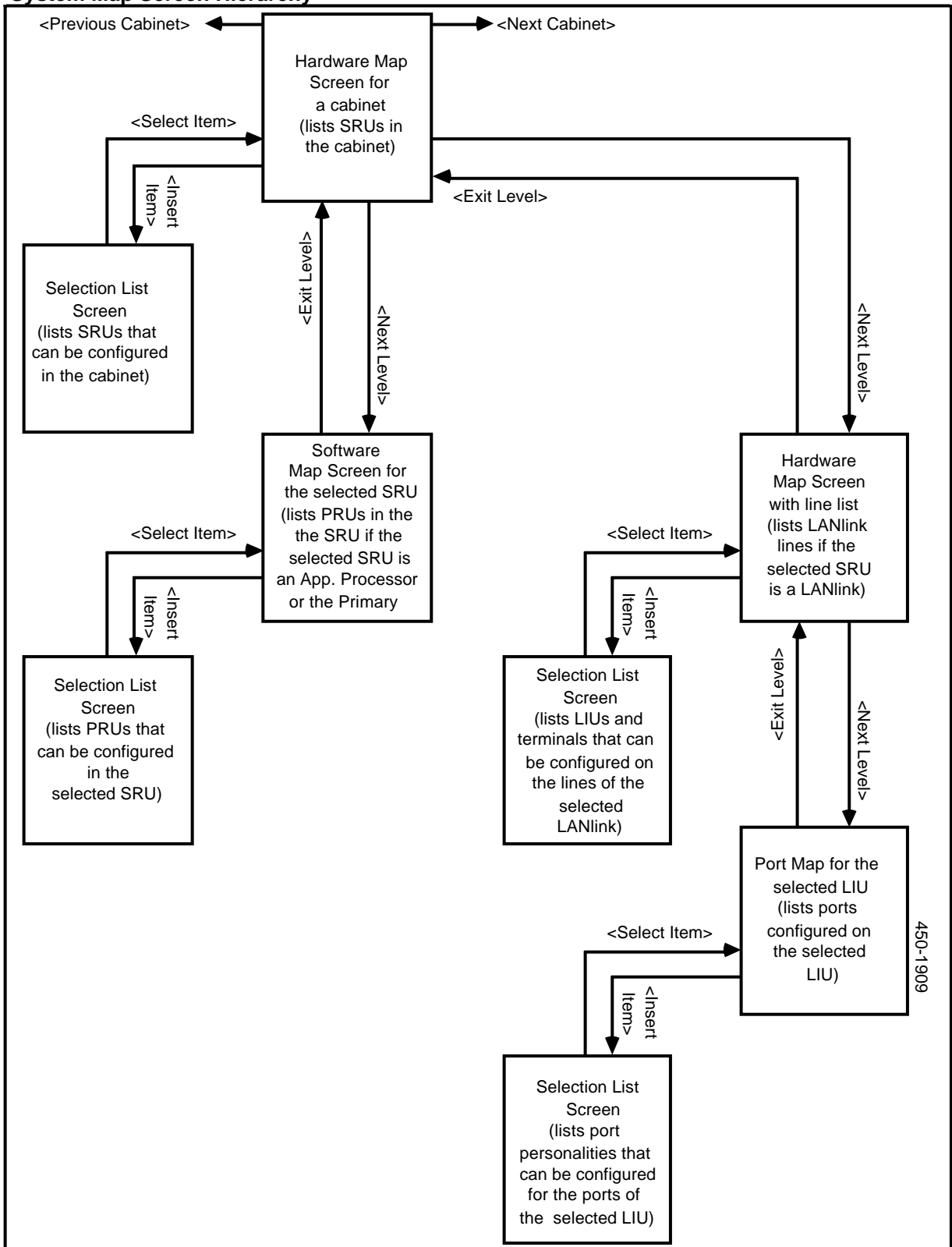
The Primary Processor SRU and the Applications Processor SRUs contain software modules called program resource units (PRUs). Every SRU of this type has an associated Software Map screen, which lists all the PRUs that are currently configured for the SRU. From any Software Map screen, you can go to the associated Selection List screen, which lists the PRUs that are available to the system.

Each LANlink SRU has an associated Hardware Map (rather than a Software Map). A LANlink is an SRU that handles the system's communications with peripheral devices. The Hardware Map screen associated with a LANlink SRU lists remote resource units (RRUs), which are the devices that are connected to the SRU. These devices are of two types: M4000-series terminals and LAN Interface Units (LIUs). (An LIU is an interface device external to the cabinets. Peripheral input and output devices are connected to an LIU.) From a LANlink SRU's Hardware Map screen, you can access the associated Selection List screen, which lists the RRUs that can be connected to the LANlink SRU.

There is a third level in the system map's screen hierarchy, the **LIU level**. Each LIU has an associated Port Map. Each LAN Interface Unit (LIU) has ports to which peripheral input and output devices can be connected. For each peripheral device, the LIU must contain an appropriate port personality. The port personality is the software that enables the LIU to communicate with the peripheral device.

The Port Map lists the software currently configured for the LIU's ports. From the Port Map, you can access the associated Selection List screen, listing the port personalities that can be loaded into the LIU.

Figure 5-1
System Map Screen Hierarchy



The second level is the **SRU level**. At this level there are map screens which list the components associated with each SRU.

Using the Different Levels of the Screen Hierarchy

At the cabinet level, you can add or delete a cabinet. You can also view, insert, delete, or change the name, address, or status of any SRU in any cabinet. At the SRU level, you can perform similar operations on the PRUs configured for an SRU, or on the terminals and LIUs connected to a LANlink SRU. At the LIU level, you can perform similar operations on the port personalities in an LIU.

At the cabinet level you can move to the Hardware Map screens for any cabinet by using the <Next Cabinet> and <Previous Cabinet> softkeys.

To move down from one level to the next, use the arrow keys to select one of the components on the currently displayed Map screen, and then press <Next Level>. The hierarchical relationship of components means that a component listed on a lower-level Map screen is always associated with components listed on higher-level Map screens. A PRU resides in a particular SRU, which is installed in a particular cabinet. Similarly, a port personality resides in an LIU, which is connected to a LANlink SRU, which is installed in a particular cabinet.

To move up from one level to the next, press <Exit Level>.

How the Mode of Operation Affects the System Map Utility

When you enter Configuration Services, you choose the mode of operation: Browse, Online Update, or Scheduled Update. The chosen mode affects the operation of all the Configuration Services utilities, including the System Map.

If you use the System Map Utility in Browse mode, you can only view the configuration information. The system does not make available the softkeys whose functions update the system map.

The update functions and softkeys are available when you are in Online Update mode or Scheduled Update mode. In Scheduled Update mode, you can always make any changes you want. In Online Update mode, your ability to make changes is limited if a scheduled update is pending, because you cannot modify the configuration of a component that is scheduled to be modified by the pending scheduled update.

In addition, you cannot modify the configuration of any component that is directly associated with a component that is to be modified in a pending scheduled update. For example, if a pending scheduled update is to change the address of a LANlink SRU, then in Online Update mode you cannot change the LANlink's address, nor can you change the address of any device (terminal or LIU) that is connected to the LANlink.

In Online Update mode, the system indicates the components that are to be modified in pending scheduled updates. 'UPD' is displayed beside such components on the Map screens.

6. Configuring Shared Resource Units

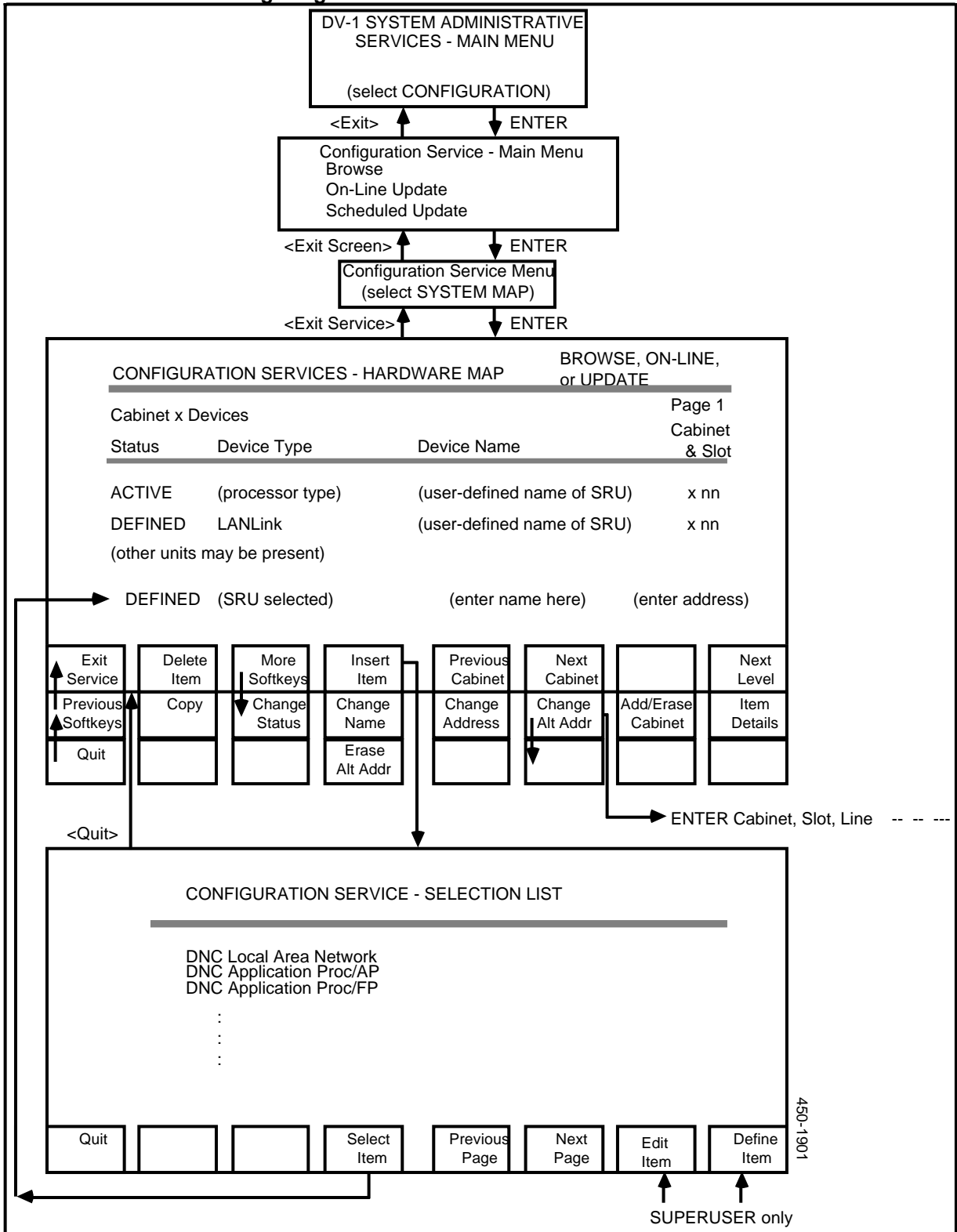
Shared resource units (SRUs) are the hardware modules that are housed in the cabinets of the system. You must ensure that the system map contains the correct software address of all SRUs that transmit information through the backplane bus (that is, all SRUs listed in the system map). Whenever you install or rearrange any such SRU, you must use Configuration Services to update the system map with the SRU's current address (cabinet number and slot number). This ensures that the system software will know where the SRU is physically located.

It is not necessary to enter the addresses of SRUs that do not use the backplane bus, such as Cartridge Tape SRUs, Mass Storage SRUs, and Power Supplies.

Figure 6-1 shows the menu structure for configuring the software addresses of SRUs

After adding or moving an SRU, you should set up the appropriate PRUs or RRUs.

Figure 6-1
Menu Structure for Configuring SRUs' Software Addresses



SRU Software Addresses

The system software locates the various SRUs by a defined communications address based on the SRU's physical location in the cabinet. System planners decide where in the cabinets each SRU is to be installed, and record this information on worksheets provided in NTP 450-10110-151. The worksheets are then stored in the Site Records, 450-1011-152.

When the system is installed, the address is entered into the system database through System Administrative Services as part of the system map. A typical SRU address looks like this: 1-08, where 1 is cabinet 1, and 08 is the slot number for an SRU in the cabinet's upper shelf.

Cabinets are numbered beginning with cabinet 1 on the left of the system lineup, as viewed from the front, up to a maximum of eight cabinets. The lineup grows to the right of cabinet 1. There are four SRU positions on each shelf, and each SRU position has two slot numbers. Slots 01 to 08 are on the upper shelf and slots 09 to 16 are on the lower shelf. Figure 6-2 shows the shelf positions and slot positions of a cabinet.

Each of the slots can be individually addressed by the system. The slot number used as an SRU's address depends on the type and size of the SRU. A quarter-shelf SRU has two slots, a half-shelf SRU has four slots, and a full-shelf SRU has eight slots. The slots correspond to printed circuit assemblies inside the SRU. Typically, the SRU's communications address is in an even-numbered slot position, as that address usually corresponds to the SRU slot with the printed circuit assembly equipped with the SRU's bus connector (male). This is why only even numbers are shown on the shelf labels.

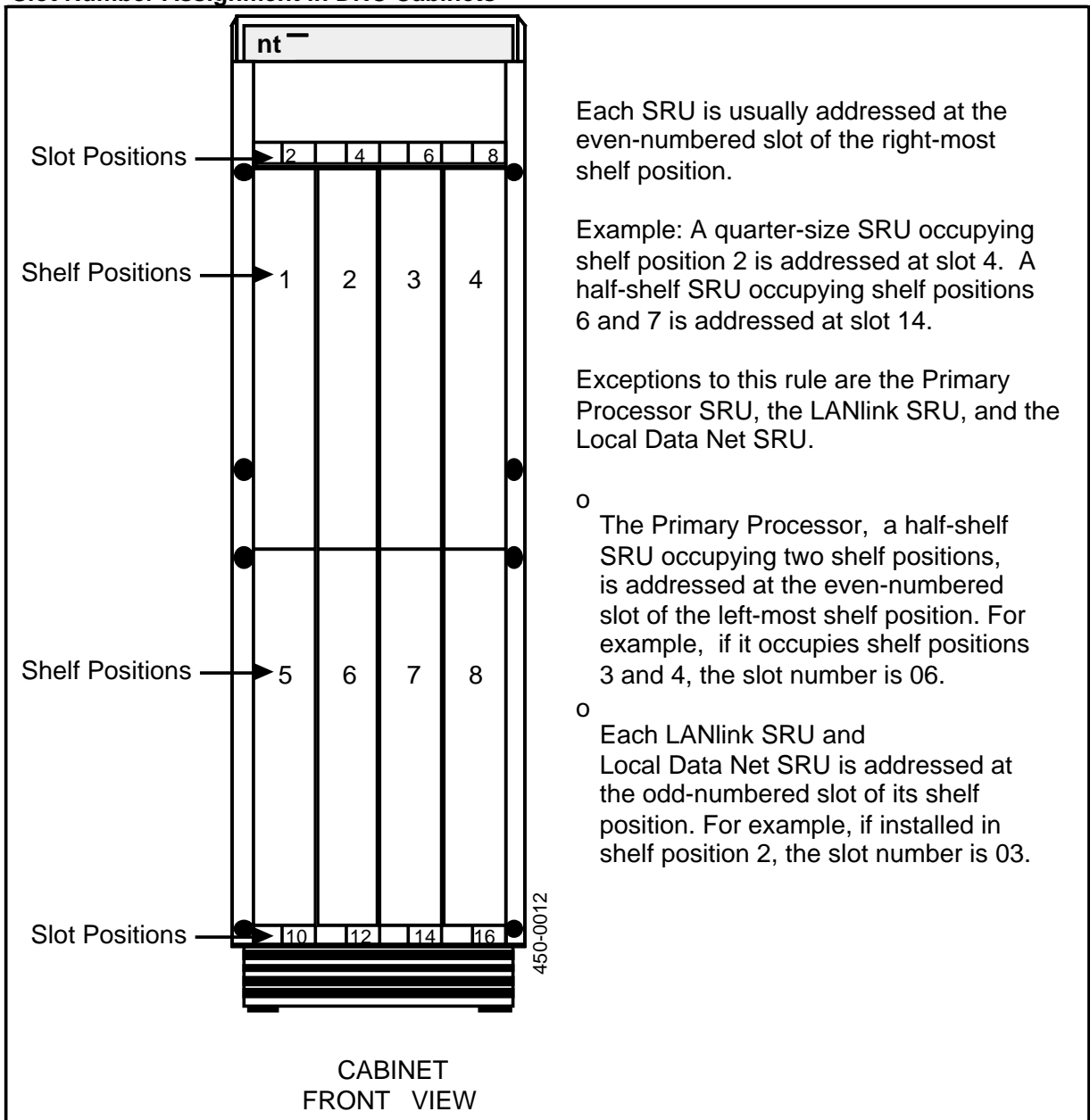
An exception to the rule of even-numbered addressing is the LANlink SRU, which is a quarter-shelf SRU (that is, it occupies one shelf position). The LANlink SRU is addressed at its left-most, or odd-numbered slot. For example, if installed in shelf position 1 of cabinet 1, its address would be 1-01. (Its bus connector, however, is located as usual on the right side.)

Another exception is the Primary Processor, which is a half-shelf (two-position) SRU that is equipped with two connectors. It is addressed at the left-most connector. If the SRU occupies positions 1 and 2 of the cabinet (slots 01 to 04), its address is 1-02. Slot 04 is not addressed. This also applies to the half-shelf File Processor SRU, the Conference Services SRU, and the Digital Trunk Link SRU.

Note: The Primary Processor can be addressed regardless of its location, that is, its physical location and its defined address do not need to match.

The Power Supply, Mass Storage, and Cartridge Tape SRUs are not addressed by the system.

Figure 6-2
Slot Number Assignment in DNC Cabinets



Defining an SRU in an Existing Cabinet

This procedure explains how to define an SRU in an existing cabinet. If you need to define the cabinet that contains the SRU, see 'Defining a New Cabinet', later in this part. To define an SRU, proceed as follows:

- (1) Sign on as a system administrator.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and press ENTER.

The system displays the Configuration Service - Main Menu

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet that is to contain the SRU.

- (7) Press <Insert Item>.

The system displays the Hardware Map screen, listing the SRUs that can be chosen.

- (8) Use the arrow keys to select the type of device, and then press <Select Item>.

The system returns to the Hardware Map screen. The selected device is listed in the lower portion of the screen, and the cursor is to the right, prompting for a device name.

- (9) Type in a device name (required; the default is '---'), and then press RETURN.

The cursor moves to the right to prompt for a cabinet number.

- (10) Type in the cabinet number, if it is to be different from the default cabinet number that is already on the screen. Then press RETURN.

The cursor moves to the right to prompt for a slot number.

- (11) Enter the slot number (required), where the SRU is to reside in the cabinet, and then press RETURN.

The system refreshes the list of SRUs in the cabinet. The newly defined SRU appears in its assigned cabinet and slot, in the defined state.

Steps 12 and 13 activate the SRU.

- (12) Press <More Softkeys>.

New softkeys appear.

- (13) Press the arrow keys to select the new SRU, and then press <Change Status>.

The status changes to active. The previous softkeys reappear.

- (14) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Using the N+1 Redundancy Feature

The N+1 redundancy feature enables the system to continue to function even if an Applications Processor fails.

To implement N+1 redundancy, you must have an Applications Processor that can act as a backup. The backup SRU must have enough unused capacity to accommodate all the program resource units (PRUs) loaded into any one of the backed up SRUs. For each of those SRUs, you use the address of the backup unit as the alternate address. If one of the backed up SRUs fails, the system loads the PRUs into the backup unit, which takes over.

Defining an Alternate Address for an SRU

To define an alternate address for an SRU, proceed as follows:

- (1) Sign on as a system administrator.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and press ENTER.
The system displays the Configuration Service - Main Menu
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.
- (5) Select System Map, and press ENTER.
The system displays the Hardware Map screen, listing the SRUs in the first cabinet.
- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet that contains the SRU.
- (7) Press <More Softkeys>.
New softkeys appear.
- (8) Press the arrow keys to select the SRU, and then press <Change Alt Addr>.
The system prompts for the alternate address, which is composed of a cabinet number and a slot number.
- (9) Type in the new alternate address, which indicates the address where the software of the SRU is to be reloaded in the event the SRU fails. The alternate address is the address of the backup SRU. Enter the address in the format
c ss 00
where c is a one-digit number (1 to 8) representing the cabinet and ss is a two-digit number (01 to 16) representing the slot. When entering the address, use spaces to separate the three components of the address (c, ss, and 00). Then press ENTER.
The previous softkeys reappear.
- (10) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Changing the Status, Name, or Address of an SRU

If you want to change the status, name, address, or alternate address of an SRU, proceed as follows:

- (1) Sign on as a system administrator.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.
- (5) Select System Map, and press ENTER.
The system displays the Hardware Map screen, listing the SRUs in the first cabinet.
- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet that contains the SRU.
- (7) Use the arrow keys to select the SRU, and press <More Softkeys>.

New softkey functions are displayed:

- <Copy> makes a copy of the selected SRU definition. The system prompts you to enter a name and address for the new SRU.
 - <Change Status> changes the status (as shown in the left-most column) by toggling between active or defined. Devices are removed from interacting with the system bus when changed from the active to the defined state.
 - <Change Name> prompts the user to type in the new name for the device specified by the cursor position.
 - <Change Address> prompts for a new cabinet and slot number. Refer to the site records (450-1011-152) for the address, or see Figure 6-2 for a description of the addressing scheme.
 - <Change Alt Addr> displays the existing alternate address. Type the new alternate address in the form 'c ss 00'. When entering the address, use spaces to separate the three components of the address (c, ss, and 00).
 - <Item Details> calls up the Item Definition screen, which displays detailed information about the SRU.
 - <Previous Softkeys> returns to the regular set of softkeys.
- (8) If you have just typed in a new name, address, or alternate address, press ENTER.
The screen is updated with the new entry. The previous softkeys reappear.
 - (9) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Deleting an SRU

To delete an SRU, take the following steps:

- (1) Sign on as a system administrator.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and press ENTER.
The system displays the Configuration Service - Main Menu
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.
- (5) Select System Map, and press ENTER.
The system displays the Hardware Map screen, listing the SRUs in the first cabinet.
- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU that is to be deleted.
- (7) Use the arrow keys to select the SRU that is to be deleted, press <Delete Item>, and then press <Delete Item> a second time to confirm the deletion.

Note 1: You cannot delete the Primary Processor SRU.

Note 2: You cannot delete the LANlink SRU that your terminal is connected to.

Note 3: Before deleting an Applications Processor, you must delete all PRUs configured under it. You cannot delete the following PRUs: System Admin Services (SAS), Screen Activity Manager (SAM), and Data Connection Manager (DCM).

- (8) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Defining a New Cabinet

If you need to define a new cabinet that is being added to the system, take the following steps:

- (1) Sign on as a system administrator.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.

- (5) Select System Map, and press ENTER.
The system displays the Hardware Map screen, listing the SRUs in the first cabinet.
- (6) Press <More Softkeys>.
New softkeys appear.
- (7) Press <Add/Erase Cabinet>.
The previous softkeys disappear, and are replaced by three new softkeys: <Quit>, <Delete Cabinet>, and <Add Cabinet>.
- (8) Press <Add Cabinet>.
A new cabinet is designated with the next available cabinet number.
- (9) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Deleting a Cabinet

You can delete a cabinet only if it has no configured SRUs. If you want to delete a cabinet that has configured SRUs, you must delete the SRUs before deleting the cabinet.

Note: You cannot delete the Primary Processor SRU, and you cannot delete the LANlink SRU that your terminal is connected to.

To delete a cabinet, proceed as follows:

- (1) Sign on as a system administrator.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and press ENTER.
The system displays the Configuration Service - Main Menu
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.
- (5) Select System Map, and press ENTER.
The system displays the Hardware Map screen, listing the SRUs in the first cabinet.
- (6) Use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet that is to be deleted.
- (7) Press <More Softkeys>.
- (8) Press <Add/Erase Cabinet>.

The previous softkeys disappear, and are replaced by three new softkeys: <Quit>, <Delete Cabinet>, and <Add Cabinet>.

- (9) Press <Delete Cabinet>.

The cabinet is deleted from the configuration.

- (10) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

7. Configuring Program Resource Units

Program resource units (PRUs) are the software modules that run on processor SRUs (the Primary Processor SRU and the Applications Processor SRUs). PRUs are listed in the system map. Each PRU has an address, which is identical to the address of the SRU that it resides on. You define the PRUs for an SRU after you have defined and activated the SRU. If you want to delete an SRU, you must first delete all the PRUs that reside on it.

The menu structure is shown in Figure 7-1.

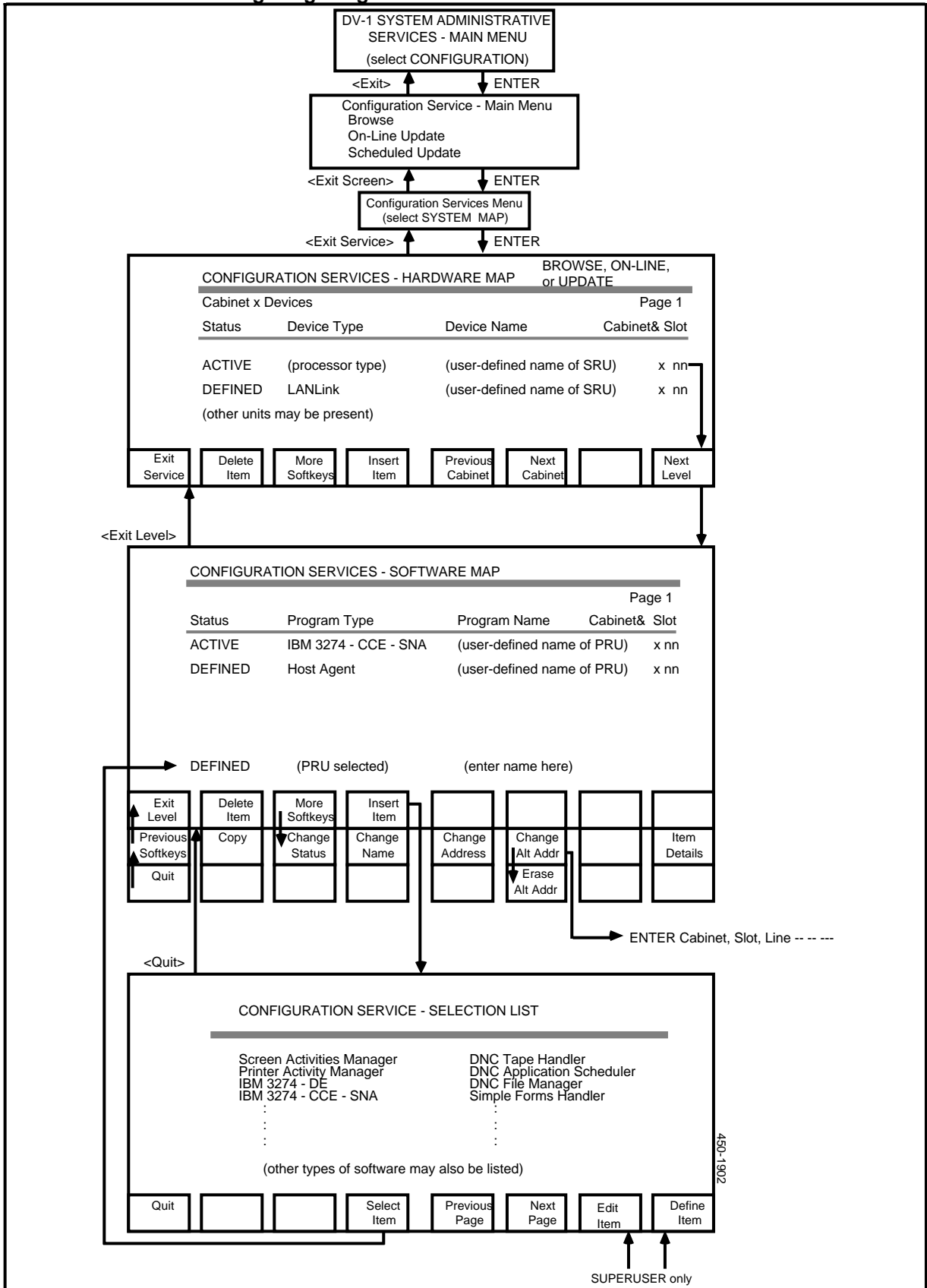
Adding a PRU to a Processor SRU

You can add a PRU to a processor SRU that is in the active state. You use the System Map Utility to add a PRU. You select the PRU from a list of available software, and associate it with the SRU. In certain cases, the system will already have one or more instances of the PRU that you are adding, and you will want to make the new instance unique. To make the instance unique, you edit its object index, as explained in this procedure.

To define a PRU, take the following steps:

- (1) Sign on as a system administrator.
The system displays the main menu.
- (2) Select **SYSTEM ADMINISTRATIVE SERVICES**, and press **ENTER**.
The system displays the System Administrative Services Main Menu.
- (3) Select **CONFIGURATION**, and then press **ENTER**.
The system displays the Configuration Service - Main Menu.
- (4) Select **Online Update** or **Scheduled Update** and then press **ENTER**.
The system displays the Configuration Services Menu.
- (5) Select **System Map** and press **ENTER**.
The first Hardware Map screen appears, listing the SRUs in the first cabinet.

Figure 7-1
Menu Structure for Configuring Program Resource Units



- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU on which the PRU is to run.
- (7) Select the SRU that is to contain the new PRU, and press <Next Level>. The system displays the Software Map screen, listing the PRUs that currently reside on the SRU. (This screen is blank if no PRUs are currently assigned.)
- (8) Press <Insert Item>. The system displays the Selection List screen, listing PRUs that can be chosen.
- (9) Use the arrow keys to select the desired PRU. Steps 10 to 16 explain how to define a unique instance of the PRU, and how to edit certain PRU parameters (maximum fault count and courtesy down time). If you do not need to define a unique instance or edit the parameters, go directly to Step 17.
- (10) Press <Edit Item>. The system displays the Item Definition screen. To move the cursor from one field to the next on this screen, press RETURN. To move the cursor back to the preceding field, hold down the SHIFT key and press the TAB key.
- (11) If you want to edit the maximum fault count, move the cursor to the Maximum Fault Count field and type in the new value. The range of acceptable values is 0 to 9.
- (12) If you want to edit the courtesy down time, move the cursor to the Courtesy Down Time field and type in the new value. Courtesy down time is expressed as a number of seconds. The recommended range of values is 0 to 60 seconds.
Note: The courtesy down time can affect memory allocation. Therefore, you should not enter a value outside the recommended range.
- (13) If you want to define a unique instance of the PRU, move the cursor to the Object Index field, and type in a new object index value that is unique among instances of this PRU. The range of acceptable values is 0 to 31.
- (14) If you modified the object index in the previous step, move the cursor to the Unit Name field, and type in a name that includes the object index value.
- (15) Press <Define as New Item>. The system redisplay the Selection List screen. The list on the screen includes the newly defined item.
- (16) If the desired PRU is not already selected on the Selection List screen, use the arrow keys to select it.
- (17) Press <Select Item>. The system redisplay the Software Map screen for the SRU. The selected PRU is in the lower portion of the screen. The cursor is to the right, prompting for a name.

- (18) Type in a new name (required; the default is '---'), and press ENTER.
The cursor moves to the right to prompt for a cabinet and slot.
- (19) To put the PRU in the selected SRU, choose the default cabinet and slot by pressing ENTER twice. (You can type in a different cabinet and slot if you want to put the PRU into a different SRU.)
The PRU appears in the list, in the defined state.
Steps 20 and 21 activate the PRU.
- (20) With the newly defined PRU selected, press <More Softkeys>.
New softkeys appear.
- (21) Press <Change Status>.
The status of the PRU changes to active. The previous softkeys reappear.
- (22) To exit, press the <Exit> softkeys until you arrive at the main menu.

After you add a PRU, you must reinitialize the Log/Alarm Query PRU to make it recognize the new PRU. To reinitialize the PRU, remove it from service and then put it back into service. These procedures are explained in 'Maintenance for Program Resource Units', in the Part 25, 'Performing Maintenance on System Components'.

Defining an Alternate Address for a PRU

The address you assign to a PRU when you initially add it to the system is the location where the system will try to load and run the PRU. If the system cannot load the PRU at that address or if a hardware fault prevents it from executing, the function the PRU provides will be lost. To prevent such a possible loss of service, you can define an alternate address for a PRU. This address is a second hardware location where the PRU can run.

In the event of a hardware malfunction, the system automatically moves the PRU to the location specified by the alternate address.

Note 1: You are not required to define alternate addresses for any PRUs. This is an optional feature.

Note 2: There are certain PRUs for which you cannot define alternate addresses. Those PRUs are: System Admin Services (SAS), Screen Activity Manager (SAM), and Data Connection Manager (DCM).

- (1) Sign on as a system administrator.
The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and then press ENTER.
The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.
The system displays the Configuration Services Menu.
- (5) Select System Map and press ENTER.
The first Hardware Map screen appears, listing the SRUs in the first cabinet.
- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU containing the PRU for which you are defining the alternate address.
- (7) Select the SRU and press <Next Level>.
The system displays the Software Map screen, listing the PRUs that currently reside on the SRU.
- (8) Select the PRU and press <More Softkeys>.
New softkeys appear.
- (9) Press <Change Alt Addr>.
The system prompts for the new address, which is composed of a cabinet number and a slot number.
- (10) Type in the new address, which indicates where the software of the PRU is to be reloaded in the event the PRU fails. Enter the address in the format

c ss 00

where c is a one-digit number (1 to 8) representing the cabinet and ss is a two-digit number (01 to 16) representing the slot. When entering the address, use spaces to separate the three components of the address (c, ss, and 00). Then press ENTER.

The previous softkeys reappear.
- (11) To exit, press the <Exit> softkeys until you arrive at the main menu.

Changing a PRU's Status, Name, Address, or Alternate Address

You can change the attributes of almost all PRUs. The exceptions are: System Admin Sevices (SAS), Screen Activity Manager (SAM), and Data Connection Manager (DCM). You cannot change the addresses or statuses of these PRUs, and you cannot define alternate addresses for them.

To change an attribute of a PRU, proceed as follows:

- (1) Sign on as a system administrator.
The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and then press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map and press ENTER.

The first Hardware Map screen appears, listing the SRUs in the first cabinet.

- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU where the PRU resides.
- (7) Select the SRU, and press <Next Level>.

The system displays the Software Map screen, listing the PRUs that currently reside on the SRU.

- (8) Press <More Softkeys>.

New softkeys appear:

- <Copy> makes a copy of the selected PRU definition. The system prompts you to enter a name and address for the new PRU.
 - <Change Status> changes the status (as shown in the left-most column) by toggling between active or defined. Devices are removed from interacting with the system bus when changed from the active to the defined state.
 - <Change Name> prompts the user to type in the new name for the PRU specified by the cursor position.
 - <Change Address> prompts for a new slot number to which the PRU will be moved.
 - <Change Alt Address> prompts for the numbers of the new cabinet and slot to which the software of the PRU will be loaded in the event the PRU fails.
 - <Item Details> calls up the Item Definition screen, which displays detailed information about the PRU.
 - <Previous Softkeys> returns to the regular set of softkeys.
- (9) Press the arrow keys to select the PRU, and press the softkey that effects the desired change.

If the name, address, or alternate address is to be changed, the system prompts for information.

- (10) Enter the required information.

The previous softkeys reappear.

- (11) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Note: After you change the address of a PRU, you must reinitialize the Log/Alarm Query RRU to make it recognize the moved PRU. To reinitialize the PRU, remove it from service and then put it back into service. These procedures are explained in 'Maintenance for Program Resource Units', in Part 25, 'Performing Maintenance on System Components'.

Deleting a PRU

PRUs should be deleted only by Northern Telecom authorized personnel. When deleting a PRU, do so as instructed by the release notes that accompany a new

software release. Note that you should not delete the following PRUs: System Admin Services (SAS), System Activity Manager (SAM), and Data Connection Manager (DCM).

To delete a PRU, take the following steps:

- (1) Sign on as a system administrator.
The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and then press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and then press ENTER.
The system displays the Configuration Services Menu.
- (5) Select System Map and press ENTER.
The first Hardware Map screen appears, listing the SRUs in the first cabinet.
- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU where the PRU resides.
- (7) Select the SRU, and press <Next Level>.
The system displays the Software Map screen, listing the PRUs that currently reside on the SRU.
- (8) Use the arrow keys to select the PRU that is to be deleted, and press <Delete Item>.
The system prompts you to confirm the deletion.
- (9) Press <Delete Item> again to confirm the deletion.
The PRU disappears from the list.
- (10) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

8. Configuring RRUS: M4000-series Terminals and LIUs

A remote resource unit (RRU) is a device that connects directly to a LANlink SRU without an intermediate device.

This part of the manual explains how to configure two types of RRUs: M4000-series terminals and LIUs.

Adding, Moving, or Deleting an M4000-series Terminal

An M4000-series terminal is connected to a LANlink SRU. Whenever you want to add, move, or delete an M4000-series terminal, you access the Hardware Map screen, select the LANlink SRU on that screen, and access the screen at the next lower level. That screen lists the RRUs - M4000-series terminals and LIUs - that are connected to the LANlink SRU.

This section refers to all the M4000-series terminals that are attached to the system, with the exception of the system administrator's terminal.

Adding an M4000-Series Terminal

This procedure describes how to configure a new M4000-series terminal on a DNC system.

Note: This procedure assumes that the new add-on hardware is completely installed according to 450-1011-201.

To add an M4000-series terminal, proceed as follows:

- (1) Sign on as a system administrator.
The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and then press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and then press ENTER.
The system displays the Configuration Services Menu.
- (5) Select System Map, and then press ENTER.

The system displays the Hardware Map screen.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the Hardware Map screen for the cabinet containing the LANlink to which the M4000-series terminal is to be connected.
- (7) On the Hardware Map screen, use the arrow keys to select the LANlink, and then press <Next Level>.

The system refreshes the Hardware Map screen, and displays the line list for the LANlink, that is, the list of terminals and LIUs connected to the LANlink, and the line number of each device.

- (8) Press <Insert Item>.

The system displays the Selection List screen, which lists device types that can be connected to the LANlink.

- (9) On the Selection List screen, use the arrow keys to select one of the following M4000-series terminals:

M4020 Terminal (for an M4020 or M4010 terminal)
M4022 Terminal
M4100 Terminal

and press <Select Item>.

The system redisplay the Hardware Map screen, with a list of the devices connected to the LANlink, with the line number of each device. In the lower portion of the screen, the system prompts for a name for the new terminal. (Only one softkey is available, the <Quit> softkey. Press this softkey if you decide not to proceed with this task.)

- (10) Enter a new name (required; the default is '---'), and then press RETURN.

The system prompts for a line number.

- (11) Enter the number of the LANlink line to which the terminal is to be connected. (If the number is a single digit, enter it with a leading 0, as in 05.) Then press ENTER.

After a pause, the system refreshes the list on the screen. In the refreshed list, the terminal appears on its assigned LANlink line in the defined state. Also, the previous softkeys reappear.

Steps 12 and 13 activate the terminal.

- (12) On the Hardware Map screen, press <More Softkeys>.

New softkeys appear.

- (13) Use arrow keys to select the terminal just defined, then press <Change Status>.

The previous softkeys reappear.

A few minutes after you exit from the menus, the new terminal begins to boot.

The terminal's status changes to active.

- (14) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Changing the Status, Name, or Address of an M4000-series Terminal

This procedure describes how to change the name or status of an M4000-series terminal, and how to move such a terminal to a different line on the same LANlink SRU.

Note: If you are changing the terminal's address, then before carrying out this procedure, you must move the terminal and reconnect it to the new LANlink line, as described in 450-1011-201.

To change the name, status, or address of an M4000-series terminal, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, then press ENTER.
The System Administrative Services Main Menu appears.
- (3) On the System Administrative Services Main Menu, select CONFIGURATION, then press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and then press ENTER.
The system displays the Configuration Services Menu.
- (5) Select System Map and press ENTER.
The system displays the Hardware Map screen.
- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the Hardware Map screen for the cabinet containing the LANlink to which the M4000-series terminal is connected.
- (7) On the Hardware Map screen, use the arrow keys to select the LANlink, then press <Next Level>.
The system refreshes the Hardware Map screen, and displays the line list for the LANlink.
- (8) Select the LANlink line to which the terminal is currently assigned.
- (9) Press <More Softkeys>.
New softkeys appear:
 - <Copy> makes a copy of the selected RRU definition. The system prompts you to enter a name and address for the new RRU.
 - <Change Status> changes the status (as shown in the left-most column) by toggling between active or defined. Devices are removed from interacting with the system bus when changed from the Active to the Defined state.
 - <Change Name> prompts the user to type in the new name for the terminal.

- **<Change Address>** prompts for the number of the LANlink line to which the terminal is to be assigned.
 - **<Item Details>** calls up the Item Definition screen, which displays detailed information about the RRU.
 - **<Previous Softkeys>** returns to the regular set of softkeys.
- (10) Press the softkey that effects the desired change.
- If the status is to be changed, the system makes the change, and the previous softkeys reappear. If the name is to be changed, the system prompts for the new name. If the address is being changed, the system prompts for a LANlink line number.
- (11) If you are changing the name, type in the new name and then press ENTER. If you are changing the address, type in the new address and then press ENTER. (If the number is a single digit, enter it with a leading 0, as in 05.)
- The previous softkeys reappear, and the system refreshes the line list to include the new information.
- (12) To exit, press the <Exit> softkeys until you arrive at the main menu.

Deleting an M4000-Series Terminal

This procedure describes how to delete an M4000-series terminal from a DNC system.

Note: The associated hardware can be removed after this procedure has been carried out.

To delete an M4000-series terminal, proceed as follows.

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, then press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, then press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and press ENTER.
The system displays the Configuration Services Menu.
- (5) Select System Map and press ENTER.
The system displays the Hardware Map screen.
- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the cabinet containing the LANlink from which the M4000-series terminal is to be deleted.
- (7) On the Hardware Map screen, use the arrow keys to select the LANlink, then press <Next Level>.
The system refreshes the Hardware Map screen, and displays the line list for the LANlink.
- (8) Select the LANlink line to which the terminal is connected.

- (9) Press <Delete Item>.
The system prompts you to press the softkey again to confirm the deletion.
- (10) Press <Delete Item> again.
The terminal disappears from the line list.
- (11) To exit, press the <Exit> softkeys until you arrive at the main menu.

Adding, Moving, or Deleting an LIU

All external devices other than M4000-series terminals are connected to LIUs, which in turn are connected to LANlink SRUs. In the screen hierarchy of the user interface, you configure LIUs at one level, and you configure the external devices at the next lower level.

This section refers to all the LIUs attached to the system.

Adding an LIU

This procedure describes how to configure an LIU connected to a LANlink. It is required after the installation of LIUs within the system.

Note: This procedure assumes that the new add-on hardware is completely installed according to 450-1011-201.

To add an LIU, proceed as follows:

- (1) Sign on as a system administrator.
The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.
The system displays the System Administrative Services Main Menu.
- (3) Select CONFIGURATION, and then press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and then press ENTER.
The system displays the Configuration Services Menu.
- (5) Select System Map, and then press ENTER.
The system displays the Hardware Map screen.
- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the Hardware Map screen for the cabinet containing the LANlink to which the LIU terminal is to be connected.
- (7) On the Hardware Map screen, use the arrow keys to select the LANlink, and then press <Next Level>.
On the Hardware Map screen, the system displays a list of the terminals and LIUs connected to the LANlink, with the line number of each device.
- (8) Press <Insert Item>.

The system displays the Selection List screen, which lists device types that can be connected to the LANlink.

- (9) On the Selection List screen, use the arrow keys to select the LIU, and then press <Select Item>.

The system redisplay the Hardware Map screen, with the list of the devices connected to the LANlink, with the line number of each device. In the lower portion of the screen, the system prompts for a name for the new LIU. Only one softkey is available, the <Quit> softkey.

- (10) Enter a new name (required; the default is '---'), and then press RETURN.

The system prompts for a line number.

- (11) Enter the number of the LANlink line to which the LIU is to be connected. (If the number is a single digit, enter it with a leading 0, as in 05.) Then press ENTER.

After a pause, the system refreshes the list on the screen. In the refreshed list, the LIU appears on its assigned LANlink line in the defined state. Also, the previous softkeys reappear.

Steps 12 and 13 activate the LIU.

- (12) On the Hardware Map screen, press <More Softkeys>.

New softkeys appear.

- (13) Use arrow keys to select the LIU just defined, and then press <Change Status>.

The previous softkeys reappear, and the LIU's status changes to active.

- (14) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu, in order to save the changes on the disk.

Changing the Status, Name, or Address of an LIU

This procedure describes how to change the name or status of an LIU, and how to move an LIU to a different line on the same LANlink SRU.

Note: If you are changing the LIU's address, then before carrying out this procedure, you must move the LIU and reconnect it to the new LANlink line, as described in 450-1011-201.

To change the name, status, or address of an LIU, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select CONFIGURATION, then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map and press ENTER.

The system displays the Hardware Map screen.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the Hardware Map screen for the cabinet containing the LANlink to which the LIU is connected.

- (7) On the Hardware Map screen, use the arrow keys to select the LANlink, and then press <Next Level>.

The system refreshes the Hardware Map screen, and displays the line list for the LANlink.

- (8) Select the LANlink line to which the LIU is currently assigned.

- (9) Press <More Softkeys>.

New softkeys appear:

- <Copy> makes a copy of the selected RRU definition. The system prompts you to enter a name and address for the new RRU.
- <Change Status> changes the status (as shown in the left-most column) by toggling between active or defined. Devices are removed from interacting with the system bus when changed from the Active to the Defined state.
- <Change Name> prompts the user to type in the new name for the LIU.
- <Change Address> prompts for the number of the LANlink line to which the LIU is to be assigned.
- <Item Details> calls up the Item Definition screen, which displays detailed information about the RRU.
- <Previous Softkeys> returns to the regular set of softkeys.

- (10) Press the softkey that effects the desired change.

If the status is to be changed, the system makes the change, and the previous softkeys reappear. If the name is to be changed, the system prompts for the new name. If the address is being changed, the system prompts for a LANlink line number.

- (11) If you are changing the name, type in the new name and then press ENTER. If you are changing the address, type in the new line number and then press ENTER. (If the number is a single digit, enter it with a leading 0, as in 05.)

The previous softkeys reappear, and the system refreshes the line list to include the new information.

- (12) To exit, press the <Exit> softkeys until you arrive at the main menu.

Deleting an LIU

This procedure describes how to delete an LIU from a DNC system.

Note: The associated hardware can be removed after this procedure has been carried out.

To delete an LIU definition, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, and then press ENTER.
The system displays the Configuration Service - Main Menu.
- (4) Select Online Update or Scheduled Update and press ENTER.
The system displays the Configuration Services Menu.
- (5) Select System Map and then press ENTER.
The system displays the Hardware Map screen.
- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the cabinet containing the LANlink from which LIU is to be deleted.
- (7) On the Hardware Map screen, use the arrow keys to select the LANlink, and then press <Next Level>.
The system refreshes the Hardware Map screen, and displays the line list for the LANlink.
- (8) Press <More Softkeys>.
New softkeys appear.
- (9) Select the LANlink line to which the LIU is connected, and press <Change Status>.
The status of the LIU changes to defined, and the previous softkeys reappear.
- (10) With the LANlink line for the LIU still selected, press <Delete Item>.
The system prompts you to press the softkey again to confirm the deletion.
- (11) Press <Delete Item> again.
The LIU disappears from the line list.
- (12) To exit, press the <Exit> softkeys until you arrive at the main menu.

9. Configuring Port Personalities for External Devices

External devices are devices such as terminals, printers, magnetic tape units, host computers, networks, and nodes. All external devices other than M4000-series terminals are connected to an LIU, which in turn is connected to a LANlink SRU.

Port Personalities

Each external device is connected to a port on an LIU. For each port that is in use, the LIU must contain software appropriate to the device connected to the port. This software is called a port personality.

Whenever you add, move, or delete an external device, you must ensure that the appropriate port personalities are configured in the system map.

Adding a Port Personality for an External Device

This procedure describes how to add a port personality for an external device that has just been added to a DNC system. In certain cases, the system will already have one or more instances of the port personality that you are adding, and you will want to define the new instance as unique. To make the instance unique, you edit its object index, as explained in this procedure.

Note: This procedure assumes that the new add-on hardware is completely installed according to 450-1011-201.

- (1) Sign on as a system administrator.
The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, and then press ENTER.
The Configuration Service - Main Menu appears.
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.
- (5) Select System Map, and then press ENTER.
The system displays the Hardware Map screen.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the screen for the cabinet containing the LANlink to which the external device's LIU is connected.

- (7) Use the arrow keys to select the LANlink, and then press <Next Level>.

On the Hardware Map screen, the system displays the line list for the LANlink.

Steps 8 to 13 add and activate an LIU. Note that instead of adding a new LIU, you can use an existing LIU. If you intend to use an existing LIU, go to Step 14.

- (8) Starting on the Hardware Map screen displaying the line list, press <Insert Item>.

The system displays the Selection List screen, listing available items.

- (9) Select an instance of the appropriate LIU, and press <Select Item>.

The system redisplay the Hardware Map screen with the LANlink line list. The newly selected LIU is on the lower part of screen, and the cursor is to the right, prompting for a name.

- (10) Enter a name (required; the default is '---'), and press RETURN.

The cursor moves to the right, to prompt for a line number.

- (11) Enter the number of the LANlink line to which the external device is to be attached, and then press ENTER.

The LIU appears on its assigned LANlink line in the defined state.

- (12) Press <More Softkeys>.

New softkeys appear.

- (13) Press <Change Status>.

The status of the LIU changes from defined to active.

Steps 14 to 26 define an LIU port for the external device.

- (14) Starting on the Hardware Map screen with the LANlink line list, use the arrow keys to select the LANlink line for the LIU to which the external device is to be connected, and press <Next Level>.

The system displays the Port Map for the LIU, which lists the external devices that are currently connected to the LIU. In the Program Name field, the screen lists the port personalities associated with the external devices. If no external devices are currently assigned to the LIU, none will appear on the screen.

- (15) Press <Insert Item>.

The system displays the Selection List screen, listing available port personalities.

- (16) Use the arrow keys to select the appropriate port personality. Ensure that the chosen port personality is compatible with the LIU. (See Table 9-A for the proper LIU type and port personality to use.)

Steps 17 to 23 explain how to define a unique instance of the port personality, and how to edit the certain parameters of the port personality (Maximum Fault Count and Courtesy Down Time). If you do not need to define a unique instance or edit the parameters, go directly to Step 24.

- (17) Press <Edit Item>.

The system displays the Item Definition screen.

To move the cursor from one field to the next on this screen, press TAB or RETURN. To move the cursor back to the preceding field, hold down the SHIFT key and press the TAB key.

- (18) If you want to edit the maximum fault count, move the cursor to the Maximum Fault Count field and type in the new value. The range of acceptable values is 0 to 9.
- (19) If you want to edit the courtesy down time, move the cursor to the Courtesy Down Time field and type in the new value. Courtesy down time is expressed as a number of seconds. The recommended range of values is 0 to 60 seconds.

Note: The courtesy down time can affect memory allocation. Therefore, you should not enter a value outside the recommended range.

- (20) If you want to define a unique instance of the port personality, move the cursor to the Object Index field, and type in a new object index value that is unique among instances of this port personality. The range of acceptable values is 0 to 31.
- (21) If you modified the object index in the previous step, move the cursor to the Unit Name field, and type in a name that includes the object index value.
- (22) Press <Define as New Item>.

The system redisplay the Selection List screen.

- (23) If the desired PRU is not already selected on the Selection List screen, use the arrow keys to select it.
- (24) Press <Select Item>.

The system redisplay the Port Map. The newly selected port personality is in the lower part of the screen, and the cursor is to the right, prompting for a name.

- (25) Enter a name (required; the default is '---'), and press RETURN.

The cursor moves to the right, to prompt for a port number.

- (26) Enter the port number, and then press ENTER. Ensure that the port number assignment is correct for the type of LIU that has been installed. Port assignments in software correspond to the port designations marked on the front of the LIU.

On the Port Map, the port personality appears on its assigned port in the defined state.

Steps 27 and 28 activate the port personality.

- (27) Press <More Softkeys>.
 - New softkeys appear.
- (28) Press <Change Status>.
 - The status of the port personality changes to active, and the previous softkeys reappear.
- (29) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the changes on disk.

Table 9-A
List of LIUs and Port Personalities by Feature

This table lists the LIU types and port personality types to use with major features.		
Feature	LIU Type 'Device Type'	Port Personality Type 'Program Type'
3274 Emulation	LAN Interface Unit (LIU)	LIU Port - Bisync
3274 Emulation	LAN Interface Unit (LIU)	LIU Port - SDLC
3780 Remote File Transfer	LAN Interface Unit (LIU)	LIU Port - Bisync
ASCII Terminal Access	LIU - ASCII Terminal Access	LIU Port - ATA
Data Spooling	LIU - Async Personalities	LIU Port - APIO
Printing	LIU - Async Personalities	Printer Port
Magnetic Tape Unit (SASI)	Magnetic Tape Unit LIU	LIU Port - Mag Tape
X.25 Gateway	LIU - HDLC / RS-232	LIU Port - LAPB/SDLC L2
NOP Port	LIU - HDLC / RS-232	LIU Port - LAPB/SDLC L2

Defining an Alternate Address for a Port Personality

To define an alternate address for a port personality, proceed as follows:

- (1) Sign on as a system administrator.
 - The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.
 - The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, and then press ENTER.
 - The Configuration Service - Main Menu appears.
- (4) Select Online Update or Scheduled Update and press ENTER.
 - The Configuration Services Menu appears.
- (5) Select System Map, and then press ENTER.
 - The system displays the Hardware Map screen.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the screen for the cabinet containing the LANlink to which the external device's LIU is connected.
- (7) Use the arrow keys to select the LANlink, and then press <Next Level>. On the Hardware Map screen, the system displays the line list for the LANlink.
- (8) Use the arrow keys to select the LIU, and then press <Next Level>. The system displays the Port Map for the LIU.
- (9) On the Port Map, press <More Softkeys>. New softkeys appear.
- (10) If the desired port personality is not already selected, use the arrow keys to select it. Then press <Change Alt Addr>. The system prompts for the new address, which is composed of a cabinet number, a slot number, and a line number. The prompt is in the format
c ss ll
where c is cabinet, ss is slot, and ll is line.
- (11) Enter the new address, which indicates where the software of the port is to be reloaded in the event the port fails. Then press ENTER. The previous softkeys reappear.
- (12) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the changes on disk.

Changing the Status, Name, or Alternate Address of a Port Personality

To change the status, name, or alternate address of a port personality, proceed as follows:

- (1) Sign on as a system administrator. The system displays the main menu.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER. The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, and then press ENTER. The Configuration Service - Main Menu appears.
- (4) Select Online Update or Scheduled Update and press ENTER. The Configuration Services Menu appears.
- (5) Select System Map, and then press ENTER. The system displays the Hardware Map screen.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the screen for the cabinet containing the LANlink to which the external device's LIU is connected.
- (7) Use the arrow keys to select the LANlink, and then press <Next Level>. On the Hardware Map screen, the system displays the line list for the LANlink.
- (8) Use the arrow keys to select the LIU, and then press <Next Level>. The system displays the Port Map for the LIU.
- (9) On the Port Map, press <More Softkeys>. New softkeys appear:
 - <Copy> makes a copy of the selected port personality definition. The system prompts you to enter a name and address for the new port personality.
 - <Change Status> changes the status (as shown in the left-most column) by toggling between active or defined. Devices are removed from interacting with the system bus when the port personality is changed from the active to the defined state.
 - <Change Name> prompts the user to type in the new name for the port personality specified by the cursor position.
 - <Change Address> prompts for a new port number, to which the port personality will be assigned.
 - <Change Alt Address> prompts for the numbers of the new cabinet, slot, and line to which the port personality will be loaded in the event the port fails.
 - <Item Details> calls up the Item Definition screen, which displays detailed information about the port personality.
 - <Previous Softkeys> returns to the regular set of softkeys.
- (10) If the desired port personality is not already selected, use the arrow keys to select it. Then press the softkey that effects the desired change.

If the status is to be changed, the system updates the information on the Port Map, and the previous softkeys reappear. If the name or alternate address is to be changed, the system prompts for information.
- (11) If the system is prompting for a new name or a new alternate address, enter the required information.

If the name is to be changed, the system updates the information on the Port Map, and the previous softkeys reappear.
- (12) To exit, press the <Exit> softkeys until you arrive at the main menu.

Moving a Port Personality

There are two methods that you can use to move a port personality:

- (a) **Moving the LIU.** You can move the LIU to another line on the LANlink. For details, see 'Adding, Moving, or Deleting an LIU' in the part titled 'Configuring RRUs'.

- (b) **Moving the Port Personality.** You can assign the port personality to another port on the LIU.

This procedure explains how to assign the port personality to another port on the LIU. But before proceeding, ensure that the external device has been physically moved and reconnected, as described in 450-1011-201.

To move a port personality to another LIU port, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, and then press ENTER.
Configuration Service - Main Menu appears.
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.
- (5) Select System Map, and press ENTER.
The system displays the Hardware Map screen.
- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the screen for the cabinet containing the LANlink that is connected to the external device's LIU.
- (7) Use the arrow keys to select the LANlink, and then press <Next Level>.
On the Hardware Map screen, the system displays the line list for the LANlink.
- (8) Use the arrow keys to select the LIU's LANlink line, and press <Next Level>.
The system displays the Port Map for the LIU.
- (9) Press <More Softkeys>.
New softkeys appear.
- (10) Use the arrow keys to select the external device's port, and press <Change Address>.
The cursor moves to the Port field, prompting for a new port number.
- (11) Type in the number of the port to which the port personality is to be assigned, and press RETURN.
The port personality appears with the new port number, and the previous softkeys reappear.
- (12) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Deleting a Port Personality

There are two methods that you can use to delete a port personality:

- (a) **Deleting the LIU.** By deleting the LIU, you also delete the port personalities it contains. For details, see ‘Adding, Moving, or Deleting an LIU’ in the part titled ‘Configuring RRUs’.
- (b) **Deleting the port personality.** You can delete the external device’s port personality from the LIU.

This procedure explains how to delete the external device’s port personality from the LIU.

Note: The associated hardware can be removed after this procedure has been carried out.

To delete an external device’s port personality, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, and then press ENTER.
The Configuration Service - Main Menu appears.
- (4) Select Online Update or Scheduled Update and press ENTER.
The Configuration Services Menu appears.
- (5) Select System Map, and then press ENTER.
The system displays the Hardware Map screen.
- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the screen for the cabinet containing the LANlink that the external device’s LIU is connected to.
- (7) Use the arrow keys to select the LANlink, and then press <Next Level>.
On the Hardware Map screen, the system displays the line list for the LANlink.
- (8) Select the LANlink line to which the external device’s LIU is connected, and press <Next Level>.
The system displays the Port Map for the LIU.
- (9) Use the arrow keys to select the external device’s port personality, and then press <Delete Item>.
The system prompts you to confirm the deletion.
- (10) Press <Delete Item> again to confirm the deletion.
The port personality disappears from the list.
- (11) To exit, press the <Exit> softkeys until you arrive at the main menu.

Adding a Nine-track Magnetic Tape Unit (SASI Version Only)

When adding a nine-track magnetic tape unit (SASI version only), the LIU to use is 'LIU - Magnetic Tape Unit', and the port personality to use is 'LIU Port - Mag Tape'. Only one device (a tape unit) is allowed on the Mag Tape LIU, and it must be assigned to port 04. (On a system using the SCSI interface, the tape unit does not connect via an LIU.)

Adding a Printer

When adding a printer for logs or reports, the LIU to use is 'LIU - Async Personalities', and the port personality to use is 'Printer Port'.

Note that after you configure the printer, you must associate it with a print queue and specify that the intended users have access to that queue. See Part 14, 'Printer Administration', for more information.

ASCII Devices

For information on configuring ASCII devices, see Part 13, 'Configuring ASCII Device Services'.

10. Controlling System Access: the Security Profile

The security profile controls various aspects of user security. Although there is only one security profile in the system, it can influence the process of configuring individual users. For example, when configuring a user you normally specify the user's initial password. However, the security profile can be modified to make passwords unnecessary. If the system uses passwords, the security profile specifies the minimum password length.

The menu structure is shown in Figure 10-1.

To modify the security profile, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the system main menu, and press ENTER.

The system displays the System Administrative Services Main Menu.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

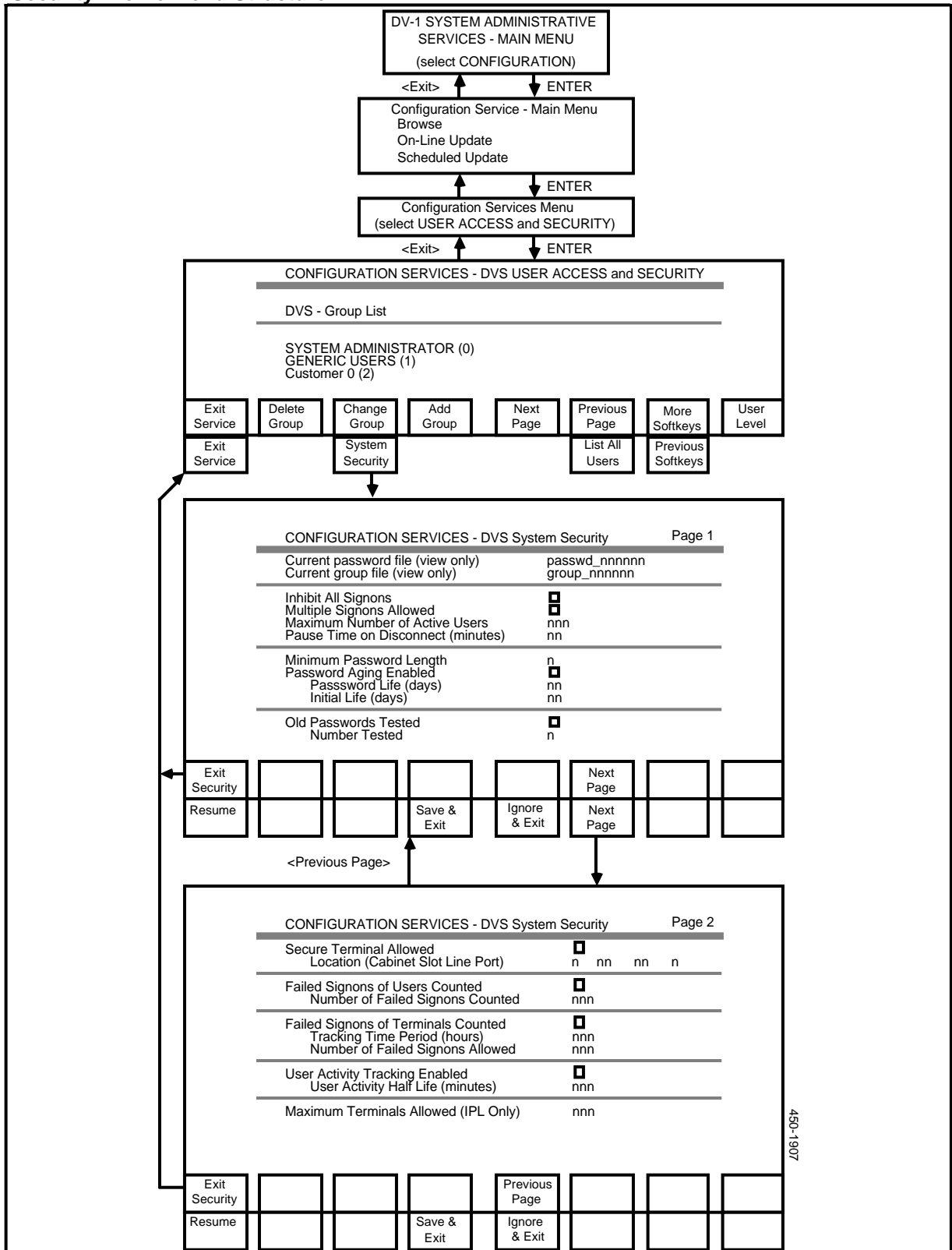
- (5) Press the arrow keys to select User Access and Security, and press ENTER.

The system displays the User Access and Security screen, which contains a list of user groups.

- (6) Press <More Softkeys>.

The system displays a second bank of softkeys for the screen.

Figure 10-1
Security Profile Menu Structure



- (7) Press <System Security>.

The system displays the System Security screen.

- (8) Edit the fields on the System Security screen by entering new data over the old. To advance from one field to the next, press TAB or RETURN. To move to the previous field, hold down SHIFT and press TAB. (On an ASCII terminal, hold down the ATTN key and press B.)

Current password/Current group file. These internal system names are displayed for information only.

Inhibit All Signons. If there is a compelling reason to keep all users off the system, move to this field and press the space bar. The system then displays a checkmark in the box beside the field label. (An ASCII terminal displays an x within square brackets instead of a checkmark.) Press the space bar again to cancel the inhibition. This removes the mark.

Multiple Signons Allowed. If you want to permit each user to be signed on to the system at more than one workstation at the same time, move to this field and press the space bar. The system then displays a checkmark in the box beside the field label. (An ASCII terminal displays an x within square brackets instead of a checkmark.) If you do not enable multiple sign-ons, then at any given time, each user can be signed on at only one workstation.

Maximum Number of Active Users. Enter the number of active users allowed to be signed on at any one time. The minimum is 1 and the maximum is 100. Unless the number of users on a system is of critical importance, use the default value of 100.

Note: Although the system accepts the values 0 and 101 to 999 in this field, only the numbers 1 to 100 are practical.

Pause Time on Disconnect. Enter the number of minutes after sign-off before a user can sign on again.

Minimum Password Length. Enter the minimum number of characters that a password must have in order to be valid. You can enter a value in the range 0 to 16.

Note: If you enter 0 for this parameter, then a password is not required when a user signs on. Each user can access the system by just entering his or her sign-on name.

Password Aging Enabled. Press the space bar to put a checkmark in the box if changing of passwords is to be prompted at timed intervals. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

Password Life. This is the number of days a password remains valid. If a user allows his or her password to expire, then the first time he or she tries to sign on after the expiration, the system displays the User Profile screen. The user can use this screen to change his or her password, as explained in in 'Changing Your User Name or Password' in Part 11. Subsequently, the user can sign on using the new password. (With software prior to NSR26, if a

user's password expired, the system locked the user out, and the user had to ask the system administrator for a new password.)

Initial Life. This is the number of days before the user's first password (assigned by the administrator) must be changed.

Old Passwords Tested. Press the space bar to put a checkmark in the box if new passwords are to be compared with previous passwords and duplicates disallowed. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

Number Tested. Enter the number of old passwords to be stored for password testing.

Secure Terminal Location. If you use the Inhibit All Signons field to keep all users off the system, then only a system administrator can sign on, and he or she can do so only at the 'secure' terminal. Enter the address of the secure terminal: the cabinet number, the slot number of LANlink SRU, the number of the LANlink line to which the LIU is connected, and the number of the LIU port to which the secure terminal is connected.

Failed Signons of Users Counted. Press the space bar to put a checkmark in the box if incorrect password entries are to be counted for each user. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

Number of Failed Signons Allowed. Enter the number of failures allowed. When the specified number of failures is reached, the system locks the user out, and the system administrator must intervene. The range of valid values is 1 to 999, and the default is 999.

Failed Signons of Terminals Counted. Press the space bar to put a checkmark in the box if incorrect user ID/password entries are to be counted for each terminal. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

Tracking Time Period. Enter the number of hours for which incorrect sign-ons are to be retained. The range of valid values is 1 to 999, and the default is 999.

Number of Failed Signons Allowed. Enter the number of incorrect sign-ons to be allowed in the time period above before terminal is locked out. The range of valid values is 1 to 999, and the default is 999.

User Activity Tracking Enabled. When this parameter is enabled, the system maintains an inactivity timer that tracks the time that has elapsed since the user last entered a keystroke. (Each entered keystroke resets the inactivity timer.) After the passage of a certain length of time (determined by the next parameter), the system closes all the user's application windows and automatically signs the user off.

User Activity Time. If activity tracking is enabled, then this parameter specifies half the time that the user can remain inactive before the system automatically signs the user off. For this parameter, you specify a value in minutes. For example, if the specified user activity time 30 minutes, then after 30 minutes of inactivity, the system displays a message on the user's terminal

screen warning that the system will sign the user off if the user remains inactive for another 30 minutes. If the user remains inactive for that amount of time, the system issues no further warnings before signing the user off. The largest value you can specify for this parameter is 999 minutes.

Maximum Terminals Allowed. This parameter determines the amount of memory that the system devotes to security features. The default value (400) is quite sufficient for a large system. Do not change this default unless warranted. If this parameter is changed, the DNC must be rebooted.

- (9) To exit from the System Security screen, press <Exit Security>.

If you have made changes to the values in the fields, new softkeys appear.

- (10) If new softkeys appear, you have the following options:

To write the new security parameters into memory, press <Save & Exit>.

To cancel the new security parameters, press <Ignore & Exit>.

The system redisplay the User Access and Security screen.

If you want to resume editing the security parameters, press <Resume>. In this case, the previous softkeys reappear.

- (11) To exit, press the <Exit> softkeys until you arrive at the main menu.

11. Configuring User Groups, Users, and their Main Menus

User Groups

All users are members of user groups. Each user group is a collection of users who share the same services and applications. All members of a group can share a common main menu, listing the options available to members of the group. You can customize main menus to allow one group and not another to access certain applications.

Dividing users into groups simplifies many administrative duties. For example, if you want to make a new application available to a number of users, you can add the application to a group's main menu instead of adding it to several individual's main menus.

The system can accommodate as many as 511 user groups. Each group can have as many as 60 users, and the system can support up to 503 users.

The system comes with two preconfigured groups, which cannot be deleted. You can define other groups as necessary. The preconfigured groups are:

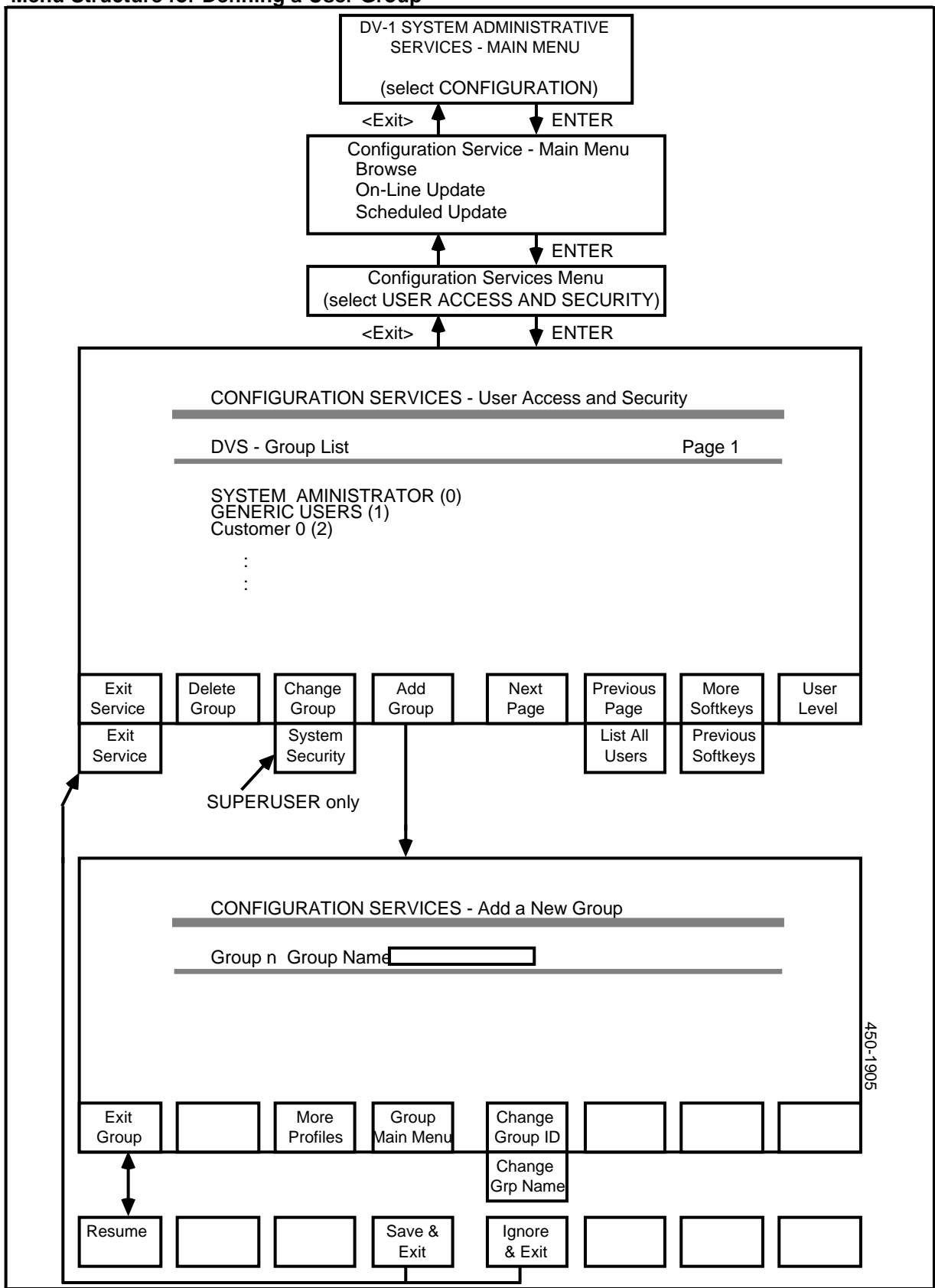
- **Group 0**, the system administrators' group. Members of this group have access to System Administrative Services.
- **Group 1**, the generic users' group. Members of this group cannot access System Administrative Services. This group serves as a model for every other users' group in the system.

A user can be a member of multiple groups. The user must have a unique sign-on name for each group to which he or she belongs. When the user enters a certain sign-on name and password, the system finds and displays the main menu for the group in which the user is known by that name and password.

Defining a User Group

This procedure describes how to define a new user group. The menu structure is shown in Figure 11-1.

Figure 11-1
Menu Structure for Defining a User Group



To define a user group, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the Main Menu, and press ENTER.

The system displays the System Administrative Services Main Menu.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select User Access and Security, and press ENTER.

The system displays the User Access and Security screen, with the first page of the group list.

- (6) On the User Access and Security screen, press <Add Group>.

The system displays the Add a New Group screen. The group is automatically assigned the next available group number.

- (7) Enter the new Group Name. The name can be up to 20 characters, including spaces. At this point, the following functions apply:
 - Pressing <Change Group ID> moves the cursor to the Group field, where you can enter a new group number. The group number can be as large as 999, but the system supports a maximum of 511 groups.
 - Pressing <Change Grp Name> moves the cursor to the Group Name field, where you can enter a new group name.

- (8) Press <Exit Group>.

New softkeys appear.

- (9) Press <Save & Exit> to write changes into the database, or press <Ignore & Exit> to abandon any changes.

The system redisplay the Group List screen.

- (10) To exit, press the <Exit> softkeys until you arrive at the main menu.

Changing the Name of a User Group

To change the name of a user group, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the Main Menu, and press ENTER.

The system displays the System Administrative Services Main Menu.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services Menu.

- (5) Select User Access and Security, and press ENTER.

The system displays the User Access and Security screen, with the first page of the group list.

- (6) If necessary, use the <Next Page> and <Prev Page> softkeys to display the page containing the group to be changed.

- (7) Press arrow keys to select the group, and press <Change Group>.

The system displays the Change a Group screen, with the cursor in the Name field.

- (8) Type in the new name.

- (9) Press <Exit Group>.

New softkeys appear.

- (10) Press <Save & Exit> to write changes into the database, or press <Ignore & Exit> to abandon any changes.

The system displays the Group List screen.

- (11) To exit, press the <Exit> softkeys until you arrive at the main menu.

Deleting a User Group

If a user group is to be deleted, note that:

- all users in the group must be deleted first
- groups 0 and 1 cannot be deleted.

To delete a user group, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the Main Menu, and press ENTER.

The system displays the System Administrative Services Main Menu.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services Menu.

- (5) Select User Access and Security, and press ENTER.

The system displays the User Access and Security screen, with the first page of the group list.

- (6) If necessary, use the <Next Page> and <Prev Page> softkeys to display the group to be deleted.
- (7) Use the arrow keys to select the group to be deleted, and press <Delete Group>.

New softkeys appear.

- (8) Press <Delete Group> again to confirm the deletion.

The system displays the Group List screen, with the deleted group missing.

- (9) To exit, press the <Exit> softkeys until you arrive at the main menu.

Configuring Individual Users

The system can support up to 503 users, with a maximum of 60 in each group. The system administrator can define a user, delete a user, change a user's profile, and move a user from one user group to another.

Note 1: Membership in user group 0 entitles a user to system administrator's privileges. Therefore, system administrators must not be moved to any other group.

Note 2: You cannot move the superuser from user group 0 to another group, and you cannot delete the superuser.

The User Profile

A user profile is the definition by which the system knows a user. There must be a user profile for each user in each user group. (If a user is a member of multiple groups, the user must have a profile defining his or her membership in each of the groups.)

Certain parameters of the user profile serve to identify the user to the system. For example, to access the system, the user must enter a sign-on name and in most systems must also enter a password. Both the sign-on name and the password are parameters of the user profile. The following are the user-profile parameters that identify the user:

- (a) **Signon Name.** The user's sign-on name must be unique within the system. The system administrator assigns it, and only the system administrator can edit it.
- (b) **Password.** The system requires passwords unless you set the minimum password length to zero in the security profile. You assign a user's password when you initially define the user's profile. Subsequently, the user can modify the password.

- (c) **Group ID.** This is a number in the range 0 to 999 identifying a user group. When the user signs on to the system using a particular sign-on name and password, the system finds the user profile with that sign-on name and password, and recognizes the user as a member of this user group. (Despite the available range of group numbers, there can be no more than 511 user groups in the system.)
- (d) **User ID.** This is the user's number within the user group. When the administrator defines the user profile, the system automatically assigns the next available number. The administrator can assign any unused number up to 999. (Despite the available range of numbers, there can be no more than 60 users in a user group.)
- (e) **User Name.** This is the name of the user as it appears on such things as headings and reports. The user name can be changed by the user.

Defining a User Profile

The menu structure for defining a user profile is shown in Figure 11-2. To define a user profile, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the system main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services Menu.

- (5) Select User Access and Security, and press ENTER.

The System displays the User Access and Security screen, with the first page of the group list.

- (6) If necessary, use the <Next Page> and <Previous Page> softkeys to locate the page of the group list containing the group to which the user is to be added.
- (7) Press arrow keys to select the group to which the user is to be added, and then press <User Level>.

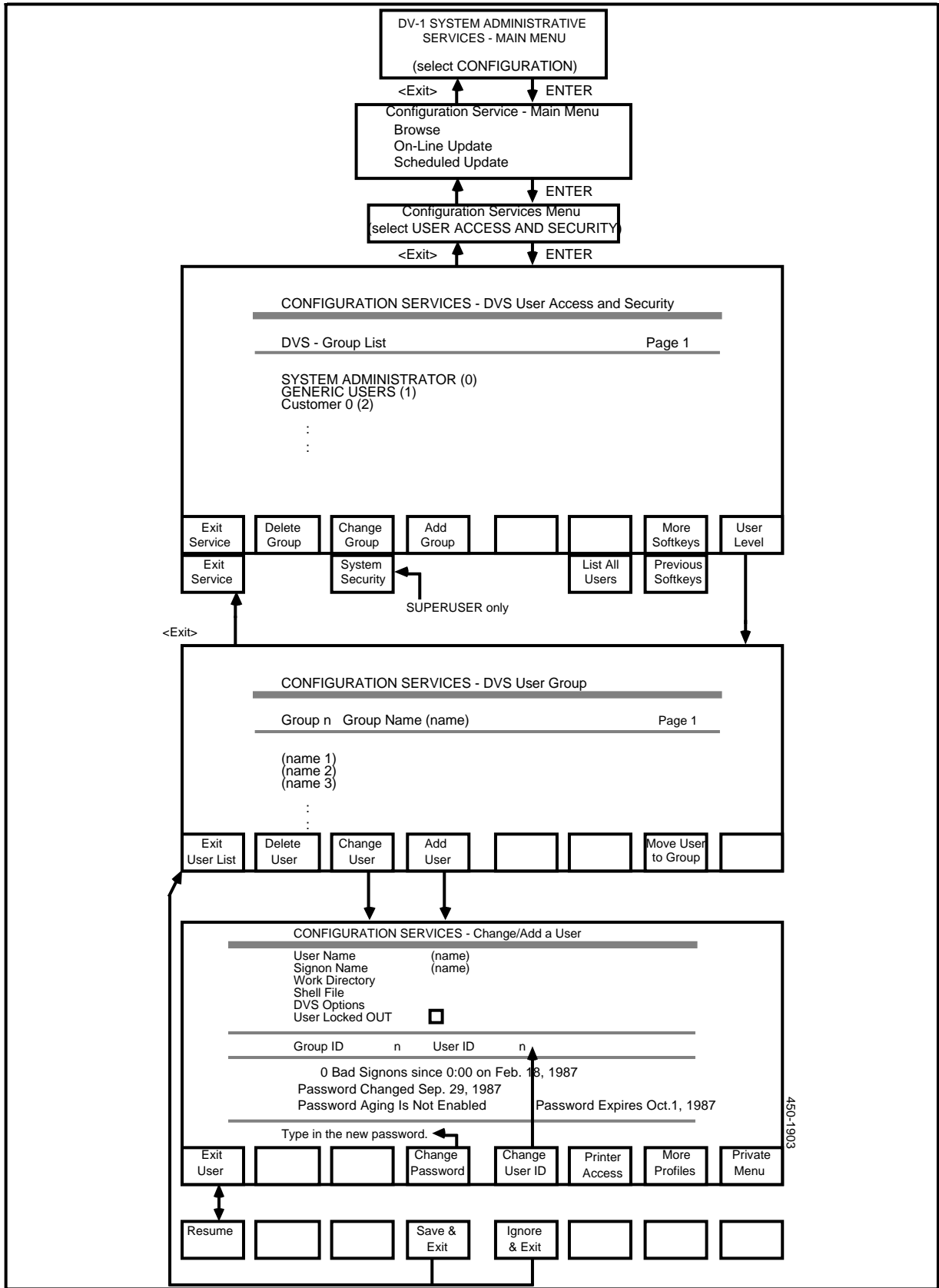
The system displays a list of users in the group.

- (8) On the screen listing users in the group, press <Add User>.

The system displays the default profile for new user.

- (9) Now you must edit the user's profile. Proceed to Step 10 of 'Changing a User Profile', and carry out Steps 10 to 15 of that procedure.

Figure 11-2
Menu Structure for Creating a User Profile



Changing a User Profile

To change any parameter of a user's profile, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the system main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services Menu.

- (5) Select User Access and Security, and press ENTER.

The system displays the User Access and Security screen, with the first page of group list.

- (6) If you do not know which group the user belongs to, you can search a list of all users. To do so, press <More Softkeys> to make the second bank of softkeys appear, and then press <List All Users>.

The system displays a user list. This list is for display only. After looking up the user press <Exit User List>.

The system redisplay the Group List screen.

- (7) On the Group List screen, use the <Next Page> and <Previous Page> softkeys to locate the page of the group list containing the user's group.
- (8) Use the arrow keys to select the user's group, and then press <User Level>.

The system displays a list of users in the group.

- (9) Press <Change User>.

The system displays the current user profile parameters.

- (10) For each of the displayed fields, key in the new entry over the old if it is to be changed. If it is not to be changed, leave it untouched. To advance to the next field, press TAB or RETURN. To move to the preceding field, hold down SHIFT and press TAB.

The fields are:

- **User Name.** The full name of the user as it appears on such things as headings and reports. The name can be 0 to 25 characters long. Invalid characters are the comma (,), dollar sign (\$) and colon (:). There is no default.

- **Signon Name.** A character string used to sign on to the system. It is assigned by the system administrator. It can be up to 16 characters long. Invalid characters are the comma (,), space () and colon (:). The character string should include only letters and numbers, as the system can encounter problems processing nonalphanumeric characters. There is no default.
 - **Work Directory.** The user's work directory is created automatically. The user's files are located in this directory.
 - **Shell File.** A shell file for the user is created automatically.
 - **DVS Options.** These options are created automatically.
 - **User Locked Out.** Press the space bar to put a checkmark in this box if the user is to be prevented from signing on. (An ASCII terminal displays an x within square brackets instead of a checkmark.) Pressing the space bar again removes the mark.
 - **User's Group ID.** This field is set to the number of the user group from which the Add User function or the Change User function was selected.
 - **User's User ID.** This is a serial number required for internal system processes. This field is set to the first available User ID number. To change the User ID number, press <Change User ID> and type in the new entry.
- (11) To change a user's password, press <Change Password> and type in the new password. The password should be composed of letters and numbers only, as the system can encounter problems processing nonalphanumeric passwords. It must include at least one nonnumeric character, and the characters cannot be all the same. Do not use spaces in the password. The maximum password length is 16 characters. The minimum password length is displayed on the screen. (The minimum length is specified by the system administrator, as explained in Part 10.) There is no default password. Note that for security reasons, neither the new nor the old password is displayed. After typing in the new password, press RETURN.

The system prompts you to enter the password again.

- (12) Enter the new password again.

The previous softkeys reappear.

- (13) Press <Exit User>.

The softkeys disappear, and three new softkeys appear: <Resume>, <Save & Exit>, and <Ignore & Exit>.

- (14) To save the new information and leave the screen, press <Save & Exit>.

The system displays the list of users in the group.

- (15) Press the <Exit> softkeys until you arrive at the main menu.

Deleting a User

To delete a user, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the system main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services Menu.

- (5) Select User Access and Security, and press ENTER.

The System displays the User Access and Security screen, with the first page of group list.

- (6) If the user's group is unknown, then on the Group List screen, press <More Softkeys> to make the second bank of softkeys appear, and then press <List All Users>.

The system displays a user list. This list is for display only. After looking up the user, return to the Group List screen.

- (7) On the Group List screen, use the <Next Page> and <Previous Page> softkeys to locate the page of the group list containing the user's group.
- (8) Use the arrow keys to select the user's group, and then press <User Level>.

The system displays a list of users in the group.

- (9) Press arrow keys to select the UserID, and press <Delete User>.

New softkeys appear.

- (10) Press <Delete User> again.

The system displays a list of users, with the deleted user missing.

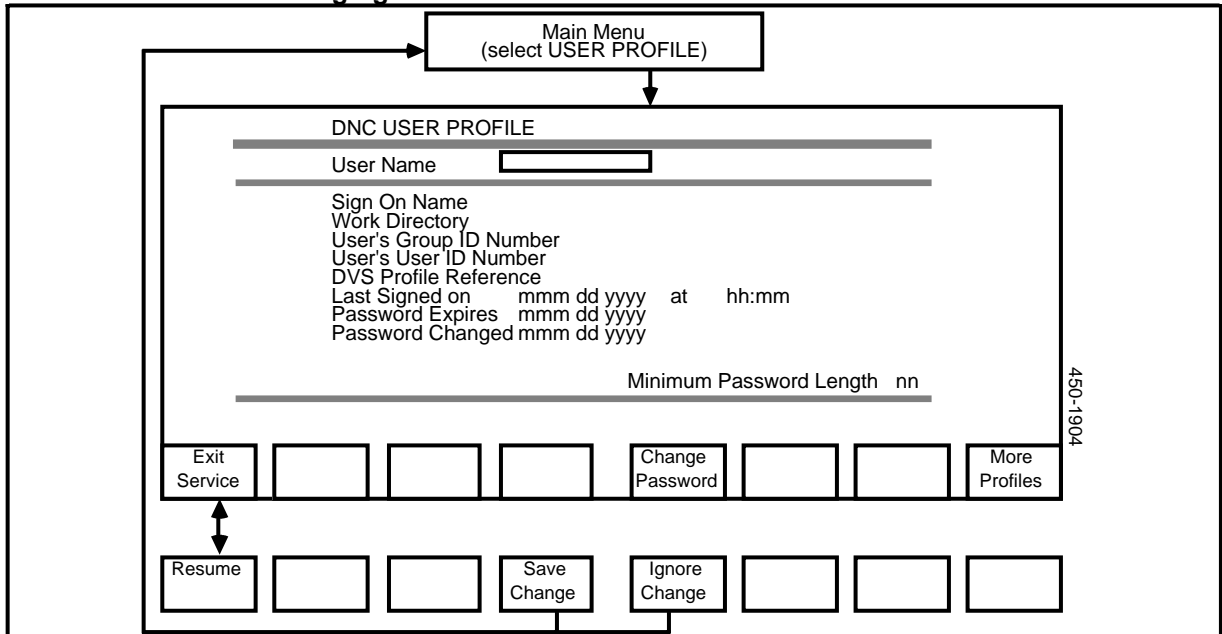
- (11) To exit, press the <Exit> softkeys until you arrive at the main menu.

Changing Your User Name or Password

This procedure describes how you can change your own user name or your password. Any user can change his or her user name or password. (Other changes can be made only by the system administrator.)

The menu structure for changing your user name or password is shown in Figure 11-3.

Figure 11-3
Menu Structure for Changing Your User Name or Password



The system uses your user name in headings and reports. You enter your password when you are signing on.

Note: The user name is different from the sign-on name.

To change your user name or password, proceed as follows:

- (1) Sign on.

The system displays the main menu.

- (2) On the main menu, select USER PROFILE and press ENTER.

The system displays the User Profile screen, which shows your current user profile parameters.

- (3) If the User Name is to be changed, type in the new User Name over the old one. If it is not to be changed, leave it untouched.
- (4) If the Password is to be changed, press <Change Password> and type in the new password. The password should be composed of letters and numbers only, as the system can encounter problems processing nonalphanumeric passwords. It must include at least one nonnumeric character, and the characters cannot be all the same. Do not use spaces in the password. The maximum password length is 16 characters, and the minimum length is displayed on the screen in the Minimum Password Length field. (The minimum length is determined by the value in the Minimum Password Length field on the System Security screen, as explained in Part 10.) There is no default password. Note that for security reasons, neither the new nor the old password is displayed. After typing in the new password, press RETURN.

The system prompts you to enter the password again.

- (5) Enter the password again. Press RETURN.

The system prompts you to enter the old password.

- (6) Enter the old password. Press RETURN.

The previous softkeys reappear, with the user profile display.

- (7) Press <Exit Service>.

New softkeys appear.

- (8) To write the new parameter values into the data, press <Save Changes>; to cancel the new parameter values, press <Ignore Changes>.

The system displays the main menu.

Configuring User-specific or Group-specific Main Menus

This procedure describes how the system administrator can define, delete, or change the main menu of a group or an individual user.

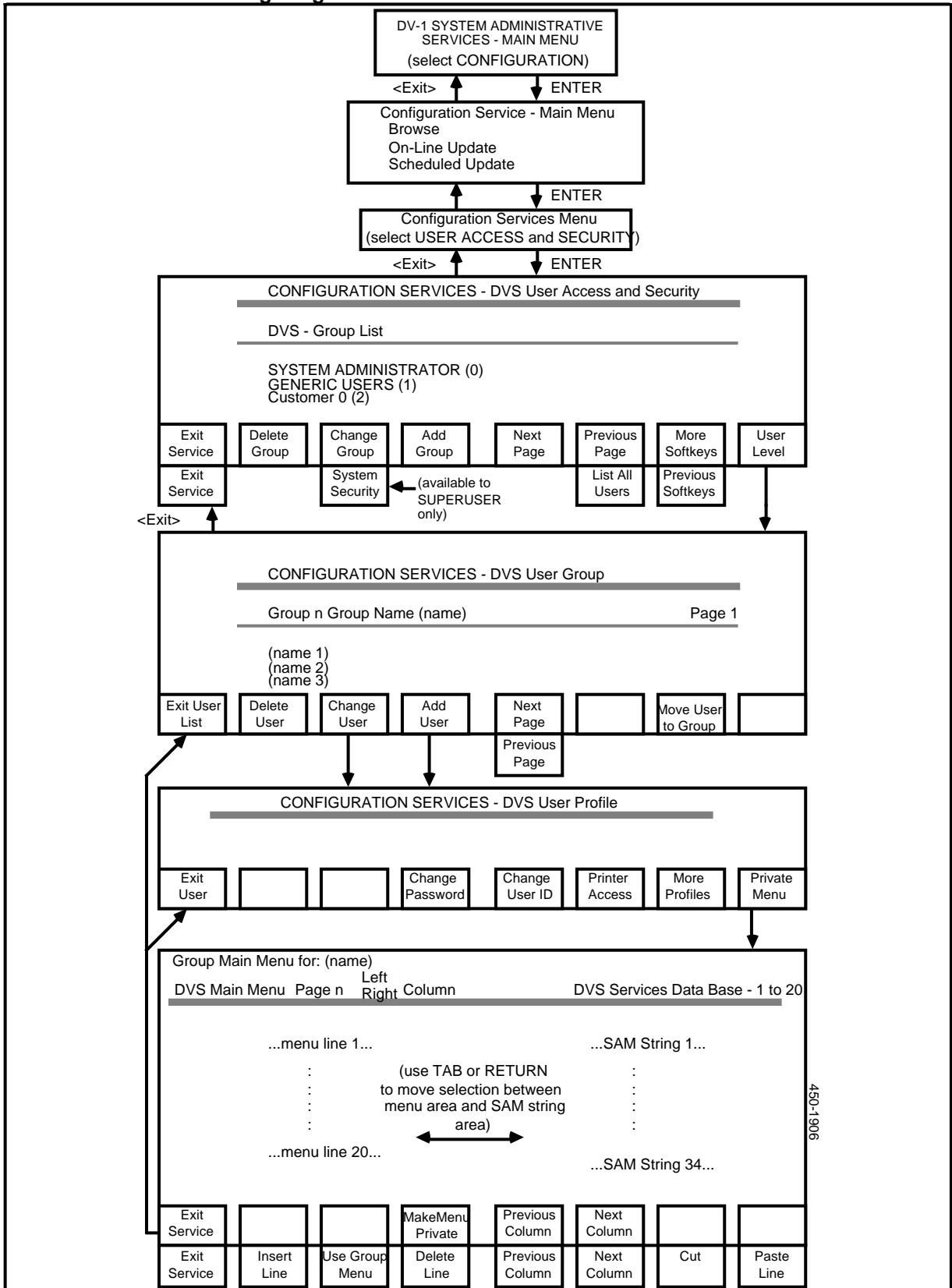
The main menu displays the services and functions that appear when a user first signs on. One main menu is created for each user group. A main menu can also be created for an individual user, overriding the main menu for the user's group.

Changes to the main menu consist of organizing character strings on the main menu screen. The strings themselves are predefined according to the services equipped on the system. Once displayed on the main menu, the strings are selected by users to call up functions and services.

Only the system administrator is permitted to change main menus.

The menu structure is shown in Figure 11-4.

Figure 11-4
Menu Structure for Configuring Main Menu



Defining a Main Menu for a User Group

To define the main menu for a group, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES on the main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION on the System Administrative Services Main Menu, and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services menu.

- (5) On the Configuration Services menu, select User Access and Security, and then press ENTER.

The system displays the User Access and Security screen, with the first page of the group list.

- (6) If necessary, use the <Next Page> and <Prev Page> to locate the page of the group list containing the user group.
- (7) Use the arrow keys to select the group on the User Access and Security screen, and then press <Change Group>.

The system displays the Change a Group screen.

- (8) On the Change a Group screen, press <Change Grp Menu>.

The system displays the screen for editing main menus.

- (9) Use the menu-editing screen to define the main menu for the group. See 'Using the Menu-editing Screen', below, for instructions.

Defining a Main Menu for an Individual User

To define a main menu for an individual user, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES on the main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION on the System Administrative Services Main Menu, and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services menu.

- (5) On the Configuration Services menu, select User Access and Security, then press ENTER.

The system displays the User Access and Security screen, with the first page of the group list.

- (6) If necessary, use the <Next Page> and <Prev Page> to locate the page of the group list containing the user's user group.

- (7) Use the arrow keys to select the group on the User Access and Security screen, and then press <User Level>.

The system displays the User Group screen.

- (8) On the User Group screen, press the arrow keys to select the specific user, and press <Change User>.

The system displays the Change a User screen.

- (9) On the Change a User screen, press <Private Menu>.

The system displays the screen for editing main menus.

- (10) Press <Make Menu Private> twice.

New softkeys appear.

- (11) Use the menu-editing screen to define the main menu for the user. See 'Using the Menu-editing Screen', below, for instructions.

Using the Menu-editing Screen

These instructions apply when you are working with both group main menus and user main menus.

There two columns on the menu-editing screen.

- (a) **The right-hand column** is a window containing the options that you can put on the main menu for a group or user. These options are called Screen Activities Manager strings, or SAM strings. You move from one side of the screen to the other by pressing the TAB key.

Pressing <Next Column> or <Previous Column> when you are on the right-hand side of the screen displays another column containing another group of options that you can place on the menu.

- (b) **The left-hand column** is a window showing one column of one screen in the main menu that you are constructing. (The menu can be as large as nine screens, each with two columns, for a total of 18 columns.) Pressing <Next Column> or <Previous Column> when you are on the left-hand side of the screen displays different columns of the main menu you are constructing.

The strategy for creating a main menu is to go to the right-hand side of the screen, find and select the SAM string you want to put on the main menu, then go to the left-hand side of the screen, and place the selected option in the desired spot on the main menu for the group or user.

To create a main menu, proceed as follows:

- (1) To position a SAM string on the menu,
 - Tab to the left-hand side of the screen and press <Next Column> or <Previous Column> to display the menu column on which a string will be placed.
 - Tab to the right-hand side of the screen and press the arrow keys to select the Screen Activities Manager (SAM) string to be placed on the menu, and press <Copy>.
 - Tab to the left-hand side of the screen and press the arrow keys to select the menu line number on which the SAM string will be placed, then press <Paste Line>.

The system places the option on the menu you are constructing, in the line and column you have chosen.

- (2) To move a SAM string from one menu location to another,
 - Tab to the left-hand side of the screen and press <Next Column> or <Previous Column> to display the menu column on which the string is located.
 - Press the arrow keys to select the SAM string to be moved, and press <Cut>.

The lines below move up one space.

- Press <Next Column> or <Previous Column> to display the column and page on which the string is to be pasted.
- Press the arrow keys to select the location on which string is to be pasted, and then press <Paste Line>.

The new text is written over the old.

- (3) To delete an option from a menu location,
 - Tab to the left-hand side of the screen and press <Next Column> or <Previous Column> to display the menu column and page on which the string is located.
 - Press the arrow keys to select the SAM string to be removed, and press <Delete Line>.

The string is deleted, and the lines below move up one space.

- (4) To insert a blank line on a menu,
 - Press <Next Column> or <Previous Column> to display the menu column and page on which the menu line is located.
 - Press the arrow keys to select the line, and then press <Insert Line>.

A blank string is inserted, and the lines below move down one space.

- (5) When you have finished defining or modifying a main menu, press <Exit Service>.

New softkeys appear.

- (6) Press <Save & Exit>.

The system displays the Change a User screen (if you have been working with an individual user's main menu) or the Change a Group screen (if you have been working with a group's main menu).

- (7) If you are on the Change a Group screen, return to the User Access and Security screen by pressing <Exit Group>.

- (8) If you are on the Change a User screen, return to the User Access and Security screen by taking these steps:

- On the Change a User screen, press <Exit User> to make the system redisplay the User Group screen.
- On the User Group screen, press <Exit User List> to make the system redisplay the User Access and Security screen.

- (9) To exit, press the <Exit> softkeys until you arrive at the main menu.

Nota that if you use this procedure to modify an existing menu, each affected user will see the new menu when he or she next signs on.

Deleting a Main Menu

When a UserID is deleted, the system automatically deletes the user's main menu.

When a user group is deleted, the system automatically deletes the user group's main menu.

12. File Processor Administration

You use the File Processor Administration interface to specify the physical and logical configuration of disk storage devices connected to a SCSI (Small Computing Systems Interface) bus in a DNC. The disk storage devices can be controlled by a Primary Processor SRU or a File Processor SRU.

Normally, the File Processor Administration Interface is not used to configure storage devices controlled by the Primary Processor SRU, because that storage is configured during system installation. Before the system is installed, system planners decide on the physical and logical configuration of the storage devices that are to be controlled by the Primary Processor. During installation, the installer enters the SCSIINIT command, which invokes File Processor Administration logic to configure that storage. After the system has been installed, you can use File Processor Administration to alter the configuration of the Primary Processor's storage, but if you do so, you must be careful not to lock the system. For details, see 'Disk Administration on the Primary Processor', later in this part.

You usually use File Processor Administration to configure the disk devices that are controlled by a File Processor SRU. The File Processor SRU is a specialized Applications Processor. It acts as an interface and as a file manager, and allows faster access to files for applications that require high performance and high availability.

A DNC can contain a number of File Processor SRUs. Connected to a single SCSI bus there can be:

- either one or two File Processor SRUs
- one Primary Processor SRU (if there is only one File Processor SRU)
- two tape units (Cartridge Tape SRUs or Nine-track Tape Units) at SCSI addresses 1 and 5
- as many as four storage SRUs (Mass Storage SRUs and/or 1/4 Shelf Disk/Tape SRUs) at SCSI addresses 0, 2, 3, and 4.

Note 1: The storage SRUs connected to a File Processor's SCSI bus are separate from any storage SRUs connected to the Primary Processor's SCSI bus.

Note 2: There can be no more than eight devices connected to a SCSI bus. For detailed information, see NTP 450-1011-152.

Configuring the File Processor

There are three major steps in configuring a File Processor.

- (a) **The first major step** is to install the File Processor SRU, to configure it in the system map, and activate it. For information on configuring and activating the File Processor SRU, see Part 6, 'Configuring Shared Resource Units'.
- (b) **The second major step** is to define the storage that the File Processor is to use. You define physical disks and logical regions, so that the system knows what storage devices are to be controlled by the File Processor SRU, and how they are to be used. To define disks and regions, you must access the File Processor Administration screens. The following sections explain how to access and use these screens.

Note that the File Processor Administration software resides on the File Processor SRU, so you must install the SRU before trying to use the administration screens.

- (c) **The third major step** is to configure the File Server PRUs that are to reside on the File Processor SRU. For detailed information, see 'Configuring File Server PRUs', later in this part.

After adding the PRUs, you must reinitialize the File Processor SRU. For information, see 'Maintenance for Shared Resource Units' in Part 25, 'Performing Maintenance on System Components'.

Shadow Disks

When defining physical disks that are to be controlled by a File Processor SRU, you can define shadow disks. A shadow disk is a backup disk that holds exactly the same information as another disk, which is known as the primary disk. Each new piece of data written to the primary disk is also written to the shadow disk. If the primary disk fails, the shadow disk is available as a backup.

Note: The Business Network Management (BNM) application does not support the shadow disk capability in NSR27 release.

Accessing the File Processor Administration Screens

If you are the superuser, you can access the File Processor administration screens. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.)

The menu structure for this section is shown in Figure 12-1.

To access the File Processor administration screens, proceed as follows:

- (1) Sign on as the superuser.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select UTILITIES and press ENTER.

The Utilities Services - Main Menu appears.

- (4) Select File Server Admin. and press ENTER.

The system displays the File Processor List screen. This screen lists all the File Processor SRUs that are currently configured in the system map and in the active state.

The File Processor List screen shows the name, type, and location (cabinet and slot) of each File Processor SRU that you have configured in the system map. Working on this screen and its related screens, you define the physical disks and regions.

Note: When you use the File Processor Administration screens, all changes to the configuration take effect as soon as you enter them.

Defining a Physical Disk

This procedure explains how to define the physical disks that are to be connected to a File Processor. By following this procedure, you are describing the storage SRUs (Mass Storage SRUs and 1/4 Shelf Disk/Tape SRUs) that are connected to the File Processor's SCSI bus.

Note 1: If the disk to be added has data on it that you want to preserve, do not follow this procedure. Instead, follow the instructions in 'Merging a Disk', later in this part.

Note 2: If you are adding a disk that is to be controlled by the Primary Processor, or by a File Processor connected to the same SCSI bus as the Primary Processor, then you must take precautions to avoid locking the system. For details see 'Configuring Disks on the Primary Processor's SCSI Bus', later in this part.

The menu structure for this section is shown in Figure 12-1.

To define physical disks, proceed as follows:

- (1) Install the Mass Storage SRU or the 1/4 Shelf Disk/Tape SRU in the cabinet. (If necessary, see 450-1011-201 for installation instructions.)
- (2) Power the system down and connect the SCSI cable to the Mass Storage SRU or the 1/4 Shelf Disk/Tape SRU. (see 'Powering up and Powering down the System', in Part 3.)
- (3) Power the system up and access the File Processor List screen.
- (4) Use the arrow keys to select the File Processor, and press <Disk Level>.

The system displays the Disk List screen. If you have not yet defined any disks for the File Processor, none will be listed on the screen.

- (5) If the Disk List screen displays unexpected disks and indicates that those disks are not responding, that indicates that the new disk has been used previously in another file system, and was not deleted from that file system. The disk contains the old configuration information, which is appearing on the screen. In this case, press <Delete Bad Disks>.

The system erases the old configuration information, and the bad disks disappear from the disk list.

Note: This problem will not occur if you always delete a disk from its file system before physically disconnecting the storage SRU from the SCSI bus. See 'Deleting a Physical Disk', later in this part.

- (6) Press <Add Disk>.

The system displays the Add a Disk screen, listing disk types that can be added.

- (7) Use the arrow keys to select the disk type, and then press <Select Item>.

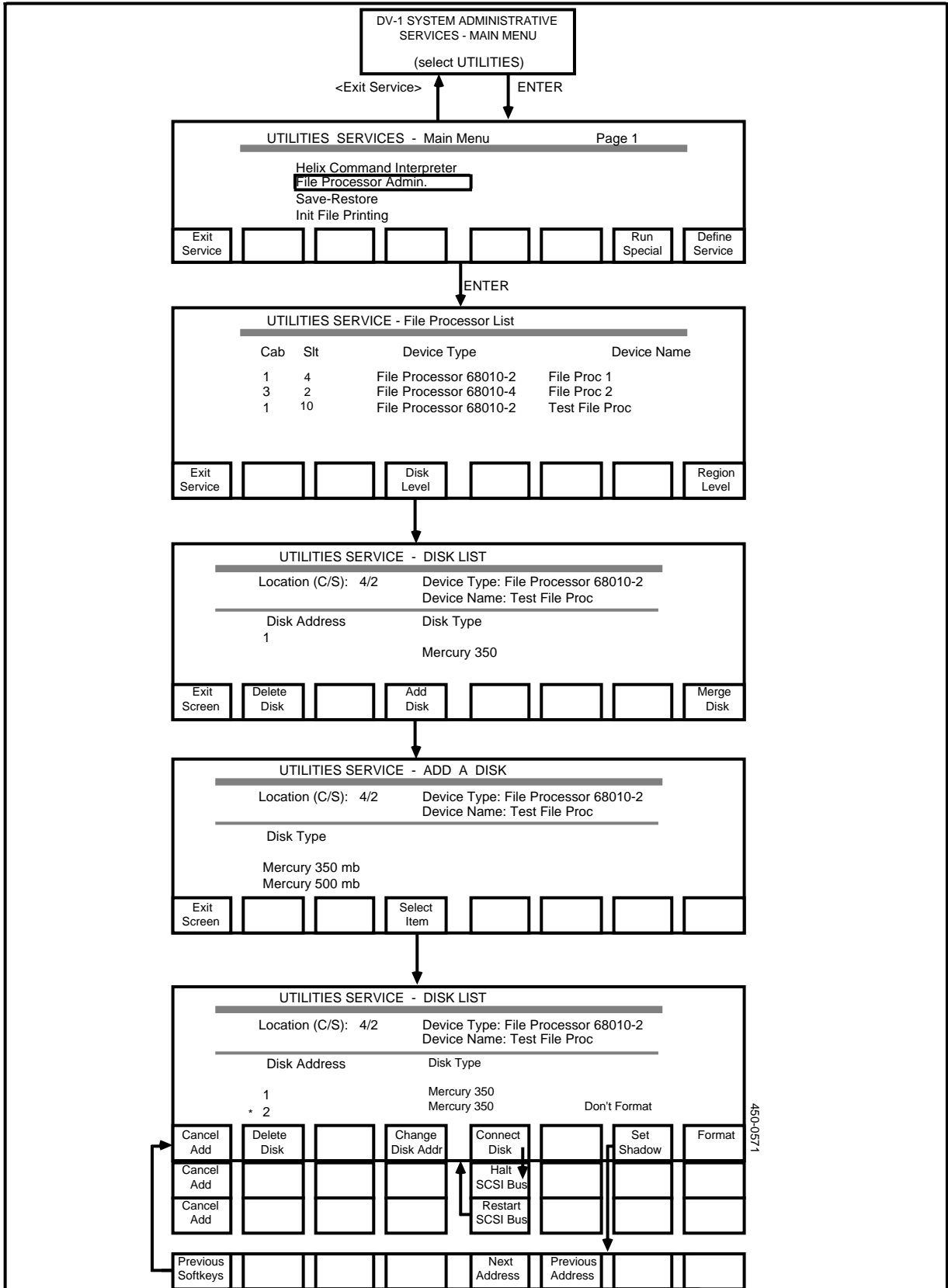
The system redisplay the Disk List screen, with new softkeys. The newly selected disk is displayed last on the list. It is displayed with the next available disk address, and with the 'Don't Format' message.

- (8) If the disk has just come from the manufacturer, you should format it when you first add it to the system. Also, if you are converting a disk from SASI to SCSI, it should be formatted. (Bear in mind that formatting a disk destroys any information it contains.) To format the disk, press <Format>.

The 'Format' message replaces 'Don't Format'.

- (9) If more than one of the SCSI addresses reserved for disks are still available, you may want to change the automatically assigned disk address. (Addresses 0, 2, 3, and 4 on the SCSI bus are reserved for disk storage SRUs. The system automatically assigns 0 as the disk address of the first Mass Storage SRU or 1/4 Shelf Disk/Tape SRU connected to the SCSI bus, and assigns 2, 3, and 4 to the disk storage SRUs that are subsequently connected to the bus. No more than four disk storage SRUs can be connected to a SCSI bus.) To change the disk address, press <Change Disk Addr>. This makes the system prompt for a new value. Type in the new SCSI address and press ENTER. The address must be one of those reserved for disk storage SRUs, and must be unique among disk addresses for the file processor. (The softkey is displayed only if there is more than one available SCSI address for the new disk.)

Figure 12-1
File Processor Administration Screens for Disks



- (10) If the new disk is the second or subsequent disk defined for the File Processor, you may want to define it as a shadow disk. In this case, press the <Set Shadow> softkey. (This softkey is displayed only if there is at least one other disk that you may want to shadow.)

New softkeys appear.

When you define a shadow disk, there may be more than one potential primary disk. In this case, use the <Next Address> and <Previous Address> softkeys to indicate the primary disk.

- (11) Press <Connect Disk>.

At the top of the screen, the system displays a message informing you to press <Halt SCSI Bus> when you are ready to change the SCSI bus.

- (12) Set the address indicator on the back of the Mass Storage SRU to the same value as the disk address assigned to the disk on the Disk List screen. To set the address, press the '+' and '-' buttons that are next to the address indicator.

- (13) Press <Halt SCSI Bus>.

At the top of the screen the system displays a message instructing you to complete installation.

- (14) Because you have already connected the SCSI cable, you can immediately press <Restart SCSI Bus>.

If formatting was specified, then that process begins. The system displays a message stating approximately the length of time that the formatting will take.

- CAUTION -

The formatting process must be allowed to run to completion. Interrupting the process can cause serious disk problems.

After any required formatting has been done, the system carries out copy operations if the disk is to be a shadow disk. The data on the primary disk is copied to the shadow disk. After any required copy operations have been done, the disk is connected (that is, the disk is placed under the File Processor's control), and the original softkeys are redisplayed.

- (15) Press <Exit Screen>

The system redisplay the File Processor List Screen.

Deleting a Physical Disk

By deleting a disk from a File Processor, you remove the storage device from the File Processor's control. You should follow this procedure whenever a disk is to be removed from a File Processor's control. This includes cases in which a disk is being transferred to another File Processor.

- CAUTION -

Never physically disconnect a disk from a File Processor without following this procedure.

This procedure is complicated. It requires you to move back and forth between File Processor Administration and Maintenance Services. The reason for the complexity is that you must flush the static RAM segment of each file processor region on the disk that you are deleting. A static RAM segment is a part of memory where the File Server PRU stores updates temporarily. This enables the PRU to run faster, because it commits updates only every so often.

The major steps in deleting a physical disk are:

- using File Processor Administration to check all the disks connected to the File Processor, to see which file server regions are on the disks
- using File Processor Administration to set to 0 the static RAM commit frequency for each file server region on the disk that is to be deleted
- using Maintenance Services to reboot the File Server PRUs associated with file server regions on the disk to be deleted, to make the PRUs flush their static RAM segments
- using Maintenance Services to take out of service File Server PRUs associated with regions on other disks connected to the File Processor (a precautionary move)
- using File Processor Administration to delete the disk
- using Maintenance Services to restore to service the File Processor PRUs associated with regions on the still connected disks.

Note 1: This procedure requires you to perform some region-level functions. These functions are explained in detail later in this part.

Note 2: If you are deleting a disk controlled by the Primary Processor or by a File Processor connected to the same SCSI bus as the Primary Processor, then you must take precautions to avoid locking the system. For details see 'Configuring Disks on the Primary Processor's SCSI Bus', later in this part.

To delete a disk from a File Processor, proceed as follows:

- (1) Access the File Processor List Screen.

- (2) Use the arrow keys to select the File Processor, and press <Disk Level>.

The system displays the Disk List screen.

Carry out Steps 3 and 4 for each disk on the Disk List screen.

- (3) Use the arrow keys to select the disk, and press <Region Level>.

The system displays the Region List screen, listing the regions for the File Processor.

- (4) Take note of all the file server regions on the disk.

Carry out Steps 5 to 8 once for each file server region on the disk that is to be deleted.

- (5) Select the file server region and press <Change Region>.

The system displays the File Server Configuration Screen, listing the configuration parameters of the File Server PRU associated with the region.

- (6) Locate the Static RAM Commit Frequency field. Use the <Next Page> and <Previous Page> softkeys to page through the list of parameters. When you locate the parameter, move the cursor to the field and enter 0 as the new value.

- (7) After entering the new value, press <Exit>.

New softkeys appear.

- (8) Press <Commit Changes>.

The system redisplay the Region List screen for the File Processor.

- (9) After specifying a Static RAM Commit Frequency of 0 for each file server region on the disk that is to be deleted, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

- (10) Initiate Maintenance Services and reboot each of the affected File Server PRUs. To reboot a PRU, remove it from service and then restore it to service, as explained in Part 25, in the sections titled 'Removing a PRU from Service Using 'Courtesy Down'' and 'Restoring a PRU to Service'.

When each PRU is rebooted, it reads the new parameter value and flushes its static RAM segment.

- (11) As a precaution, before deleting the disk from the File Processor, it is advisable to 'courtesy down' any File Server PRUs that are associated with file server regions configured on other disks connected to the File Processor SRU. See 'Removing a PRU from Service Using 'Courtesy Down'' in Part 25.

- (12) To exit from Maintenance Services, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

- (13) Access the File Processor List Screen.

- (14) Use the arrow keys to select the File Processor, and press <Disk Level>.

The system displays the Disk List screen.

- (15) Use the arrow keys to select the disk, and then press <Delete Disk>

At the top of the screen, the system displays a message informing you to press ENTER when you are ready to change the SCSI bus.

- (16) Ensure that you are ready to disconnect the SCSI cable from the storage SRU. When you are ready, press ENTER.

At the top of the screen the system displays a message instructing you to proceed.

- (17) If you want to preserve the information on the disk, then you must disconnect the SCSI cable from the Mass Storage SRU now. If you continue without disconnecting the cable, the File Processor SRU writes a mark on the disk indicating that all the space is free 'scratch' space.

When you have disconnected the cable and want to continue, press ENTER.

The disk disappears from the disk list.

- (18) Press <Exit Screen> to return to the File Processor List.
- (19) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.
- (20) Initiate Maintenance Services and restore to service the File Server PRUs associated with regions on disks that are still connected to the File Processor. See 'Restoring a PRU to Service' in Part 25.

If the deleted disk contained one or more file server regions, then the File Server PRUs may now correspond to different file server regions. For more information, see 'Pairings of File Server PRUs and File Server Regions', later in this part.

Merging a Disk

If you want to put a disk under a File Processor's control while retaining information that is on the disk, you must merge the disk rather than add it. For example, if you want to change the File Processor SRU that controls a Mass Storage SRU, you must delete the disk from its original File Processor, and then merge the disk into its new File Processor. Note 1: When you delete the disk from its original File Processor, disconnect the SCSI cable from the Mass Storage SRU in Step 17 of the deletion process. Otherwise you lose any information on the disk.

Note: If you are merging a disk that is to be controlled by the Primary Processor or by a File Processor connected to the same SCSI bus as the Primary Processor, then you must take precautions to avoid locking the system. For details see 'Configuring Disks on the Primary Processor's SCSI Bus', later in this part.

To merge a disk, proceed as follows:

- (1) Install the Mass Storage SRU or the 1/4 Shelf Disk/Tape SRU in the cabinet. (If necessary, see 450-1011-201 for installation instructions.)
- (2) Power the system down and connect the SCSI cable to the Mass Storage SRU or the 1/4 Shelf Disk/Tape SRU. (see 'Powering up and Powering down the System', in Part 3.)
- (3) Power the system up and access the File Processor List screen.
- (4) Use the arrow keys to select the File Processor, and press <Disk Level>.

The system displays the Disk List screen.

- (5) Press <Merge Disk>.

A new 'Mercury 350' disk is added to the list on the Disk List screen, and new softkeys appear. The new disk is displayed last on the list. It is displayed with the next available disk address.

Note: The <Format> and <Set Shadow> softkeys are not available when you are merging a disk, because the data on a merged disk is to be retained. If the disk is formatted or made into a shadow disk, any information already on it is destroyed.

- (6) If more than one of the SCSI addresses reserved for disks are still available, you may want to change the automatically assigned disk address. (Addresses 0, 2, 3, and 4 on the SCSI bus are reserved for disk storage SRUs. The system automatically assigns 0 as the disk address of the first Mass Storage SRU or 1/4 Shelf Disk/Tape SRU connected to the SCSI bus, and assigns 2, 3, and 4 to the disk storage SRUs that are subsequently connected to the bus. No more than four disk storage SRUs can be connected to a SCSI bus.) To change the disk address, press <Change Disk Addr>. This makes the system prompt for a new value. Type in the new SCSI address and press ENTER. The address must be one of those reserved for disk storage SRUs, and must be unique among disk addresses for the file processor. (The softkey is displayed only if there is more than one available SCSI address for the disk.)
- (7) Press <Connect Disk>.

At the top of the screen, the system displays a message informing you to press <Halt SCSI Bus> when you are ready to change the SCSI bus.

- (8) Set the address indicator on the back of the disk storage SRU to the same value as the disk address assigned to the disk on the Disk List screen. To set the address, press the '+' and '-' buttons that are next to the address indicator.
- (9) Press <Halt SCSI Bus>.

At the top of the screen the system displays a message instructing you to complete installation.

- (10) Because you have already connected the SCSI cable, you can immediately press <Restart SCSI Bus>.

The original softkeys are redisplayed. The merged disk is connected to the File Processor (that is, it is placed under the File Processor's control).

You do not need to define regions for the merged disk, because this information is already on that disk. Every region that is contained entirely on the merged disk is added to the File Processor's region list. Any remaining areas on the merged disk are reclaimed as free space.

If the merged disk contains a file server region, and if you want to continue to use the region, then the new File Processor SRU must have a File Server PRU for the region. For related information, see 'Pairings of File Server PRUs and File Server Regions', later in this part. See Part 7 for information on configuring PRUs.

Configuring Disks on the Primary Processor's SCSI Bus

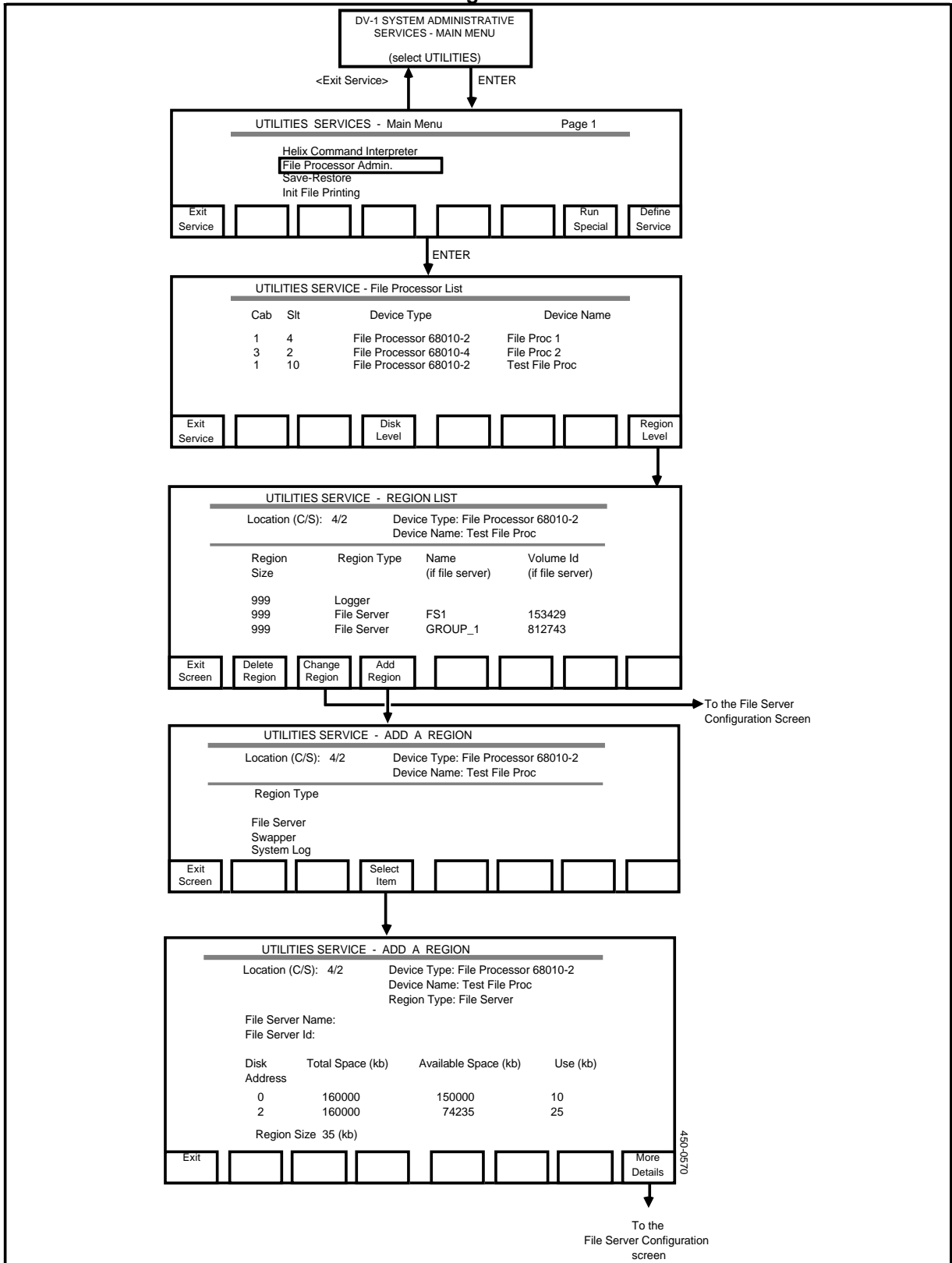
If you use File Processor Administration to add, merge, or delete a disk configured on the Primary Processor's SCSI bus, you must take precautions to prevent the system from locking. The system locks if it is required to send a screen display to a terminal during the interval between your pressing <Halt SCSI Bus> and your pressing <Restart SCSI Bus>.

To ensure that the system does not lock, take these precautions:

- (a) Ensure that no other user is signed on and using an application that might require the system to send a screen display to a terminal. In practice this means that you must ensure that all other users are kept off the system while you are using File Processor Administration to update the configuration of the disks connected to the Primary Processor.
- (b) Do not switch windows while the bus is halted.

Note that these precautions are necessary only when you update the configuration of disks connected to the Primary Processor SRU.

Figure 12-2
File Processor Administration Screens for Regions



Defining Regions

A region is a logical grouping of storage areas used for a particular purpose. For example, a region may be designated for use by a File Server PRU, which stores and retrieves files at the request of other programs. A region can occupy some or all of the space on a storage device, and can include space from multiple storage devices. For each File Processor, you can define regions of various types, and you can define multiple instances of some types of regions. For example, you can define two file server regions, in which case there are two separate File Server PRUs running on the File Processor SRU, each using one of the regions for storage.

The menu structure for this section is shown in Figure 12-2.

- (1) Access the File Processor List Screen.
- (2) Use the arrow keys to select the File Processor, and press <Region Level>.

The system displays the Region List screen. If you have not yet defined any regions for the File Processor, none will be listed on the screen.

- (3) Press <Add Region>.

The system displays the Add a Region screen, listing region types that can be added.

- (4) Use the arrow keys to select the region type, and then press <Select Item>.

New fields appear in the lower portion of the screen, and new softkeys appear.

You can now use the screen to construct a region of the desired size, composed of portions of one or more disks.

- (5) If the region is a file server region, enter a value in the File Server Name field. The name must be unique within the system. If the system is connected to others in a Local Data Net network, then the name must be unique within the network.

Note: Ensuring uniqueness is the responsibility of the system administrator. The system does not check for uniqueness. When entering the name, bear in mind that file server names are stored in uppercase letters, so case distinctions will not ensure uniqueness.

- (6) If the region is a file server region, enter an integer value in the File Server ID field. The file server ID must be in the range 101 to 9999, and must be unique within the system. If the system is connected to others in a Local Data Net network, then the ID must be unique within the network.

Note: Ensuring uniqueness is the responsibility of the system administrator. The system does not check for uniqueness.

- (7) You can now use the screen to construct the region. The region is composed of portions of one or more disks. Designate how much space on each storage device is to be included in the region. Each Mass Storage SRU or 1/4 Shelf

Disk/Tape SRU is identified by its disk address. For each of these SRUs, the value in the Use field indicates the amount of space to be included in the region.

If the region is a file server region, then the initial values in the Use fields represent all available space on the Mass Storage SRUs. For other region types, the initial values in the column are set to 0. As you enter values in the Use fields, the system updates the values in the Available Space and Region Size fields.

- (8) If you are defining a file server region, you may need to access the Configure File Server Screen to modify the values of the file server configuration parameters. This process is explained in the next section, 'Changing File Server Parameters'.
- (9) To save the definition of the region, press <Exit>, and then press <Save and Exit>.

The system redisplay the Region List screen. The new region is now in the list.

For each file server region, there must be a File Server PRU running in a File Processor SRU. There can be a maximum of 11 File Server PRUs in the system, and a maximum of four running in a single File Processor SRU. (For related information, see 'Pairings of File Server PRUs and File Server Regions' later in this part. See Part 7 for information on configuring PRUs.)

Changing File Server Parameters

You can use the Configure File Server screen to enter new values for the parameters of a File Server PRU. When the PRU is next rebooted, it reads in the new parameter values, and they then apply to the file server region that is associated with the PRU. (For related information, see 'Pairings of File Server PRUs and File Server Regions' later in this part.)

Note: The File Server PRU can continue to run while you enter new values for most parameters. However, you cannot enter a new file server name while the PRU is in service. If you intend to enter a new name, take the PRU out of service first. (See 'Removing a PRU from Service Using 'Courtesy Down'' in Part 25.)

There are two ways to display the Configure File Server screen:

- on the Region List screen, select a file server region, and press <Change Region>
- while defining a file server region on the Add a Region screen, press <More Details>.

The Configure File Server screen is shown in Figure 12-3.

When the Configure File Server screen first appears, it displays the current values of the configuration parameters. These values are used by the File Server PRU

associated with the file server region. To change the value of a parameter, use the <Next Page> and <Previous Page> softkeys to move to the page containing the parameter, and then move the cursor to the appropriate field and type in the new value.

When you press <Exit>, you can choose to commit the changes or to cancel them. You then return to the previous screen.

Note: If you change the parameters, the new values do not take effect until you restart the File Server PRU that is associated with the region. You restart the PRU by removing it from service and then putting it back into service, as explained in ‘Removing a PRU from Service by Using ‘Courtesy Down’’ and ‘Restoring a PRU to Service’ in Part 25.

Deleting Regions

When you delete a region, it ceases to exist, and all its storage space is freed.

Before deleting a region, courtesy down all the PRUs that use the region. (See ‘Removing a PRU from Service by Using ‘Courtesy Down’’ in Part 25.) In particular, before deleting a file server region, courtesy down the File Server PRU that uses the region. (For related information, see ‘Pairings of File Server PRUs and File Server Regions’ later in this part.) In addition, if you delete a file server region that does not correspond to the highest numbered File Server PRU configured on the File Processor, then you should courtesy down all the File Server PRUs on the File Processor.

To delete a region, proceed as follows:

- (1) Access the File Processor List Screen.
- (2) Use the arrow keys to select the File Processor, and press <Region Level>.

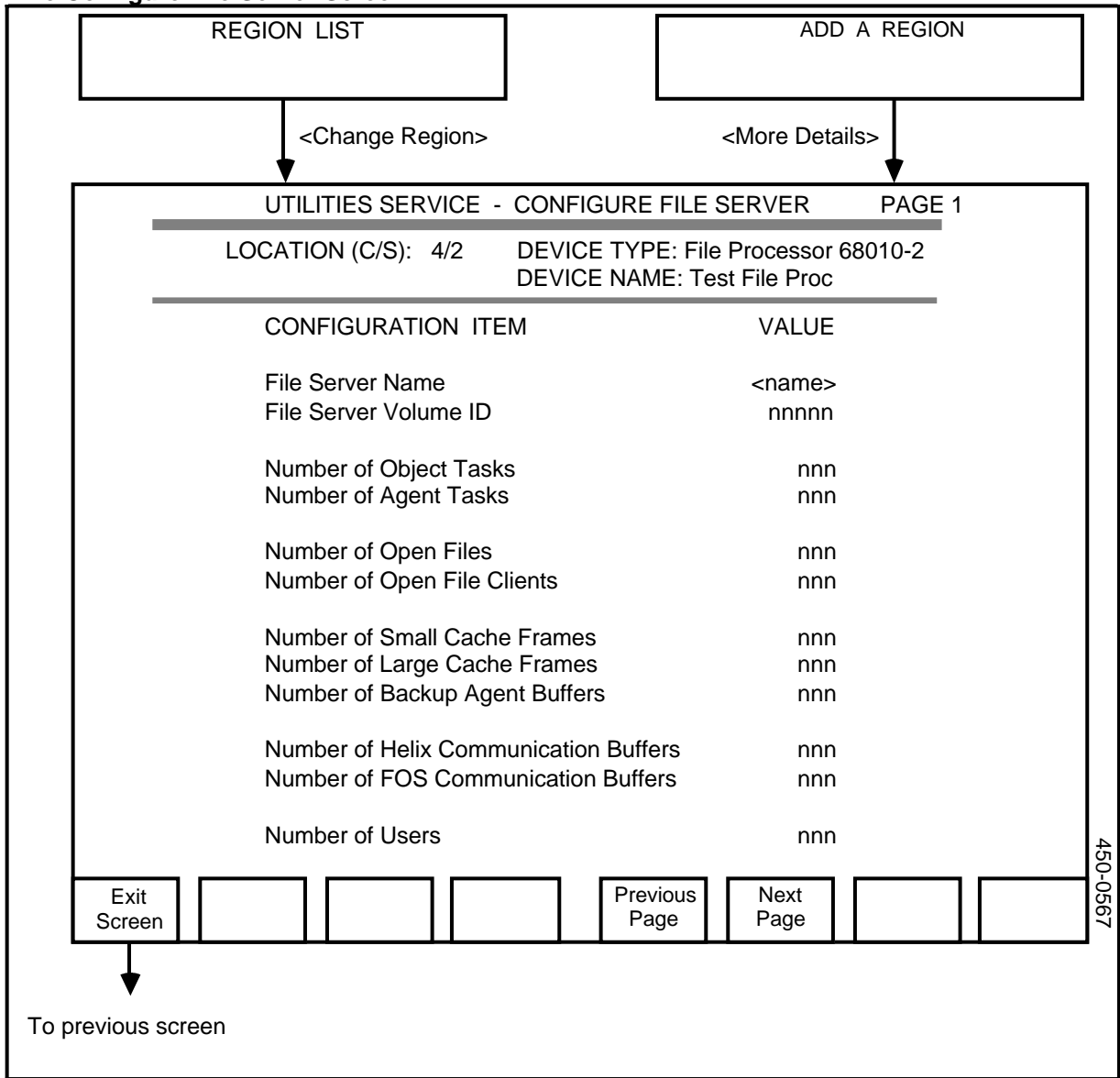
The system displays the Region List screen.

- (3) Use the arrow keys to select the region, and then press <Delete Region> twice.

The region disappears from the region list.

- (4) Press <Exit Screen> to return to the File Processor List.

Figure 12-3
The Configure File Server Screen



Pairings of File Server PRUs and File Server Regions

For each file server region that you define for a File Processor, you must configure a File Server PRU to run in a File Processor SRU. (For information on configuring PRUs see Part 7.) There can be up to four File Server PRUs on a single File Processor SRU. When you configure File Server PRUs in a File Processor SRU, the system numbers them from 1 to 4 in the sequence in which they are configured. The system includes the numbers in the PRU names that it assigns in the system map. The PRUs are named FS-PRU-1, FS-PRU-2, and so on. (Because these names automatically differentiate the instances of the File Server PRU, you do not need to configure a unique object index for each instance.)

When you configure file server regions and File Server PRUs, remember that the system assigns the PRUs to the regions according to the sequence in which the

regions are defined. The first File Server PRU serves the first file server region, the second PRU serves the second region, and so on.

When you delete a file server region, you can alter the pairings of File Server PRUs and file server regions. Such changes can cause problems if you have configured differing file server parameters for the various File Server PRUs. For example, if a File Processor has the maximum of four file server regions, and if you delete the third region, then the system assigns the third File Server PRU to the last remaining file server region. The fourth PRU, which formerly served that region, is unassigned. The last region then inherits the file server parameters that you originally configured for the now deleted region.

Signing on to a File Processor's SCSI Disk for Maintenance Purposes

You may need to access the disk that is associated with a SCSI File Processor to determine how much unused space remains on the disk, or to list the files on the disk. You can access a disk only if you are the superuser. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.)

To access a SCSI disk, proceed as follows:

- (1) Sign on as the superuser.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

- (4) Select Helix Command Interpreter, and then press ENTER.

The system prompt appears. (It is usually '>'.)

- (5) Type in **ci.code** and press ENTER.

- (6) Type in login and press ENTER.

The system prompts for a userID.

- (7) Type **0** and press ENTER.

The system prompts for a password.

- (8) Type **0** and press ENTER.

Configuring Tape Devices on a File Processor

Tape devices can use addresses 1 and 5 of a File Processor's SCSI bus. Cartridge and reel-to-reel tape devices are supported.

If any tape devices are attached to a File Processor, then the SCSI Tape Server PRU must be active in the File Processor SRU. The SCSI Tape Server PRU manages the initialization of tape devices and provides remote access to PRUs residing on other SRUs. For information on how to configure and activate the PRU, see Part 7, 'Configuring Program Resource Units'. After configuring and activating the PRU, you must restart it. To restart the PRU, remove it from service and then put it back into service, as explained in 'Removing a PRU from Service Using 'Courtesy Down'' and 'Restoring a PRU to Service' in Part 25.

13. Configuring ASCII Device Services

This part describes how to configure ASCII devices in the DNC Dynamic Network Control Systems. ASCII devices include ASCII terminals and host computers. All ASCII terminals must be VT100* -compatible, and all those used to emulate M4000-series terminals must have direct cursor addressing, scrolling, and RS-232-c serial interface.

Note: These procedures apply to DVS/DV1 release 3.00/3.07/3.01.00 only. DVS is a software base for a family of products of which the DNC systems are members. Before doing any of the procedures, you should plan the configuration of the devices on worksheets. While planning is important for all configuration tasks, it is especially important for ASCII Device Services, as information is entered into the system using a building-block strategy.

Overview of the Configuration Procedures

The ASCII device configuration must be performed on each DVS system, even if multiple DVS systems are networked together via Local Data Net or other means. The following paragraphs describe the principal steps in configuring ASCII Device Services. Each of these steps is described in detail in this part.

Installing the Hardware. Before implementing the ASCII device configurations in software, the hardware must be installed according to the instructions in NTP 450-1011-201 and any manufacturers' instructions for the ASCII devices.

Configuring the System Users. After installing the hardware, you must use System Administrative Services to configure the system users.

Configuring the System Map. The system map defines which of the hardware devices use which communications ports. All devices in the system are included in the system map, which must be configured in SAS prior to configuring the Batch Configuration file.

Building the Batch Configuration File. Although the system map defines which devices use which communications ports, it does not provide all the

* VT100 is a trademark of Digital Equipment Corporation.

necessary communications parameters required for computer communications. These parameters are entered into a special file called the batch configuration file.

You access the batch configuration file using a text editor for entering the parameters for ASCII communications. The text editor is based on a building block language, which means you should first define generic port characteristics and then use these definitions to describe specific port locations and personalities. The text editor itself is described in a document published by Bell-Northern Research titled XMS User Documentation - User Interfaces.

You can enter comments in the file. You should make use of this feature to help you when you return to the file in the future to make revisions and updates.

Compiling the Batch Configuration File. After editing and saving the batch configuration file, you compile it. In compilation, the ASCII Device Configurator (a software module) checks the file for syntax errors. If it finds errors, it records them in an error file. The error file has a capacity 50 errors. Following compilation, you can correct the errors listed in the error file. Compile the file repeatedly until you eliminate all the errors.

If you change the file after compiling it (such as for future updates and changes) the complete file must be recompiled. You cannot just recompile the changes.

Initializing the ASCII Connection Agent (ACA). The ASCII Connection Agent (ACA) is a software module that governs the configuration and reconfiguration of ASCII devices. It must be reinitialized after each update of the batch configuration file. The new definitions do not take effect until the ACA is courtesied down and back up again.

- CAUTION -

Courtesying down the ACA will break any active session between ASCII devices. Before courtesying down the ACA, you should notify all affected users.

How to Configure the System Map

This procedure describes how to configure the system map for ASCII devices. It assumes you understand how the system map works, as described in the Configuration service description. It also assumes you have determined the port assignments for all ASCII devices and recorded this information on worksheets.

Adding an ASCII Device

To add an ASCII device to a DNC system, you must:

- configure the ASCII Connection Agent PRU
- configure an LIU port for the ASCII device in the system map, and activate the port
- define the device in the batch configuration file, and compile that file

- use the Maintenance service to 'Courtesy Down' the ASCII Connection Agent PRU and then to put the PRU back into service.

This procedure describes how to configure the port in the system map. The procedure assumes that the new add-on hardware is completely installed according to 450-1011-201.

To add an ASCII device to the system, proceed as follows:

- (1) Sign on as the system administrator.
- (2) Select System Administration Services from the main menu and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select Configuration Services and press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select System Map and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) Press <Next Cabinet> repeatedly until you arrive at the Hardware Map screen for the cabinet containing the LANlink SRU that is connected to the LIU to which the ASCII device is to be connected.
- (7) Use the arrow keys to select the LANlink SRU, and then press <Next Level>.

On the Hardware Map screen, the system displays a line list showing the devices connected to the lines of the LANlink SRU.

Steps 8 to 11 configure a LAN Interface Unit (LIU) on a LANlink line.

- (8) Press <Insert Item>.

The system displays the Selection List screen.

- (9) Use the arrow keys to select an LIU, and press <Select Item>.

The Hardware Map screen with the line list reappears. The newly selected LIU is listed in the lower portion of the screen, in the defined state. The cursor is prompting for a name.

- (10) Enter a name that helps define the LIU, such as "ATA at 4800 baud", and press RETURN.

The cursor moves to the right, to prompt for a line number.

- (11) Enter the number of the LANlink line to which this LIU is to be connected and press ENTER.

The system refreshes the line list, placing the LIU in its assigned position. The LIU is still in the defined state.

Steps 12 to 16 assign an ASCII device to a port on the LIU.

- (12) Use the arrow keys to select the LIU and press <Next Level>.

The system displays the Port Map for the ports on the LIU.

- (13) Press <Insert Item>.

The system displays the Selection List screen, listing port personalities.

- (14) Use the arrow keys to select the appropriate personality, and press <Select Item>.

The system redisplay the Port Map, with the selected port personality in the lower portion on the screen, in the defined state. The cursor is prompting for a name.

- (15) Enter a suitable name (the default is '---') and press RETURN. For example, an ASCII terminal access (ATA) port might be given a name of "ATA No.1".

The cursor moves to the right, prompting for a port number.

- (16) Enter the port number and press ENTER.

The system redisplay the list of ports on the Port Map, with the new personality on its assigned port. The port is in the defined state.

Steps 17 to 19 activate the LIU.

- (17) Press <Exit Level>.

The LANlink line list reappears on the Hardware Map screen.

- (18) Press <More Softkeys>.

New softkeys appear.

- (19) Use the arrow keys to select the newly defined LIU, and then press <Change Status>.

The status of the LIU changes to active.

Steps 20 to 22 activate the port for the ASCII device.

- (20) Use the arrows keys to select the LIU, and then press <Next Level>.

The system displays the Port Map for the LIU.

- (21) Press <More Softkeys>.

New softkeys appear.

- (22) Use the arrow keys to select the ASCII device port, and then press <Change Status>.

The status of the port changes to active.

- (23) To leave Configuration Services, press the <Exit> softkeys until you arrive at the main menu.

- (24) Configure the batch configuration file to reflect the system map.

Deleting an ASCII Device's Port

This procedure describes how to delete an ASCII device's port from a DNC-500.

When you delete an ASCII device's port, you must:

- delete the port from the system map
- edit the batch configuration file by deleting the device definition, and then recompile the file
- use the Maintenance service to 'Courtesy Down' the ASCII Connection Agent PRU and then to put the PRU back into service.

Note: The associated hardware can be removed after this procedure is carried out.

To delete an ASCII device's port, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, press <Next Cabinet> until the system displays the Hardware Map screen for the cabinet containing the LANlink SRU that is connected to the LIU with the X.25 port.
- (7) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

On the Hardware Map screen, the system displays the line list for the LANlink.

- (8) Press <More Softkeys>.

New softkeys appear.

- (9) Use the arrow keys to select the LIU with the port that is to be deleted, and press <Next Level>.

The system displays the Port Map, which lists the ports on the LIU.

- (10) Select the port to which the device is connected, and press <Change Status>.

The status of the port changes to defined, and the previous softkeys reappear

- (11) With the device's port still selected, press <Delete Item>, then <Delete Item> again to confirm the deletion.

The port personality disappears from the list on the Port Map.

- (12) Press the <Exit> softkeys until you arrive at the main menu.

- (13) Configure the batch configuration file to reflect the change in the system map.

Moving an ASCII Device's Port

When you move an ASCII device in a DNC system, you must:

- use the Configuration service to change the LIU port used by the device
- edit the batch configuration file so that it has the new address, and recompile that file
- use the Maintenance service to courtesy down the ASCII Connection Agent PRU and then to put the PRU back into service.

This procedure explains how to change the LIU port used by the device.

Note: This procedure assumes the hardware is installed and operational, as described in 450-1011-201.

To move an ASCII device's port, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, press <Next Cabinet> until the system displays the Hardware Map screen for the cabinet containing the LANlink SRU that is connected to the LIU whose port is to be moved.
- (7) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

On the Hardware Map screen, the system displays the line list for the LANlink.

- (8) Press <More Softkeys>.

New softkeys appear.

- (9) Use the arrow keys to select the LIU with the port that is to be moved, and press <Next Level>.

The system displays the Port Map, which lists the ports on the LIU.

- (10) Use the arrow keys to select the port to be moved, and press <Change Address>.

The system prompts for a new port number.

- (11) Enter the new port number, and then press ENTER.

The port personality appears at the newly assigned port.

- (12) Press the <Exit> softkeys until you arrive at the main menu.
- (13) Configure the batch configuration file to reflect the change in the system map.

The Batch Configuration File

The batch configuration file contains the communications parameters for each ASCII device connected to the system. When the file is enabled, the ports are activated. The batch configuration file is accessed via System Administrative Services (SAS). The file is usually named BCFG.TEXT. (An alternative name may be used for the file. Consult the application documentation for the name.)

In the batch configuration file, you define communications parameters for each port. The port definition in the configuration file must match the port definition in the system map. This information should be available on worksheets before you attempt to input anything into the file.

To build the configuration file, the superuser uses XMS editing commands. These are entered in the Helix Command Interpreter in the Utilities service. (This service can be accessed only by the superuser.) The commands are provided below as they are used, but if you desire further information, refer to the XMS user reference manual for user interfaces.

The system is equipped with a template file under the heading BCFG.TEXT. You can copy this file and change the copy, or copy the file as a backup, and change the original. The initial BCFG.TEXT file is shown in Figure 13-1. Figure 13-2 shows a small BCFG.TEXT file with parameters filled in.

Figure 13-1
The BCFG.TEXT File, as Provided with a New System

```
(* This BCFG file is only an example file and should be customized to
your configuration *)

(* The default ACAROOT *)
$D ACAROOT;
$F MISC, PRIMARY, SECONDARY, UPDATE, COMMIT, SWAP;

L, LOGONE, LOGTWO, 2, 15, 1440;

(* A skeleton AHADATA - must be filled in *)
$D AHADATA;
$F CSLP, PORT;

?/?/?/? , "DIRECT 9600";

(* A skeleton APIDATA - must be filled in or removed *)
$D APIDATA;
$F CSLP, PORT;

?/?/?/? , "DIRECT 9600";

(* A skeleton ATADATA - must be filled in or removed *)
$D ATADATA;
$F CSLP, PORT, ATTN;

?/?/?/? , "DIRECT 9600", BREAK;

(* A skeleton HUNTDAT - must be filled in or removed *)
$D HUNTDAT;
$F NAME, PORTS, PHONE, CONNECT;

"HUNT GROUP 1", ?/?/?/?-?/?/?/? , "ATDT ???-???? /OD/", "BASIM 39 BACMS/OD/";

(* A skeleton NAILEDSD - must be filled in or removed *)
$D NAILEDSD;
$F OPORT, DPORT, PHONE, CONNECT;
?/?/?/?-?/?/?/? , "ATDT ???-???? /OD/", "BASIM 39 BACMS/OD/";

(* Some sample port definitions *)
$D PORTDAT;
$F NAME, MODEM;
RECEIVE, FLOW, PARITY, DATA, STOP, LINE, ECHO, MISC, BUFFER, PACKET, TIMEOUT,
DELIM;

"DIRECT 1200", NONE,
1200, XOFF, EVEN, 7, 1, FULL, OFF, -A, 256, 128, 10, 10:13;

"DIRECT 9600", NONE,
9600, XOFF, NONE, 8, 1, FULL, OFF, -A, 256, 128, 10, 10:13;

"MODEM 1200", NT212,
1200, XOFF, NONE, 8, 1, FULL, OFF, -A, 256, 128, 10, 10:13;

"MODEM 2400", HAYES2400,
2400, XOFF, MARK, 7, 1, FULL, OFF, -A, 256, 128, 10, 10:13;

(* A sample USRHOST *)
$D USRHOST;
$F USER, HUNT;
```

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Figure 13-2
A Sample BCFG.File, with Data-fill

```

BNR EDITOR

(* BCFG file created July 9, 1987. *)

(* AHADATA *)
$D AHADATA;
$F CSLP, PORT;

2/3/6/2, "PORT 1";
2/3/6/3, "PORT 1";

(* APIDATA *)
$D APIDATA;
$F CSLP, PORT;
(*      TAKEN OUT BY GWF ON 9/18
2/3/6/4, "PORT 1"; *)

(* ATADATA *)
$D ATADATA;
$F CSLP, PORT, ATTN;

2/3/3/2, "PORT 2", 27;
2/3/3/3, "PORT 3", 27;

(* HUNTDAT *)
$D HUNTDAT;
$F NAME, PORTS, PHONE, CONNECT;

"HUNT GROUP 1", 2/3/6/2:2/3/6/3, "ATDT 9-872-3140/OD/";

(* Port Definitions *)
$D PORTDAT;
$F NAME, DATA, ECHO, FLOW, LINEMODE, PARITY, TRANSMIT, RECEIVE, STOP, MODEM;

"PORT 1" , 8 , OFF , NONE , FULL , NONE , 1200 , 1200 , 1 , HAYES1200;
"PORT 2" , 8 , OFF , XOFF , FULL , NONE , 9600 , 9600 , 1 , NONE;
"PORT 3" , 8 , OFF , NONE , FULL , NONE , 2400 , 2400 , 1 , NONE;

(* USRHOST *)
$D USRHOST;
$F USER, HUNT;

SUPERUSER, "HUNT GROUP 1";

```

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If you are the superuser, you can access and configure the BCFG.TEXT file. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.) Proceed as follows:

- (1) Sign on as the superuser.

- (2) Select System Administrative Services and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

- (4) Select Helix Command Interpreter and press ENTER.

The system prompt appears. (It is usually '>'.)

- (5) To start the editor, type in the following command on the Helix command line:

ED name

where name is the pathname of the batch configuration file. Then press ENTER.

Note 1: The pathname of the batch configuration file is usually

:LOCAL:PRU:SAS:CS:BCFG.TEXT

However, the file may have a different name and directory location, depending on the DNC application. Consult the application documentation for specifics.

Note 2: You can make a copy of the file and edit the copy, if you are familiar with the XMS file system. Otherwise, follow the subsequent steps exactly.

- (6) Edit the copy or the original using the XMS editor. The BCFG syntax and parameters are described following this procedure.
- (7) To save the file, press the RESET key, then press Q, and then type in S.
- (8) Exit from the editor by typing in E.

You exit to the Helix Command Interpreter. The system prompt reappears.

- (9) To exit from the Helix Command Interpreter, type in EXIT and then press ENTER.

The Utilities Service - Main Menu reappears.

- (10) Press the <Exit> softkeys until you arrive at the main menu.

You can now compile the file as described later in this part.

Some Background on DVS Data Objects

In order to understand what configuration information is needed by ASCII Device Services (ADS), it is necessary to understand the way that configuration information is stored and used.

In DVS, configuration information is stored in data records. Groups of similar records of information are called objects. Each of the individual records of information is called an instance of the object. The order of that record of information in an object is called its object index.

The System Map is a collection of software objects that represents each of the hardware and software resource units in the system. The System Map describes where the ports are, but ADS requires additional information, such as baud rates, parity, and other communications parameters.

This kind of information is found in the various ASCII device personalities that can be loaded into the LAN Interface Units.

There are eight paragraphs in the language used to describe the various ADS characteristics of your configuration. They can be typed into the BCFG.TEXT file in any order, but it is recommended that they be entered in the order shown below to avoid unnecessary errors when the file is compiling. You should create all the statements you require of each type before creating the statements for the next type.

The BCFG.TEXT paragraphs are as follows:

- (a) The ASCII Connection Agent (identified in BCFG.TEXT as ACAROOT) describes the basic characteristics of the ADS configuration, such as the names of the primary and secondary log files. You do not have to enter any information for this object.
- (b) Generic Port Characteristics (identified in BCFG.TEXT as PORTDAT) contains the detailed operating data for a type of port. A name is assigned for each type of port. You must decide prior to configuring the file what types of generic port personalities you want for your ASCII device communications. The generic ports relieve you from having to type in the same operating data for individual ports that require the same operating data. Up to 20 port types can be defined.
- (c) ASCII Terminal Access statements (identified in BCFG.TEXT as ATADATA) identify each port configured with an ATA port personality. ATA enables an ASCII terminal to communicate with the system, providing windowing capabilities and full access to data services. It can also provide transparent handling of ASCII communications that originate at an ASCII terminal and are to be passed on to a dedicated ASCII host via a nailed up connection. In a nailed up connection, the system assigns an ASCII Pass-through (APT) sub-personality to the ATA port. A combined total of up to 50 ATA, APIO, and AHA ports can be defined by ASCII Terminal Access statements, ASCII Programmed Input/Output statements, and ASCII Host Access statements.
- (d) ASCII Programmed Input/Output statements (APIDATA) identify each port configured with an APIO port personality. An APIO port can be used in one of three ways:
 - In a nailed up connection. In this case, the NAILED statement references both the APIO port and an ATA port.

- Any ports that are used in hunt groups (referenced from a HUNTDAT statement, as described below). The hunt group implies that the host is accessed by ASCII terminals using an ATA personality. This access is achieved using the system's main menu.
- Any ports not referenced elsewhere are meant to be used by applications requiring access to ASCII devices. An example is a DVIX* application that must access a badge reader.

A combined total of up to 50 APIO, ATA, and AHA ports can be defined by ASCII Programmed Input/Output statements, ASCII Terminal Access statements, and ASCII Host Access statements.

- (e) Nailed up connection statements (NAILEDs) define nailed up connections. In a nailed up connection, an ASCII terminal is connected to an ASCII host, with the DNC as the intermediary. A nailed up connection serves as an ASCII pipe, providing transparent handling of communications between an ASCII terminal and an ASCII host, as if there were a single dedicated connection between them. A NAILEDs statement refers to two ports: the ATA port used by the terminal and the APIO port used by the ASCII host. There can be up to 20 nailed up connections in a system.
- (f) ASCII Host Access statements (AHADATA) define each port configured with an AHA port personality. AHA provides the protocol conversions necessary for the DNC system to communicate with an asynchronous host computer (such as a Digital Equipment Corporation PDP-11 or VAX, or a Hewlett-Packard HP3000). The option of accessing the asynchronous host can be included on the DNC system's main menu. When a user selects the option, the system uses an AHA port for the connection to the host. A combined total of up to 50 AHA, ATA, and APIO ports can be defined by ASCII Host Access statements, ASCII Terminal Access statements, and ASCII Programmed Input/Output statements.
- (g) Hunt group statements (HUNTDATA) are used to define hunt groups. A hunt group is a group of LIU ports used to access a specific host. Each hunt group statement associates one or more LIU ports with a hunt-group name. The hunt-group name appears on the main menu, under ASCII Host Access. When the user selects the hunt-group name on the main menu, the system searches for an available port from the hunt group. There can be up to 20 hunt groups in a system.
- (h) User/Host Access statements (USRHOST) define which hosts can be accessed by which users.

The DVS System Map for a particular port points to the instance in one of the personality ADS objects that describes that port. Each instance in a personality object describes exactly one port and each port is described by exactly one instance in a personality object.

The User Access data object is one of the software objects in which the system stores configuration data. The User Access object defines which hunt groups each

* DVIX is a trademark of Northern Telecom.

user can access. The object contains one instance (that is, one record) for each user of the DVS. In order to relate that record to the other information about that user, the ASCII Device Services Configuration Generator (ADC) puts that user's record in the User Access data object into the same position as the user's record in the User Profile data object. For example, if the record for user ABC is the fourth record in the User Profile data object, ADC puts that user's hunt-group-access information into the fourth record in the User Access data object.

The Syntax for BCFG.TEXT Paragraphs

The BCFG.TEXT paragraphs have a common syntax or format. All the information you enter must conform to this syntax as the file is read by a software module called the ADS configuration generator (ADC). The syntax is as follows:

```
$D <paragraph name>;  
$F <field 1>,<field 2>,<field n>;  
    <data 1>,<data 2>,>data n>;
```

Where

- **<paragraph name>** is one of the eight paragraphs (ACAROOT, PORTDAT, ATADATA, APIDATA, NAILED, AHADATA, HUNTDATA, and USRHOST). Each paragraph is used to define a collection of logical objects, such as generic port types or specific ASCII devices.
- **<field 1>** to **<field n>** is a list of parameter names used to identify the type of communications data required for a specific object. Objects have some required parameters and others that are optional. The field names are entered in a specific order, an order that matches the corresponding data entered in the next line.
- **<data 1>** to **<data n>** are the actual data fields that set the communications and other parameters required by the object. The complete list is terminated by a semicolon. The data items must appear in the same order as the corresponding field name entered in the preceding line. For example, if the first field name is CSLP, which identifies the physical communications address of the ASCII device (cabinet, slot, line and port), the first item in the data list must be the numbers of the cabinet, slot, line, and port used by that device.

There are a number of general rules that apply to the syntax for all the paragraphs:

- There may be only one paragraph defining each object type in a BCFG file.
- All statements end with a semicolon. This allows long statements to wrap to a second line. If you leave out the semicolon, you will have errors when you compile the file.
- A statement in a BCFG file is all of the characters in the file up to the next semicolon (;) or the end of the file.
- More than one statement may occur on a single physical line, as long as each is terminated by the semicolon.

- Blanks in a statement are ignored when not enclosed in double quotation marks ("). Thus, the statements PORT1 and PORT 1 are the same unless enclosed by double quotes.
- A BCFG statement is translated to upper case before processing.
- Comments may be placed in a statement, as long as they begin with an opening parenthesis and asterisk, (*, and end with a closing parenthesis and asterisk, *). The system will not act on any information thus enclosed. A comment may be included in another comment, or nested. You can also use the comment characters to remove an entire statement without actually deleting it; in such a case, the system ignores the data within the comment.
- Field types may be abbreviated to three characters and must therefore be unique in the first three characters.
- Fields in a statement are separated by a comma (,).
- If you enter just a comma in place of a field, the default value for that field type will be entered by the system.
- Numbers are decimal unless otherwise noted.
- Character data may be delimited with quotation marks (") or may just be entered into the field. However, because some data must be enclosed by quotation marks, it is always a good idea to use them for all character data. Character data with significant blanks should be enclosed in quotation marks.
- Control characters can be entered in fields by typing the control character in the format /hh/, where hh represents the two hexadecimal digits that are the equivalent of the value of that character. For example, /0D/ represents a carriage return character, /07/ is a bell, /22/ is a double quotation mark, and /2F/ is a slash.
- When more than one control character is to appear consecutively in the field, they may be delimited by a single set of slashes. Thus, /0D0A/ represents a carriage return and linefeed (<CR><LF>). Any character represented with this syntax is used literally as data and is not interpreted by ADC.
- Control characters may be part of a quoted character field, such as "ATDT 1-800-555-1212 /0D/".

If more than 20 characters are entered in a field, it is truncated to 20 characters.

Common field types

Several field types are found in more than one object type. Typically, these fields define communication parameters. The common field types are CSLP, DATA, ECHO, FLOW, LINEMODE, MODEM, NAME, PARITY, STOP, RECEIVE, and TRANSMIT. This section describes those field types. For each of these field types, both the valid keywords for that type and the way those keywords are represented in the objects are explained.

CSLP is used to uniquely identify a particular port in the system. It follows the same pattern as elsewhere in system administration:

c/s/l/p

where

c = the cabinet number (1 to 8).

s = the slot number (1 to 16). LanLinks must be in odd-numbered slots.

l = the LANlink line number (1 to 12).

p = the LAN Interface Unit port number (2 to 11; port 1 is reserved for parallel printers).

DATA describes the number of bits used to represent a character. Legal values are 7 and 8.

ECHO describes what device, if any, echoes characters back to the device. Legal values and their meanings are:

OFF - The LIU agent does not echo incoming characters

ON - The LIU agent echoes incoming characters

FLOW describes which type of flow control is to be used with the attached device. Legal values and their meanings are:

NONE - No flow control is used.

XOFF - XOFF/XON flow control is used.

DTR - DTR flow control is used.

IXANY - XOFF/any flow control is used.

ETX - ETX/ACK flow control is used (not available for AHA ports).

ACK - ACK/NAK flow control is used.

LINEMODE selects either the communications mode for the line. Legal values and their meanings are:

FULL - Full duplex mode is used. Implies that both DSR and DCD are required to be active.

HALF - Half duplex mode is used. Implies that DSR is required to be active.

MODEM describes the type of modem to be used with the attached device. Legal values and their meaning are:

NONE - No modem

HAYES2400 - Hayes 2400 Baud Modem.

NT212 - NT212 A/D Modem.

HAYES1200 - Hayes 1200 Baud Modem.

NAME is an identifier used to tag statements within one paragraph for reference within statements of other paragraphs. Names must follow these rules:

- Names must be unique within the BCFG file.
- The name can be 1 to 20 characters.

- Any character can be a part of a name with the exception of a comma, semicolon, the character pair (*, and a slash.
- Blanks embedded within a name are compressed into a single blank.
- Quoted strings can also be used as names. The name used to define a hunt group is the same name that subsequently appears on the ASCII Host Access selection screen.

For example, you can assign a name to some generic port characteristics in PORTDAT. Later, you can use the name with a specific CSLP to assign the CSLP those characteristics.

PARITY describes the form of parity to be used. Legal values and their meanings are:

NONE - No parity
ODD - Odd parity
EVEN - Even parity
MARK - Mark parity
SPACE - Space parity

If under RECEIVE (in the next paragraph) you select AUTO, the parity is detected from the incoming data stream and set automatically by the system, overriding any parity set by the user.

RECEIVE. RECEIVE describes the bit rate at which characters are received at an LIU port. Characters are also transmitted at this rate. Legal values and their meanings are:

AUTO - Legal only for RECEIVE. Specifies that the RECEIVE rate is determined when the connection is made. The connection may only be 300, 1200, or 2400 baud. AUTO also causes the incoming parity to be determined and used, overriding any parity set by the user.

EXTERNAL - External clocking is to be used.

Or any of the following baud rates:

50
75
110
134.5
150
300
600
1200
1800
2000
2400
3600

4800
7200
9600
14400
16000
19200

STOP describes the number of stop bits used. Legal values are 1, 1.5 and 2, for that number of stop bits.

ASCII Connection Agent (ACA)

This object contains information necessary for the proper initialization of the ASCII Connection Agent.

Paragraph Syntax.

Name of the object: ACAROOT

Required field types: none

Optional Field Types: MISC, PRIMARY, SECONDARY, UPDATE, COMMIT, SWAP

MISC - Character flags that describe miscellaneous information (currently limited to whether logging is enabled or disabled).

- L - Logging of messages and statistics is enabled.
- -L - Logging is disabled.

PRIMARY - A 21-character file name of the file to be used as ACA's logging file. The default name is:

:LOCAL:ACA:LOGS:LOGONE.

SECONDARY - A 21-character file name for a file to be used as a secondary file for logging when the primary file has been filled and is being dumped. The default file name for the secondary file is:

:LOCAL:ACA:LOGS:LOGTWO.

UPDATE - The number of minutes (1 to 60) between updates of queried connection screens. The default is two minutes.

COMMIT - The number of minutes (1 to 60) between commits (saves) of the log file. The default is 15 minutes.

SWAP - The number of minutes between swapping the primary and secondary log files (that is, exchanging the file currently collecting data). The number must be greater than that specified for COMMIT. The default is 1440 minutes.

Example:

```
$D ACAROOT;  
$F MISC, PRIMARY, SECONDARY, UPDATE, COMMIT, SWAP;  
L, PRIMLOG, SECONDLOG, 10, 5, 360;
```

This example will log to the files PRIMLOG and SECONDLOG (on the directory path :LOCAL:ACA:LOGS); it will update queried connection screens every five minutes, and swap the log files every six hours.

Generic Port Characteristics (PORTDAT)

This BCFG.TEXT paragraph contains generic port characteristics that can be applied to specific ports in other paragraphs. It helps centralize port data for administration purposes and minimizes typing errors. Each statement in the paragraph defines one generic port type. You can define up to 20 port types, each of which may be referenced by particular ASCII devices in the ASCII personality paragraphs (ATADAT, AHADATA, and APIDATA).

Paragraph Syntax:

Name of the object: PORTDAT

Required field types: NAME

Optional field types: MODEM, RECEIVE, FLOW, PARITY, DATA, STOP, LINEMODE, ECHO, BUFFER, PACKET, TIMEOUT, DELIM, MISC

NAME - For a definition of name, refer to the section on common field types.

MODEM - For legal values, refer to the section on common field types. The default is NONE.

DATA - For legal values, refer to the section on common field types. The default is 8 bits.

ECHO - For legal values, refer to the section on common field types. The default is NONE.

FLOW - For legal values, refer to the section on common field types. The default is XON/XOFF.

LINEMODE - For legal values, refer to the section on common field types. The default is FULL.

PARITY - For legal values, refer to the section on common field types. The default is EVEN.

RECEIVE - For legal values, refer to the section on common field types. The default is 1200.

STOP - For legal values, refer to the section on common field types. The default is 1.

BUFFER - The number of bytes in the receive buffer, stated as a decimal integer. The number must be at least 2 and at most 1024. The default is 256. This is the area used to hold characters until transferred to the system. Three factors can be used to determine how often the contents of the buffer get transferred: PACKET, TIMEOUT, and DELIM.

PACKET - The number of characters (bytes) to be held in the buffer before being automatically transferred to the system. This number should not be larger than 75% of the buffer's size. The default is 128.

TIMEOUT - The maximum number of centiseconds (stated as a decimal integer) to wait for additional characters before sending those already in the buffer. The default is 10.

DELIM - A series of decimal integers separated by colons (:) which represent the ASCII characters used as a packet delimiter. If such a delimiter is received by the buffer, all characters in the buffer and this delimiter are sent to the system. The defaults are CR (carriage return) and CRLF (carriage return and linefeed).

MISC - Character flags which describe the mode information used in APIO personalities only:

- A - The port is connected to a DVS application.
- -A - The port is connected to another terminal.

Example:

```
$D PORTDAT
$F NAME, MODEM, DATA, ECHO, FLOW, LINEMODE, PARITY, RECEIVE,
STOP, BUFFER, PACKET, TIMEOUT, DELIM, MISC;
  PORT1, NONE, 7, ON, NONE, FULL, EVEN, AUTO, 1, 1024, 512, 10,
10:13, -A;
```

This example defines the port characteristics as consisting of no modem, 7 data bits, LIU echo enabled, no flow control, full duplex mode, odd parity, auto-baud sensing, 1 stop bit, receive buffer size of 1024 bytes, packet size of 512 bytes, 10 centiseconds for timeout between received characters, ASCII characters 10 and 13 used as delimiters, no application is to access this port, and it has a name of PORT1.

After you have created all the generic port types you require, you can begin assigning specific devices to the port types. You do this by specifying PORT1 as the port characteristics in the device personality paragraph (such as ATADATA, AHADATA, or APIDATA). The device is identified in its paragraph by its address of CSLP (for cabinet, slot, line and port).

Auto-baud Arrangements

You can configure auto-baud arrangements for an AHA or APIO port, by using the AUTO keyword in the RECEIVE field when configuring the port in the PORTDAT paragraph. Baud rates of 300, 600, 1200, and 2400 are supported. In order for the LIU port to determine the correct baud rate and parity, the attached device must send a four-character string composed of three carriage returns followed by a period. This signal synchronizes the port and the attached device.

Auto-bauding is not supported on printer ports.

ASCII Terminal Access (ATADATA)

This paragraph defines the individual ports serving ASCII terminals (that is, ports configured for an ATA personality).

The ports listed in this ATADATA paragraph are used by ASCII terminals to do one of two things:

- emulate M4000 terminals so that the ASCII terminal can access the system's main menu
- provide an ASCII pipe between the ASCII terminal and an ASCII host using the ASCII Programmable Input/Output personality (that is, providing an unaltered data flow between the devices).

To simplify later updates, you should enter the statement for each ASCII terminal on a separate line, ended by a semicolon.

Paragraph Syntax:

Name of the object: ATADATA

Required field types: CSLP, PORT

Optional field types: ATTN

CSLP - Enter the cabinet, slot, line, and port for this terminal as shown in the section titled 'Common Field Names'.

PORT - Enter the name of a generic port that has the operational characteristics required by this ASCII terminal. For example, if the terminal requires the characteristics defined by a generic port named PORT1, enter PORT1 here.

ATTN - Enter the decimal integer that represents the ASCII value for the key to be used as the attention key for this terminal. On an ASCII terminal, the attention key is used as a command prefix key that enables the ASCII terminal to emulate the softkeys and hardkeys of an M4000 terminal. DNC systems require that ASCII terminals be assigned an attention key. The BREAK key is the default, and is shown as BREAK. To assign any other key as the attention key, use the ASCII value for the key, stated as a decimal integer.

Example:

```
$D ATADATA
$F CSLP, PORT, ATTN;
    3/5/1/6, PORT1, BREAK;
    3/5/2/3, PORT3, 27;
```

This example assigns to the first terminal, connected to cabinet 3, slot 5, line 1, port 6, the characteristics of PORT1 (defined in PORTDAT). Its attention key is left as the default, the BREAK key.

The second terminal, connected to cabinet 3, slot 5, line 2, port 3, is assigned the characteristics of PORT3 (defined in PORTDAT). This terminal uses ESC as its attention key (the ESC key has a decimal value of 27 in ASCII). Refer to an ASCII code chart for the decimal values of other keys.

ASCII terminals used in an ASCII pipe with an APIO port do not require the attention key.

ASCII Programmed I/O Access (APIO)

This paragraph lists information for ports used as APIO personalities for ASCII hosts. The ports are used to provide an ASCII pipe between the APIO port and an ASCII terminal (that is, providing an unaltered data flow between the devices).

To simplify later updates, you should enter the statement for each APIO port on a separate line, ended by a semicolon.

Paragraph Syntax:

Name of the object: APIDATA

Required field types: CSLP, PORT

CSLP - Enter the cabinet, slot, line, and port for this APIO port as shown in the section titled 'Common Field Names'.

PORT - Enter the name of a generic port that has the operational characteristics required by this APIO port. For example, if the port requires the characteristics defined by a generic port named PORTx, enter PORTx here.

Example:

```
$D APIDATA
$F CSLP, PORT;
    1/3/1/4, PORTx;
    1/3/1/5, PORTx; (*referenced in a NAILEDs*)
    1/3/1/6, PORTx; (*referenced in a HUNTDAT*)
```

This example assigns to the APIO port, connected to cabinet 1, slot 3, line 1, port 4, the characteristics of PORT1 (defined in PORTDAT).

The second port, connected to cabinet 1, slot 3, line 1, port 5, is also assigned the characteristics of PORTx, but is referenced in a NAILEDs paragraph. This means the port serves as the destination end of an ASCII pipe, the other end being an ASCII terminal (ATA personality).

The third port, connected to cabinet 1, slot 3, line 1, port 6, is also assigned the characteristics of PORTx, but is referenced in a HUNTDAT paragraph. This means the port will support an ASCII Terminal Access port that requires access to the ASCII host through the system's main menu.

Nailed Up Connections (NAILEDs)

This paragraph identifies pairs of ports (defined as their CSLP addresses) to be used in dedicated, or nailed up, connections, such as between an ASCII terminal and a compatible ASCII host. Information is transmitted between them unaltered (that is, no protocol conversions are required). There can be up to 20 nailed up connections in a system.

To simplify later updates, you should enter the statement for each pair of ports on a separate line, ended by a semicolon.

Paragraph Syntax:

Name of the object: NAILEDs

Required field types: OPORT, DPORT

Optional field types: PHONE

OPORT - Enter the cabinet, slot, line, and port for the ASCII terminal (as shown in the section titled 'Common Field Names') that is the originator port for this connection (referenced from ATADATA).

DPORT - Enter the cabinet, slot, line, and port for the APIO port (as shown in the section titled 'Common Field Names') that is the destination port for this connection (referenced from APIDATA).

PHONE - Enter a phone number of up to 40 digits that is sent automatically to the modem connected to the APIO port when the terminal is powered up. The number is sent as-is; if special modem control characters are required, they must be included in the string. These characters can be imbedded using the /hh/ construct.

Example:

```
$D NAILEDs
$F OPORT, DPORT, PHONE;
  1/3/2/5, 1/3/1/3, "ATDT1-800-555-1212/OD/";
```

This example defines an ASCII pipe, or nailed up connection, between the originating ASCII terminal connected to cabinet 1, slot 3, line 2, port 5 to the destination APIO host connected to cabinet 1, slot 3, line 2, port 3. It also defines

the telephone number sequence to be dialed to establish the connection, including special modem control characters.

ASCII Host Access (AHADATA)

This paragraph lists information for ports used as ASCII Host Access personalities. The ports are used by ASCII terminals and personal computers that emulate an M4000 terminal in order to access the system's main menu.

To simplify later updates, you should enter the statement for each AHA port on a separate line, ended by a semicolon.

Paragraph Syntax:

Name of the object: AHADATA

Required field types: CSLP, PORT

Optional field types: none

CSLP - Enter the cabinet, slot, line, and port for this host port as shown in the section titled 'Common Field Names'.

PORT - Enter the name of a generic port that has the operational characteristics required by this AHA port. For example, if the port requires the characteristics defined by a generic port named PORTx, enter PORTx here.

Example:

```
$D AHADATA
$F CSLP, PORT;
    1/3/1/4, PORTy;
```

This example assigns to the AHA port, connected to cabinet 1, slot 3, line 1, port 4, the characteristics of PORTy (defined in PORTDAT).

Hunt Group Data (HUNTDAT)

This paragraph identifies which ports (defined as their CSLP addresses) to be assigned to specific hunt groups. The hunt group is used when an ASCII host is selected from the system's main menu; the system searches sequentially through the hunt group for an available port to make the connection.

To simplify later updates, you should enter the statement for each hunt group beginning on a new line, separating the CSLP addresses with colons and ending the statement with a semicolon. There can be up to 20 hunt groups in a system.

Paragraph Syntax:

Name of the object: HUNTDAT

Required field types: NAME, PORTS

Optional field types: PHONE

NAME - Give the hunt group a name according to the rules shown in the section titled 'Common Field Names'. The name specified here will appear in a list of selectable hosts in the ASCII Hosts Menu.

PORTS - Enter the cabinet, slot, line, and port (as shown in the section titled 'Common Field Names') for each port to be included in the hunt group. Separate the CSLP addresses with a colon. No more than 30 ports can be specified.

PHONE - Enter a phone number of up to 40 digits for this hunt group. The number is sent automatically to the first available modem in the hunt group to establish a connection when the host is selected from the ASCII Host Menu.

The number is sent as-is; if special modem control characters are required, they must be included in the string. These characters can be imbedded using the /hh/ construct.

Example:

```
$D HUNTDAT
$F NAME, PORTS, PHONE;
   GROUP1, 1/3/3/5:1/3/4/4, "ATDT1-800-555-1212/OD/";
```

This example defines a hunt group named GROUP1 that consists of two ports with an auto-dial sequence as shown.

User/Host Access Data (USRHOST)

This paragraph identifies which ASCII hosts can be accessed by which users. It should include all users in the system. As users are added to the system, their ASCII host access rights should also be defined.

To simplify later updates, you should enter the statement for each user beginning on a new line.

Paragraph Syntax:

Name of the object: USRHOST

Required field types: USER, HUNT

Optional field types: none

USER - Enter the user's DNC user name (the user name is a unique identifier of up to 16 characters specified in the user profile for that user).

HUNT - Enter one or more hunt group names (as specified in HUNTDAT) that this user is allowed to access. No more than 20 hunt groups may be specified.

Example:

```
$D USRHOST
$F NAME, HUNT;
    DNCUSER1, GROUP1;
    SUPERUSER, GROUP1:GROUP2;
```

This example allows the DNCUSER1 to access only hunt group named GROUP1, but allows SUPERUSER to access GROUP1 and GROUP2.

Compiling the ASCII Batch Configuration File

When the ASCII batch configuration file has been completed, it must be compiled. Do so according to the following procedure:

- (1) Sign on as the superuser.
- (2) Select System Administrative Services from the main menu and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select Configuration and press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update and press ENTER.

The Configuration Services Menu appears.

- (5) On the Configuration Services Menu, select ASCII Device Services, and then press ENTER.

The system displays the ASCII Device Services Batch Configuration screen, which lists the default name of the batch configuration file:

```
:LOCAL:PRU:SAS:CS:BCFG.TEXT
```

- (6) If the name of the batch configuration file differs from the default name, type the correct name over the default. When the name is correct, press <Compile BCFG>.

The system then processes the file.

Note: To stop the processing of the file, press the <Exit Service> softkey.

If an error is encountered, the system continues processing the file. The errors are collected in an error file (BCFG.TEXT.LIST if you compile the original file, or the name you gave the copy, with .LIST concatenated to it) until the file has completed its processing or 50 errors have been collected. You can then fix these errors and reprocess the file as follows:

- (1) When the file stops compiling either as the result of accumulating 50 errors or completion, press the <Exit> softkeys until you arrive at the System Administrative Services - Main Menu.
- (2) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

- (3) Select Helix Command Interpreter and press ENTER.

The system prompt appears. (It is usually '>'.)

- (4) To start the editor, type in the following command on the Helix command line:

ED name

where name is the name of the batch configuration file. Then press ENTER.

Note 1: The name of the batch configuration file is usually

:LOCAL:PRU:SAS:CS:BCFG.TEXT

However, the file may have a different name and directory location, depending on the DNC application. Consult the application documentation for specifics.

Note 2: If the file does not open, press ESC, type EXIT, and then press ENTER.

- (5) Edit the file using the XMS editor.
- (6) To save the file, press the RESET key, then press Q, and then type in S.
- (7) Exit from the editor by typing in E.

You exit to the Helix Command Interpreter. The system prompt reappears.

- (8) To exit from the Helix Command Interpreter, type in EXIT and then press ENTER.

The Utilities Service - Main Menu reappears.

- (9) Press the <Exit> softkeys until you arrive at the main menu.

Initializing the ASCII Connection Agent

When the ASCII batch configuration file has been completed, all errors corrected, and initialized, the ASCII Connection Agent (ACA) PRU should be reinitialized. This reinitialization is required because the new values in the batch configuration file go into effect only when the ACA PRU is reinitialized.

There are two stages to the procedure. The first stage is to go into the Configuration service and verify that the ACA is defined as a PRU. The second stage is to go into the Maintenance service to initialize the ACA PRU.

Steps 1 to 11 verify that the ACA is defined as a PRU.

- (1) Sign on to the system as the system administrator.

The main menu appears

- (2) Select System Administrative Services and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select Configuration and press ENTER.

The Configuration service - Main Menu appears.

- (4) Select Online Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select System Map and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) Use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU on which the ACA PRU is to reside.

Note: The ACA PRU can reside on the Primary Processor SRU, or on an Applications Processor SRU.

- (7) Use the arrow keys to select the SRU, and press <Next Level>.

The system displays the Software Map screen, listing the PRUs that are configured for the selected SRU.

- (8) Press <Insert Item>.

The system displays the Selection List screen, listing PRUs that can be configured.

- (9) On the Selection List screen, use the arrow keys to select the ASCII Connection Agent, and then press <Select Item>.

The system redisplay the Software Map screen. The newly selected PRU is listed in the lower portion of the screen, in the defined state. The system is prompting for a name.

Note: If you decide to abort the operation, you can do so by pressing <Quit>.

- (10) Enter a name (required; the default is '---') such as ACA, and press ENTER three times.

The PRU appears in the list, in the defined state.

- (11) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. Steps 12 to 17 activate the ACA PRU.
- (12) On the System Administrative Services Main Menu, select MAINTENANCE, and press ENTER.

The system displays the Faulty Units screen.

- (13) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all the SRUs located in the first cabinet, and gives the status of each.

- (14) Use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU on which the ACA PRU resides.
- (15) Use the arrow keys to select the SRU, and press <Next Level>.

The system displays the PRU State Display screen, which lists the name and status of each PRU residing on the SRU.

- (16) Use the arrow keys to select the ASCII Connection Agent PRU, and press <Courtesy Down>.
- (17) Wait until the status of the PRU changes to down, and then press <Courtesy Up>.
- (18) To leave the Maintenance Services, press the <Exit> softkeys until you arrive at the system main menu.
- (19) Sign off by pressing <Sign Off> and then ENTER.

Error Messages Collected when Compiling BCFG.TEXT

Errors detected when the BCFG.TEXT file is being compiled are written to an error log, called BCFG.TEXT.LIST (or, if you have copied the file, to the name of that file with .LIST appended to the name). If an error file of this name already exists from a previous compilation, the existing error file is overwritten.

Any error (but not a warning) detected during compilation prevents that object from being written. The compilation continues until either 50 errors have been collected or the file is completely compiled. This allows you to fix a number of errors at once without halting compilation for each error. Warning messages are logged in the error file, but do not stop the objects from being written.

When an error occurs in a \$D or \$F statement, the entire paragraph is ignored until the next \$D statement is read. This means further errors in the paragraph with the error in the \$D or \$F statements will not be found until the BCFG.TEXT file is recompiled.

While the BCFG file is being compiled, a screen is displayed to the user that informs him of the current line in the BCFG file, the number of errors detected, the number of warnings detected, the last error message, and the filename of the error log.

The list of error messages is:

Syntax Errors in \$D statements:

@<Line number> : Object name not found - <OBJECT>.

@<Line number> : Object already defined - <OBJECT>.

Syntax Errors in \$F statements:

@<Line number> : No \$D statement found.

@<Line number> : Unable to find field - <FIELD>.

@<Line number> : Field already specified - <FIELD>.

Syntax Errors in data statements:

@<Line number> : No \$F statement found.

@<Line number> : Too many occurrences - <OBJECT>.

@<Line number> : Number out of range - <NUMBER>.

@<Line number> : Invalid number - <NUMBER>.

@<Line number> : Invalid escape sequence - <STRING>.

@<Line number> : Invalid CSLP - <CSLP>.

@<Line number> : Unable to find flag - <FLAG>.

@<Line number> : Extra values for field will be ignored.

@<Line number> : Extra fields will be ignored.

@<Line number> : Too many characters - <STRING>. (Warning)

@<Line number> : Too many characters. Check for unbalanced : quotes - <STRING>. (Warning)

Lookup Errors

: Unable to find port type - <PORTNAME>.

: Unable to find modem type - <MODEMNAME>.

: Unable to find terminal type - <TERMNAME>.

: Unable to find CSLP - <CSLP>.

: Unable to find hunt group - <HUNTNAME>.

: Unable to find user name - <USERNAME>.

LIU definition errors

: Port is not being defined - <CSLP>.

: Multiple nailed up connections for one port - <CSLP>.

: Port defined in too many hunt groups - <CSLP>.

: Port defined in both a hunt group and a nailed up connection - <CSLP>.

: Hunt groups may not contain ATA ports - <CSLP>.

: Invalid LIU load - <CSL>.

: Threshold packet size is larger than 3/4 of the receive buffer size.

@<Line #> : Invalid log filename - <FILENAME>.

@<Line #> : Duplicate log filename - <FILENAME>.

Other errors

: Unable to access file - <FILENAME>.

14. Printer Administration

This part covers the following topics related to printer administration:

- configuring printers in the system map
- setting up printers, including switch settings and cabling
- setting up print queues and associating queues with printers
- designating which users have access to which print queues
- managing the print queues.

Configuring Printers in the System Map

Printers must be connected to LIU ports to which you have assigned appropriate printer port personalities. When adding, moving, or deleting a printer for logs or reports, follow the configuration instructions found in the part titled 'Configuring Port Personalities for External Devices'.

Note 1: Whenever you change a printer's configuration parameters, a printer queue administrator must service the printer. See 'Servicing the Printer', later in this part, for more information.

Note 2: For Journal System printers, consult NT field personnel.

Setting up Printers

To prepare a printer for use with the system, take the following steps:

- (1) Ensure that the printer is connected to the proper type of LIU port, either serial or parallel, and that the cabling is correct.
- (2) Refer to the printer's manuals for start-up information.
- (3) Follow the instructions in the printer manuals to set up the communications parameters.

Note 1: If you want the printer to produce a leading blank page at the start of each job, or a trailing blank page at the end of each job, you specify it in System Administrative Services. (See 'Printer Administration', later in this part, for more information.)

Note 2: For a serial printer, you must enter the values of the following communications parameters on the Printer Communications Settings screens: baud rate, number of stop bits, number of bits per character, type of parity, communications mode (full or half duplex), flow control

characters, receive buffer size, and laser printer format. If you set the printer's internal configuration to certain values (such as by setting switches on the printer), note the values so that you can add them to the Printer Communications Settings screens.

- (4) Ensure that the printer is plugged in and that the paper is properly fed into it.
- (5) In System Administrative Services, use the System Map service to configure the printer by cabinet, slot, line, and port.

Note: There can be as many as 32 printers in a DNC system.

- (6) In System Administrative Services, use the Printer Queues service to specify the printer's communications parameters.
- (7) If you initially configure the printer but later change the printer's parameters, then after you have changed the parameters, a printer queue administrator must service the printer. (See 'Servicing the Printer', later in this part, for more information.)

Programming the NT System Matrix Printer

Most frequently, DNC systems are equipped with NT System Matrix serial or parallel printers. To set up such a printer, you program it by taking the following steps:

- (1) If the printer is a parallel printer, ensure that the optional 'APAR' PC board is installed in the printer.
- (2) Plug in the printer and ensure that paper is properly fed into it.
- (3) Switch the printer on.

The display on the printer control panel shows '88'. The print head moves to the left margin. There is a delay of 3 s during which the printer performs a self-test. Then the display on the control panel shows either 'OF' or 'On'.

Note: If there is any other display, it may indicate a failure of the self-test or another fault condition. In this case, consult the manufacturer's documentation, or contact Northern Telecom for service.

- (4) If the display on the control panel shows 'On', press the ONLINE button on the control panel.

The printer goes off-line, and the display on the control panel shows 'On'.

- (5) Flip up the rear cover of the printer and position the LOAD switch to the down position and the PROGRAM switch to the up position. (The switches are located beneath the rear cover, on the vertical panel, on the right side as you face the front of the machine.)
- (6) Initiate program mode by pressing the PRG button on the control panel.

The display on the control panel displays 'Pg' and the printer prints a listing of the current configuration. Note that the listing is divided into nine sections numbered 1 to 9. See Figure 14-1 for an example.

- (7) Program the printer as explained in the following paragraphs. If the printer uses the serial interface, the settings conform to those shown in Figure 14-1. If the printer uses the parallel interface, the settings must conform to those shown in Figure 14-2.

Figure 14-1
Internal Configuration Settings for the NT System Matrix Printer Using a Serial RS-232-C Interface

THE PRESENT CONFIGURATION IS:

- 1. Font:**
 Style - (44A506576) EDP
 CPI - 10.0
 Country - USA
 Mode - Normal
- 2. LPI - 6**
- 3. Forms Control:**
 Form Length - 11.0"
 Top Margin - 0.0"
 Bottom Margin - 0.0"
- 4. Interface Control:**
 Interface Type - Serial
 Output Buffer Length 0512
 Interface Straps A:
 0 1 2 3
 12345678901234567890123456789012
 00001000000001000000100000001000
 Interface Straps B:
 0 1 2 3
 12345678901234567890123456789012
 11000000000000000000000000000000
 Speed - 9600
 Parity - Even
- 5. Margin Settings:**
 Left Margin - 0.0"
 Right Margin - 13.2"
- 8. Printer Control Straps:**
 Printer Straps A:
 0 1 2 3
 12345678901234567890123456789012
 10011000001000000000000000000000
 Printer Straps B:
 0 1 2 3
 12345678901234567890123456789012
 00000000000000000000000000000000
- 9. Emulation Mode - Diablo**

Press the number "0" to return to normal operation.

To continue modification select (1-9)

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Figure 14-2
Internal Configuration Settings for the NT System Matrix Printer Using a Parallel Interface

THE PRESENT CONFIGURATION IS:

- 1. Font:
 - Style - (44A506576) EDP
 - CPI - 10.0
 - Country - USA
 - Mode - Normal
- 2. LPI - 6
- 3. Forms Control:
 - Form Length - 11.0"
 - Top Margin - 0.0"
 - Bottom Margin - 0.0"
- 4. Interface Control:
 - Interface Type - Centronics
 - Output Buffer Length 0512
 - Interface Straps A:

0	1	2	3
12345678901234567890123456789012			
00000000000000000000000000000000			
 - Interface Straps B:

0	1	2	3
12345678901234567890123456789012			
00000000000000000000000000000000			
 - Speed - 9600
 - Parity - Even
- 5. Margin Settings:
 - Left Margin - 0.0"
 - Right Margin - 13.2"
- 8. Printer Control Straps:
 - Printer Straps A:

0	1	2	3
12345678901234567890123456789012			
10011000001000000000000000000000			
 - Printer Straps B:

0	1	2	3
12345678901234567890123456789012			
00000000000000000000000000000000			
- 9. Emulation Mode - Diablo

Press the number "0" to return to normal operation.

To continue modification select (1-9).

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In program mode, set up the printer by pressing the buttons on the control panel. Note that the buttons are numbered 0 to 9. Buttons 1 to 9 correspond to parts of the printer configuration. If you press one of these buttons, the printer prints out a menu that corresponds to the similarly numbered part of the printer configuration. For example, pressing button number 1 prints the Font Menu. If any part of the printer configuration differs from the requirements shown in Figure 14-1 (serial interface) or Figure 14-2 (parallel interface), press the appropriate button, and follow the prompts to change the configuration.

Note: If a serial printer is configured to do parity checking, then follow Figure 14-1, but change the setting of of the following bits to 0:

- bit 29 in Interface Strap A
- bit 2 in Interface Strap B.

When you finish changing a part of the configuration, press button number 0 to record the changes. At this point you can press another one of the buttons numbered 1 to 9 to print out another menu and begin changing another part of the configuration, or you can press button 0 to return to normal operation.

When all parts of the configuration are correct, return to normal operation and press the ONLINE button on the control panel to ready the printer for use.

Printer Switch Settings

Diablo 630 API-ECS Switch Settings

This printer provides two switch blocks on the control panel (labeled 'FFCPN') for the selection of various communications parameters. For compatibility with the LIU, you must set up the printer for seven bits per byte and Space parity. Set switch 6 on the right switch block to 'ON'. Set the other switches on the right switch block to 'OFF'. Set all the switches on the left switch block to 'OFF'.

Diablo 630 (Non-ECS Model) Switch Settings

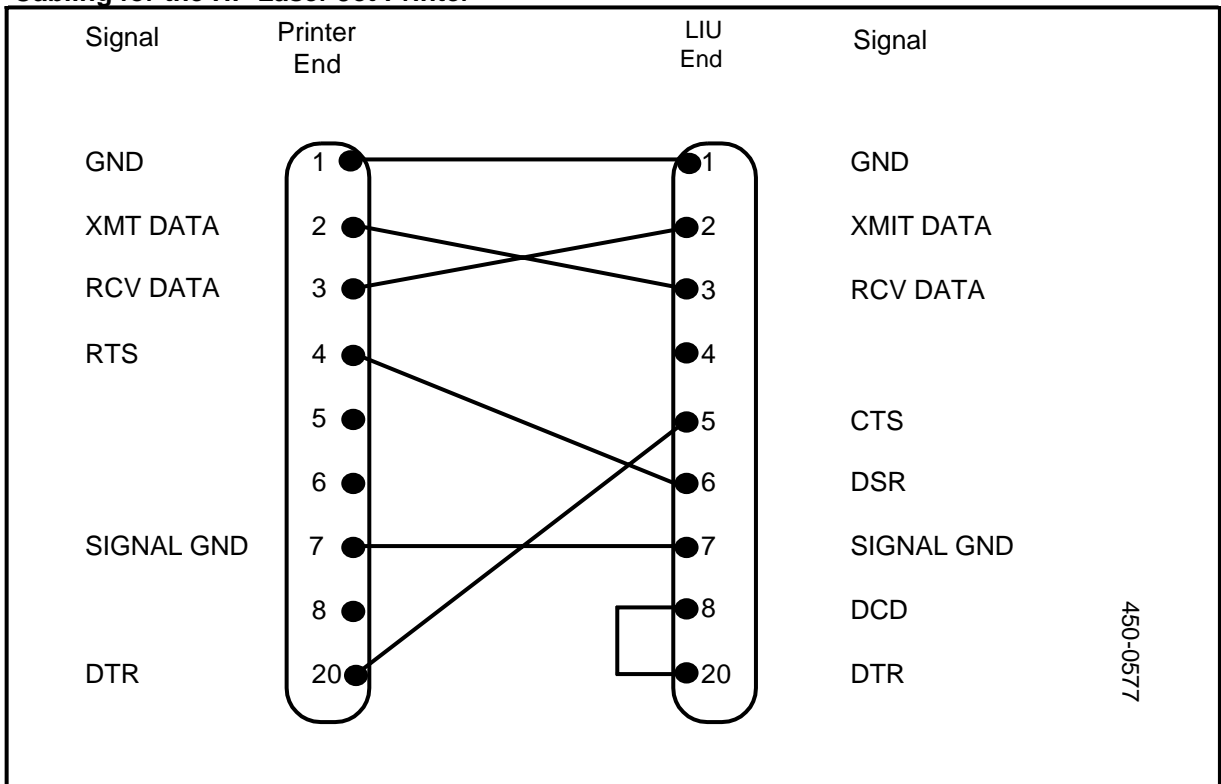
This printer provides two 'FFCPN' control panel switch blocks for the selection of various communications parameters. Set all the switches on the control-panel switch blocks to 'OFF'.

This printer also has a switch block on the HPR05 board. To access the HPR05 switch block, remove the printer cover and remove the metal shield panel that covers the HPR05 board. These switches select the default baud rate (9600) and handshake protocol (DC1/DC3). Set switches 1, 6, 7, and 8 to 'OFF', and switches 2, 3, 4, and 5 to 'ON'.

Hewlett Packard ThinkJet Switch Settings

This printer may have one or two switch blocks on the back panel. It is available with either a serial RS-232-C serial interface or a parallel interface. Parallel printers have two switch blocks; serial printers have only one. On both parallel and serial models, set all switches to 'OFF'.

Figure 14-3
Cabling for the HP Laser Jet Printer



Data Products B-series Printer Switch Settings

These printers are high-speed line printers that should be attached to the LIU via a parallel interface. There are four switch blocks on the parallel interface board. Switch blocks S1 and S2 deal with user-configurable options. The recommended settings for these switches are as follows. On switch block S1, set switch 1 to 'ON' and set the other switches to 'OFF'. On switch block S2, set switch 2 to 'ON' and set the other switches to 'OFF'.

Note: Switch blocks S3 and S4 deal with hardware options. Do not alter the switches on S3 and S4.

RS-232-C Cabling for Printers

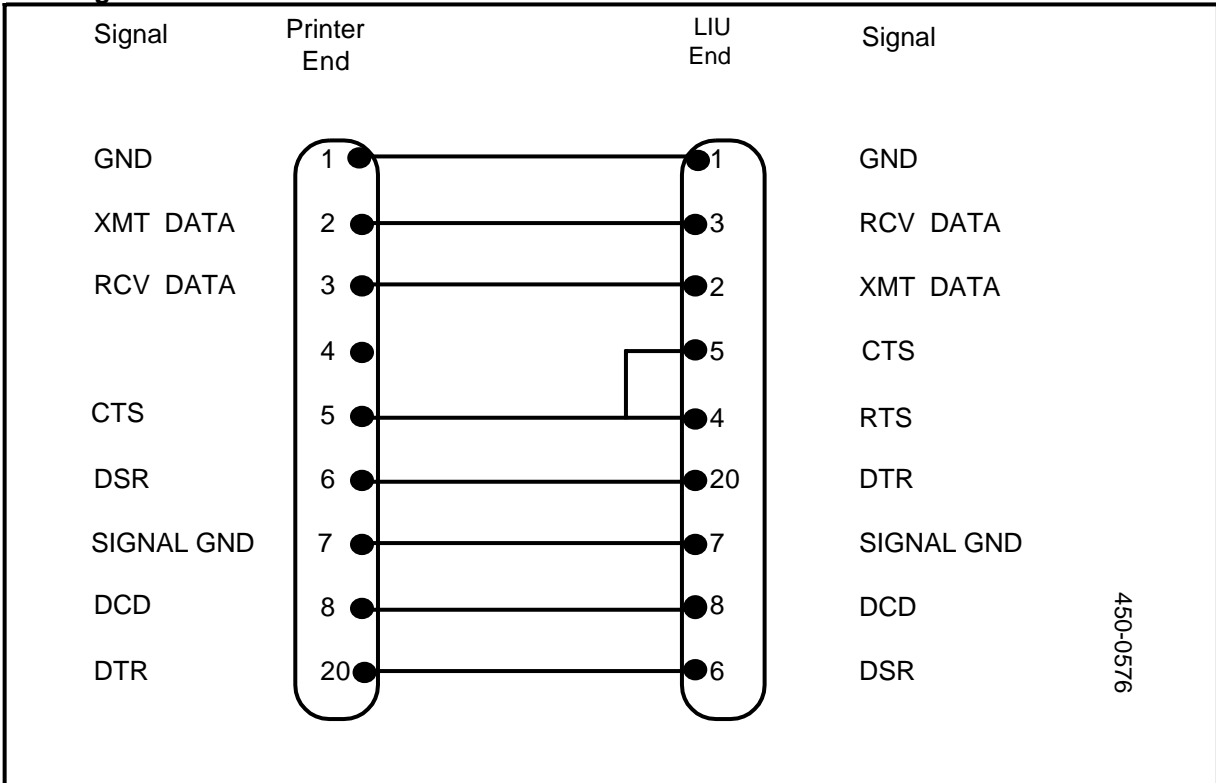
Hewlett Packard Laser Jet Cabling

To connect the Hewlett Packard Laser Jet printer to the LIU, use a cable adaptor to wire the RS-232-C cable as shown in Figure 14-3.

If a cable adaptor is built, it should be used together with an NT0M96DE or NT0M96DF 'straight-through' cable.

- CAUTION -
 After adapting the cable for use with this printer, do not try to use the cable with any other type of printer, or use a different type of cable for the printer. Use of the wrong cable may damage the printer and the LIU.

Figure 14-4
Cabling for the Xerox 4045 Laser Printer



Xerox 4045 Laser Printer Cabling

To connect the Xerox 4045 Laser Printer to the LIU, use a cable adaptor to wire the RS-232-C cable as shown in Figure 14-4. If a cable adaptor is built, it should be used together with an NT0M96DE or NT0M96DF 'straight-through' cable.

- CAUTION -
 After adapting the cable for use with this printer, do not try to use the cable with any other type of printer, or use a different type of cable for the printer. Use of the wrong cable may damage the printer and the LIU.

This printer's internal switches must be set for XON/XOFF flow control. This means that switch C1 should be set to 'ON', and switches C2 and C3 should be set to 'OFF'. (When configuring the printer, specify XON/XOFF flow control on the Printer Communication Settings screen.)

Printer Queue Administration

Printer queue administration is the control of printers through the use of queues for the jobs sent to those printers. You can:

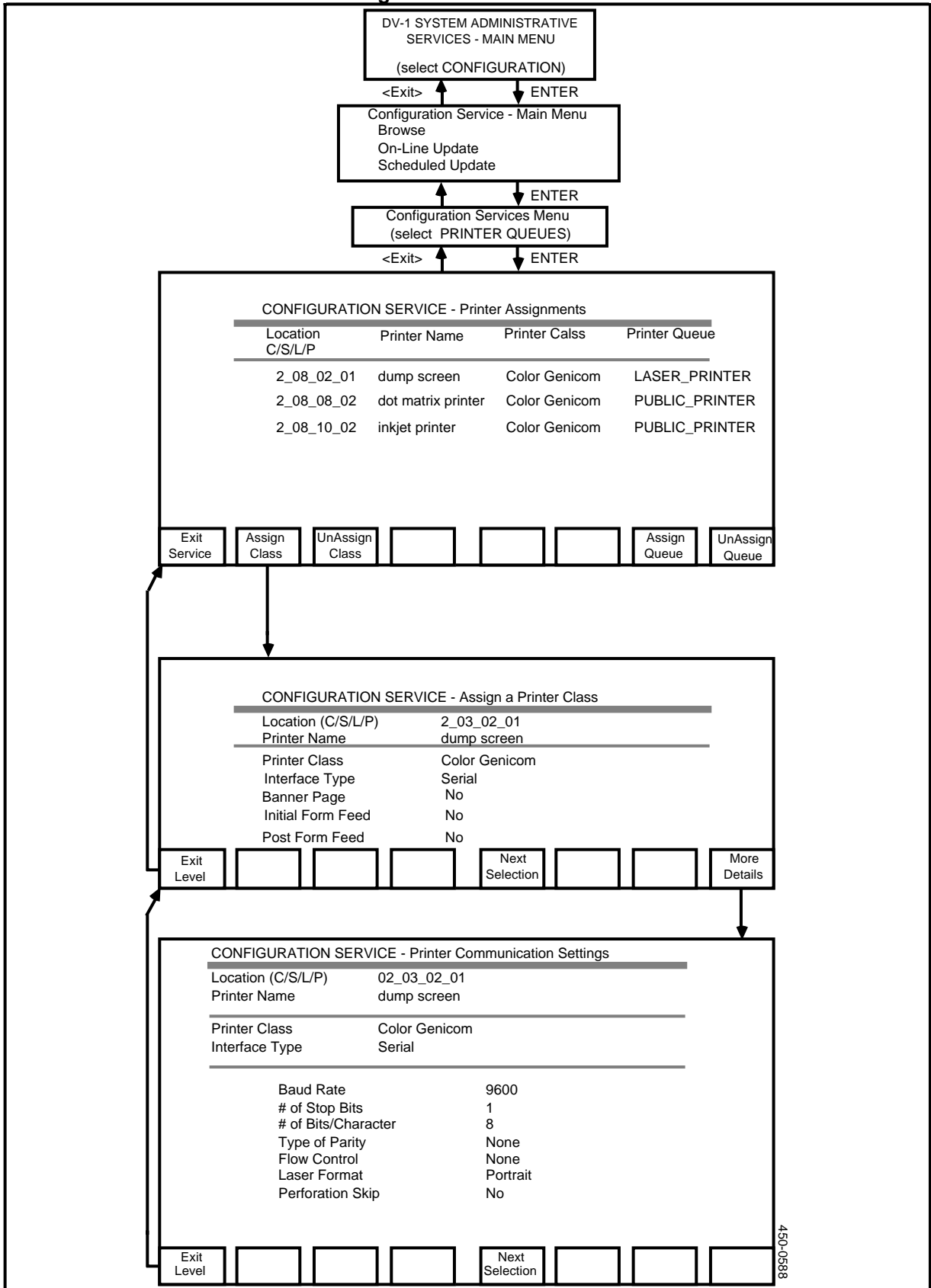
- specify the printer class that a printer belongs to
- define printer parameters, such as interface type
- change printer parameters
- define a print queue
- specify the queue whose print jobs the printer outputs
- switch a printer to a different print queue
- terminate the association of a printer and a print queue
- edit a print queue to change its users or administrator
- delete a print queue.

Note: The procedures in this part assume that you have used the System Map Utility to configure an appropriate LIU port for each printer. For information, see Part 9, 'Configuring Port Personalities for External Devices'.

Specifying a Printer's Class and Parameters

This procedure describes how to designate the class and the communications parameters of each printer on a DNC system. (There can be as many as 32 printers in a DNC system.) The menu structure is shown in Figure 14-5.

Figure 14-5
Menu Structure for Printer Class Designation



To specify a printer's class and other parameters, take the following steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues and press ENTER.

The system displays the Printer Assignments screen.

- (6) If a printer does not have a printer class, then 'UNASSIGNED' appears in the Printer Class field. Select the unassigned printer and press <Assign Class>.

The system displays the Assign a Printer Class screen. On this screen you specify the printer's characteristics, including its class.

Steps 7 to 11 explain how to specify the printer's characteristics.

- (7) The first field on the Assign a Printer Class screen is Printer Class.

A class is just a type of printer. For example, Diablo printers and other types of printers that are set up to emulate Diablos are in the Diablo class.

Here is a list of the printers and printer classes that are supported on the system:

Printer	Class
Apple Laserwriter	Apple Laserwriter
Diablo	Diablo
Epson FX-80	Epson FX-80
Epson LQ	Epson LQ
Genicom (color)	Color Genicom
Genicom (monochrome)	Monochrome Genicom
HP Thinkjet	HP Thinkjet
HP Laser	HP Laser
NT Personal Printer	HP Thinkjet
NT Striker	Diablo
NT System Matrix (monochrome)	Monochrome Genicom
NT System Matrix (color)	Color Genicom
Xerox 4020	Xerox 4020

If your system has a printer that is not listed above, then it is emulating one of the listed printers. Select the class that is being emulated.

Press <Next Selection> repeatedly until the correct printer class is displayed.

- (8) Use the arrow keys to select the next field, Interface Type. The default setting for this field is Serial. To change the setting to Parallel, press <Next Selection>.
- (9) Use the arrow keys to select the next field, Banner Page. The default setting for this field is No. To change the setting to Yes, press <Next Selection>.
- (10) Use the arrow keys to select the next field, Initial screen Feed. The default setting for this field is No. To change the setting to Yes, press <Next Selection>.
- (11) Use the arrow keys to select the next field, Post screen Feed. The default setting for this field is No. To change the setting to Yes, press <Next Selection>.

If the interface type for this printer is parallel, go to Step 20. If the interface type for this printer is serial, then you must specify the printer communication settings, as explained in Steps 12 to 19.

Steps 12 to 19 specify parameters for a serial printer interface.

- (12) On the Assign a Printer Class screen, press <More Details>.

The system displays the Printer Communications Settings screen. When the screen appears, the cursor is in the Baud Rate field.

- (13) Press <Next Selection> until the baud rate matches the one supplied for the printer.
- (14) Use the arrow keys to select the next field, # of Stop Bits. To change the setting, press <Next Selection>.
- (15) Use the arrow keys to select the next field, # of Bits/Character. To change the setting, press <Next Selection>.
- (16) Use the arrow keys to select the next field, Type of Parity. To change the setting, press <Next Selection>.
- (17) Use the arrow keys to select the next field, Flow Control. To change the setting, press <Next Selection>.
- (18) Use the arrow keys to select the next field, Laser Format. If you are supporting a laser printer, press <Next Selection> until that format is selected.
- (19) Use the arrow keys to select the next field, Perforation Skip. To change the setting, press <Next Selection>.
- (20) Press <Exit Level>.

The system redisplay the Assign a Printer Class screen.

- (21) On the Assign a Printer Class screen, press <Exit Level>.

New softkeys appear.

- (22) If all entries for this printer are correct, press <Save & Exit>. If any entries for this printer are incorrect, press <Ignore & Exit>.

The system displays the Printer Assignments screen, with the printer's class.

- (23) Repeat this procedure for each printer that does not have a class.
- (24) When you have assigned a printer-class attribute to each printer, go to the section titled 'Defining a Print Queue'.

Changing Printer Parameters

If you need to change any parameter of a previously configured printer, you can do so using the Assign a Printer Class screen or the Printer Communication Settings screen as explained in the preceding section. After you have changed the printer class or any other parameter, a printer queue administrator must service the printer. (See 'Servicing the Printer', later in this part.)

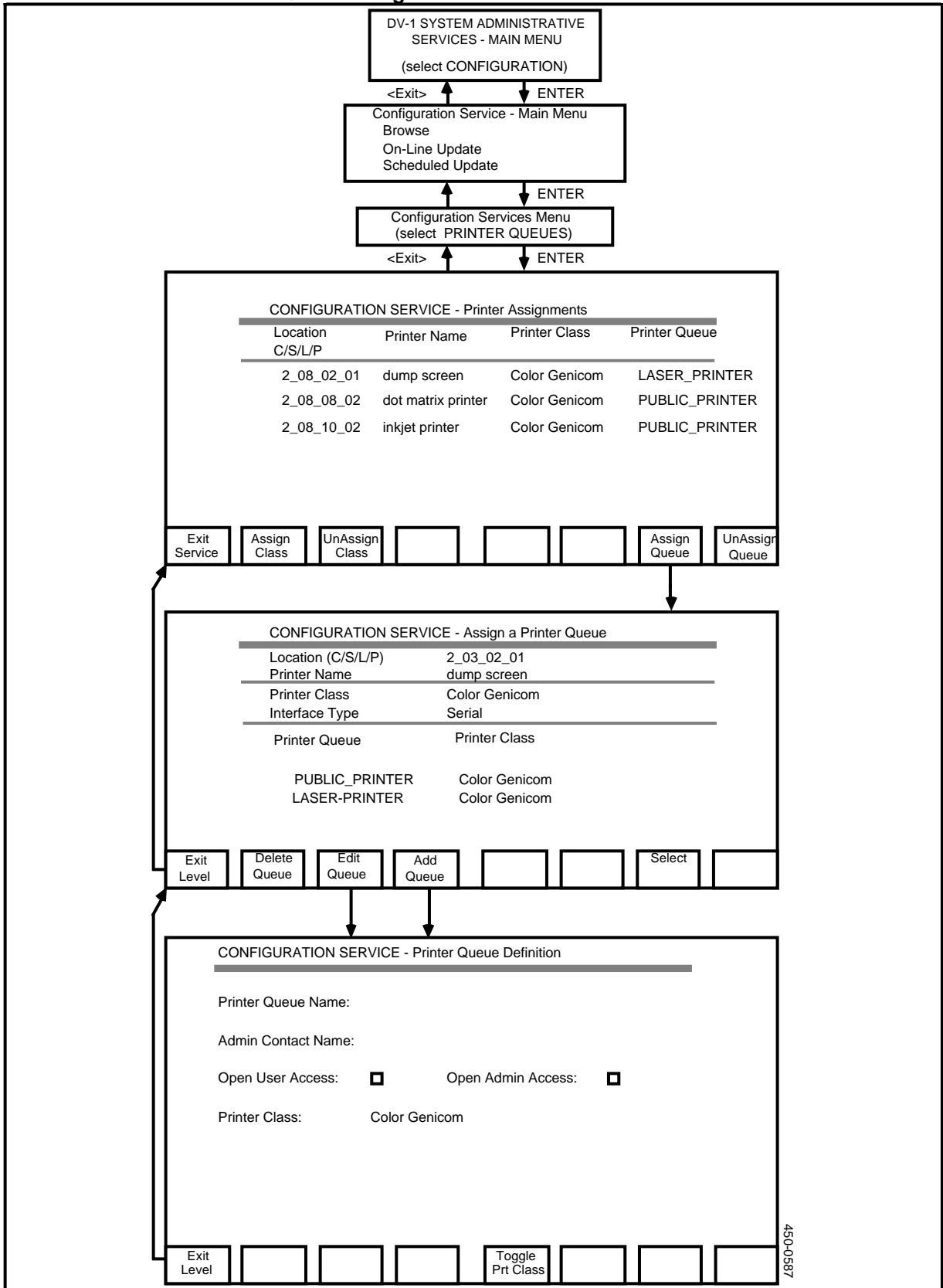
Defining a Print Queue

This procedure describes how to define print queues. There can be up to 64 print queues in the system. After you have defined a queue, individual print jobs can go into it. Each queue can hold up to 255 print jobs at any given time.

Each user is associated with one or more print queues, and each queue is associated with a printer. This is how you control where each user's print jobs come out.

The menu structure for defining print queues is shown in Figure 14-6.

Figure 14-6
Menu Structure for Printer Queue Assignments



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To define a queue, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues, and press ENTER.

The system displays the Printer Assignments screen. When the screen appears, the first printer is selected.

- (6) On the Printer Assignments screen, press <Assign Queue>.

The system displays the Assign a Printer Queue screen.

- (7) Press <Add Queue>.

The system displays the Printer Queue Definition screen, with the cursor in the Printer Queue Name field.

- (8) Type the name of the queue. Make sure that there are no blank spaces in the name. Once a name is assigned, the only way to change it is by deleting and re-adding the queue. Check the spelling.
- (9) Press TAB.

The cursor moves to the next field, Admin Contact Name.

- (10) Type the printer administrator's name.

Note: The Admin Contact Name field is used for information only. By filling out this field, you are not appointing someone as an administrator of the print queue. For information on how to appoint queue administrators, see Step 13 of this procedure, and 'Specifying the Users and Administrators of Print Queues', later in this part.

- (11) Press TAB.

The cursor advances to the next field, Open User Access.

- (12) If you grant open user access to the queue, all users can send print jobs to the queue. Once open user access to the queue is configured on the system, it cannot be denied on a user-by-user basis. If you want to deny access to even one user, do not grant open access. If you want the printing process to be as

simple as possible, grant open user access to all queues. To grant open user access, press the space bar once, and then press TAB. To deny open user access to the queue, press TAB.

The cursor advances to the next field, Open Admin Access.

- (13) If you grant open administrator access to the queue, all users will be able to do tasks reserved for the printer administrator. A printer administrator can, among other things, cancel other people's jobs, so consider very carefully whether open administrator access is warranted. To grant open administrator access, press the space bar once and press TAB. To deny open administrator access to the queue, press TAB.

The cursor advances to the next field.

Note: To designate a queue as an administration queue, you must deny user access to the queue and permit open administrator access to the queue. An administration queue is one used for print jobs generated by the administration software. An administration queue cannot be used to print any user's job, not even if the user is a system administrator.

- (14) Press <Toggle Prt Class> until the correct printer class is displayed in the Printer Class field.

Note: A printer can print the jobs in a print queue only if its printer class is identical to the printer class assigned to the queue.

- (15) On the Printer Queue Definition screen, press <Exit Level>.

New softkeys appear.

- (16) If all entries for this printer queue are correct, press <Save & Exit>. If any entries for this printer queue are incorrect, press <Ignore & Exit>.

The system displays the Assign a Printer Queue screen.

- (17) Repeat the procedure ('Defining a Print Queue') as often as necessary to create as many queues as required.
- (18) When you have no more queues to define, press <Exit Level> on the Assign a Printer Queue screen.

The system displays the Printer Assignments screen.

Specifying a Printer's In-service Print Queue

This procedure describes how to specify the queue whose print jobs the printer outputs. This queue becomes the printer's 'in-service' queue.

Note: If you delete a printer and then re-add it in the system map, then you must specify a queue for the printer before you put it into service. (By deleting the printer, you canceled its former association with any print queues.)

To assign a print queue to a printer, take these steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues and press ENTER.

The system displays the Printer Assignments screen with the first printer selected.

- (6) On the Printer Assignments screen, use the arrow keys to select the printer that is to be associated with a printer queue. Then press <Assign Queue>.

The system displays the Assign a Printer Queue screen.

- (7) Use the arrow keys to select the queue to be assigned to the printer, and then press <Select>.

The system redisplay the Printer Assignments screen. On this screen, the selected queue appears in the Printer Queues column for the printer.

Note: The queue assigned to the printer must have the same printer class.

- (8) If you have just selected a queue to replace a previously assigned queue, then a printer queue administrator must proceed to service the printer, to ensure that all system components will use the new information. See 'Servicing the Printer', later in this part, for more information.
- (9) When you have no more queues to assign, exit by pressing the <Exit> softkeys until you arrive at the Configuration Services Menu.

Switching a Printer to a Different Print Queue

If you want to switch a printer to a different print queue, you can do so by following a three-stage process. First, you terminate the printer's association with its original print queue, as explained in the next section ('Terminating the Association of a Printer and a Print Queue'). Second, you specify the print queue that is to become the printer's new in-service queue, as explained in the immediately preceding section ('Specifying a Printer's In-service Print Queue'). Third, a printer queue administrator must service the printer, to ensure that all system components will use the new information. See 'Servicing the Printer', later in this part.

Terminating the Association of a Printer and a Print Queue

This procedure describes how to terminate the association of a printer and a print queue. This process is called ‘unassigning the queue’. The unassigned queue continues to exist, but ceases to be the printer’s in-service queue.

To unassign a queue, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues and press ENTER.

The system displays the Printer Assignments screen, with the first printer selected.

- (6) Use the arrow keys to select the printer whose queue is to be unassigned, and press <UnAssign Queue>.

The system displays a message asking you to confirm the unassignment.

- (7) To confirm, press <UnAssign Queue>.

The message ‘UNASSIGNED’ appears in the Printer Queue field for that printer.

Note: If you subsequently assign another queue to the printer, a printer queue administrator must then proceed to service the printer, to ensure that all system components will use the new information. See ‘Servicing the Printer’ for more information.

- (8) When you have no more queues to unassign, press <Exit Service> on the Printer Assignments screen.

New softkeys appear.

- (9) To proceed with unassigning the queues, press <Save & Exit>. To abandon the changes you have specified, press <Ignore & Exit>.
- (10) To exit, press the <Exit> softkeys until you arrive at the main menu.

Editing a Print Queue

This procedure describes how to change the access to a queue by users or administrators and how to change the name of the queue's printer administrator.

Note: You cannot change the name of the printer queue or change its printer class.

To edit a print queue, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues and press ENTER.

The system displays the Printer Assignments screen with the first printer selected.

- (6) On the Printer Assignments screen, use the arrow keys to select a printer that is associated with the queue that you want to edit, and press <Assign Queue>.

The system displays the Assign a Printer Queue screen.

- (7) Use the arrow keys to select the queue you want to edit, and press <Edit Queue>.

The system displays the Printer Queue Definition screen, with the cursor in the Admin Contact Name field.

- (8) Change the name of the printer administrator, if necessary.
- (9) To change the user access, press TAB to move the cursor to the Open User Access field and press the spacebar.
- (10) To change the administrator access, press TAB to move the cursor to the Open Admin Access field and press the spacebar.
- (11) On the Printer Queue Definition screen, press <Exit Level>.

New softkeys appear.

- (12) If you want to save the edited values, press <Save & Exit>. If you want to abandon the changes, press <Ignore & Exit>.

The system displays the Assign a Printer Queue screen.

- (13) Repeat the procedure for each queue that needs to be edited.
- (14) When you have no more queues to edit, press <Exit Level> on the Assign a Printer Queue screen.

The system displays the Printer Assignments screen.

- (15) If you want to use the edited values, press <Save & Exit>. If you want to abandon the changes, press <Ignore & Exit>.
- (16) To exit, press the <Exit> softkeys until you arrive at the main menu.

Deleting a Print Queue

This procedure describes how to delete a print queue. Deleting a queue removes it from the system. Deleting a queue should not be confused with unassigning a queue from a printer, where the queue remains in the system but is no longer associated with the printer.

- CAUTION -

Check that the queue to be deleted is not the in-service queue for a printer. If the queue is in service, you must take it out of service before you can delete it. (See the Printer Assignments screen for the list of in-service queues.)

To delete a print queue, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues and press ENTER.

The system displays the Printer Assignments screen with the first printer selected.

- (6) Starting on the Printer Assignments screen, press <Assign Queue>.

The system displays the Assign a Printer Queue screen.

- (7) Use the arrow keys to select the queue to be deleted.
- (8) Press <Delete Queue>.

The system prompts you to press <Delete Queue> again to confirm the deletion.

Note: If the system refuses to carry out the deletion, the queue is still listed as an in-service queue for a printer. You must take the queue out of service before deleting it.

- (9) To confirm the deletion, press <Delete Queue> again. If you want to cancel the deletion, press <Exit Level>.
- (10) When you have no more queues to delete, press the <Exit> softkeys until you arrive at the main menu.

Servicing the Printer

After you have used Configuration Services to change a printer's class, its in-service queue, or any of its configured parameters, a printer queue administrator must service the printer. Servicing the printer is a software operation that ensures that all system components are using the new information.

To service the printer, the printer queue administrator performs the following procedures:

- taking the printer out of service
- selecting the new queue
- putting the printer back into service.

For full details, see 'Changing the Pairings of Printers and Print Queues', later in this part.

Note: Only a printer queue administrator can service the printer. The following section explains how the system administrator designates printer queue administrators.

Specifying the Users and Administrators of Print Queues

There are two types of access to a print queue user access and administrator access.

If you have user access to a queue, you can send print jobs to the queue and you can alter parameters that apply to your print jobs, parameters such as the number of copies. If you have user access to more than one print queue, you can move your print jobs from one to another of those queues. User access does not enable you to do anything that affects any other user's jobs.

If you have administrator access to a queue, you can manipulate all the print jobs in the queue. You can take the queue's printer out of service and restore it to service. If you have administrator access to more than one print queue, you can move print jobs from one to another of those queues, and you can alter the pairings of printers and print queues.

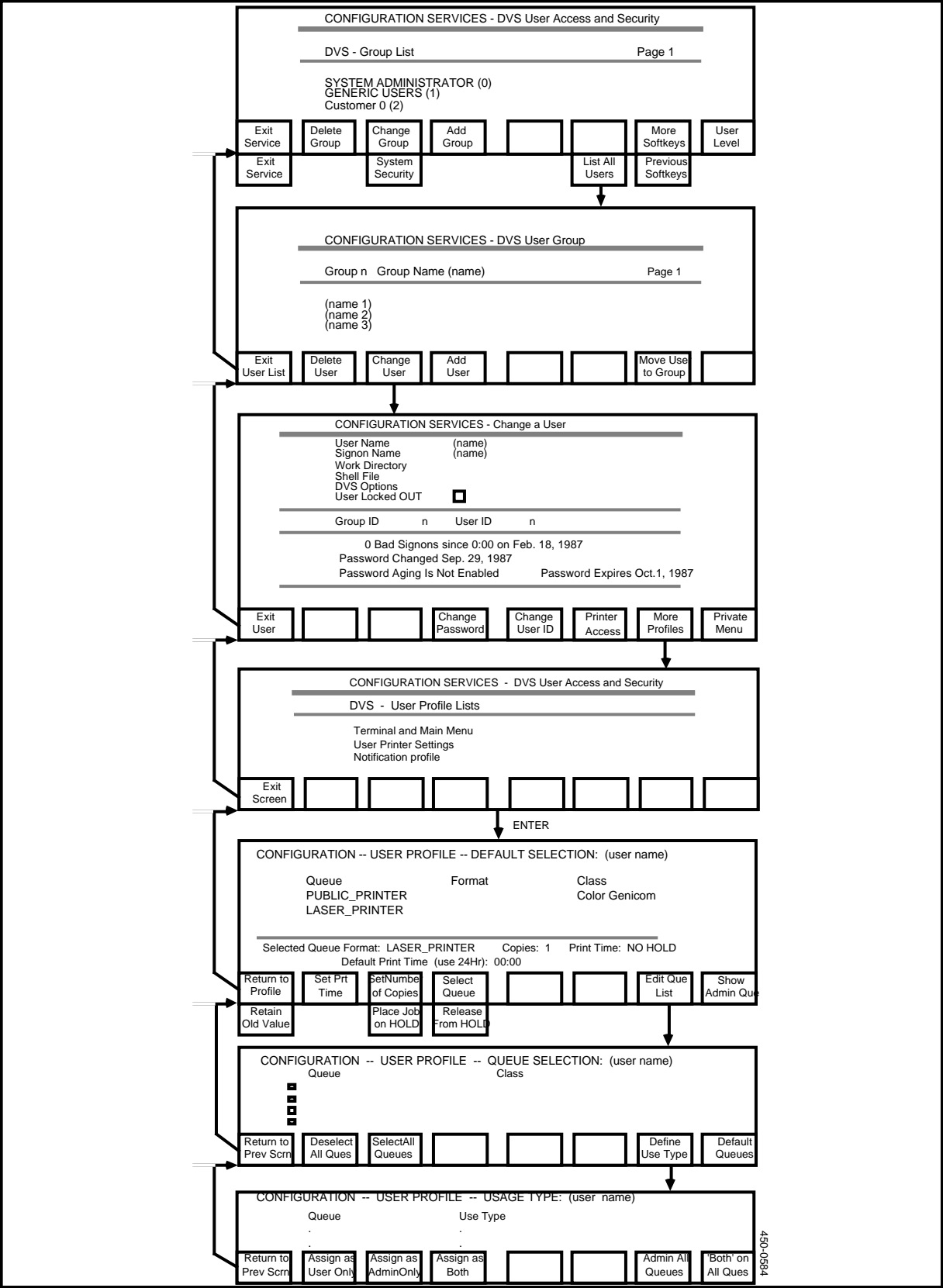
Note 1: The print queue administrator need not be a system administrator.

Note 2: A single queue can have one or many users, and one or many administrators.

This procedure describes how to designate the authorized users and administrators of restricted print queues. A print queue is restricted if you define it without open user access or without open administrator access. (See 'Defining a Print Queue', earlier in this part.) If a queue does not have open user access, you can grant user access rights to individual system users, and thus designate them as users of the queue. Similarly, if a queue does not have open administrator access, you can grant administrator access to selected system users, and thus designate them as administrators of the queue. Note that a print queue can have more than one administrator, and that a system user can have both user access and administrator access to a queue.

The menu structure is shown in Figure 14-7.

Figure 14-7
Menu Structure Specifying a User's Access Rights to Restricted Print Queues



To specify a user's access rights to restricted print queues, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Press arrow keys to select User Access and Security, and press ENTER.

The system displays the Group List screen, with page one of the list.

- (6) Starting on the Group List screen, press <More Softkeys>.

New softkeys appear.

- (7) Press <List All Users>.

The system displays the User List screen.

- (8) Use the arrow keys to select the user's name, and press <Change User>.

The system displays the Change a User screen.

- (9) Press <More Profiles>.

The system displays the User Profile Lists screen.

- (10) Use the arrow keys to select User Printer Settings and press ENTER.

The system displays the Default Selection screen for the user. This screen lists queues defined with open user access.

- (11) Press <Edit Que List>.

The system displays the Queue Selection screen for the user. This screen lists all queues defined with restricted access. A queue is restricted if it does not have open user access or if it does not have open administrator access. For information on these access characteristics, see 'Defining a Print Queue', earlier in this part.

- (12) If you want the user to have access to all the restricted queues, press <Select All Queues>. (In this step you do not specify the type of access that the user is to have.)

A checkmark appears beside each queue listing.

- (13) If you want the user to have access to only some of the restricted queues, then you must indicate the queues. For each such queue, use the arrow keys to select the queue and then press the spacebar.

A checkmark appears beside selected queue listing.

- (14) After indicating all the restricted queues to which the user is to have some sort of access, press <Define Use Type>.

The system displays the Usage Type screen for the user. On this screen, the system lists all the queues that you checked off on the Queue Selection screen. On the Usage Type screen, you specify the user's access rights to queues. For each queue listed on the screen, you designate the user as a queue user, a queue administrator, or both.

- (15) To grant the user administrator access to all the selected queues, press <Admin All Queues>.
- (16) To grant the user both user access and administrator access to all the selected queues, press <'Both' on All Ques>.
- (17) To grant access rights to one queue at a time, select the queue and press <Assign as Admin Only>, <Assign as Both>, or <Assign as User Only>.
- (18) After specifying the user's access rights to each of the selected queues, press <Return to Prev Scrn>.

The system redisplay the Queue Selection screen.

- (19) Press <Return to Prev Scrn>.

New softkeys appear.

- (20) To save your entries, press <Save & Exit>. To abandon your changes, press <Ignore & Exit>.

The system redisplay the Default Selection screen for the user. If you have just designated the user as a user of restricted queues, the list on the Default Selection screen now includes those restricted queues.

- (21) On the Default Selection screen, press <Return to Profile>.

New softkeys appear.

- (22) Press <Save & Exit>. To abandon your entries, press <Ignore & Exit>.

The system redisplay the User Profile Lists screen.

- (23) Press <Exit Screen>.

The system redisplay the Change a User screen.

Assigning a User's Default Queue

This is how to assign a default queue for a user:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Press arrow keys to select User Access and Security, and press ENTER.

The system displays the Group List screen, with page one of the list.

- (6) Starting on the Group List screen, press <More Softkeys>.

New softkeys appear.

- (7) Press <List All Users>.

The system displays the User List screen.

- (8) Use the arrow keys to select the user's name, and press <Change User>.

The system displays the Change a User screen.

- (9) Press <More Profiles>.

The system displays the User Profile Lists screen.

- (10) Use the arrow keys to select User Printer Settings and press ENTER.

The system displays the Default Selection screen for the user.

- (11) Use the arrow keys to select the queue to be assigned as the user's default queue, and press <Select Queue>.

The selected queue appears as the default queue.

- (12) On the Default Selection screen, press <Return to Profile>.

New softkeys appear.

- (13) Press <Save & Exit>. To abandon your entries, press <Ignore & Exit>.

The system redisplay the User Profile Lists screen.

- (14) Press <Exit Screen>.

The system redisplay the Change a User screen.

Assigning a Default Number of Copies for a User's Print Jobs

This is how to specify a default number of copies for a user's print jobs:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Press arrow keys to select User Access and Security, and press ENTER.

The system displays the Group List screen, with page one of the list.

- (6) Starting on the Group List screen, press <More Softkeys>.

New softkeys appear.

- (7) Press <List All Users>.

The system displays the User List screen.

- (8) Use the arrow keys to select the user's name, and press <Change User>.

The system displays the Change a User screen.

- (9) Press <More Profiles>.

The system displays the User Profile Lists screen.

- (10) Use the arrow keys to select User Printer Settings and press ENTER.

The system displays the Default Selection screen for the user.

- (11) Press <SetNumber of Copies>.

The system prompts for the new default value.

- (12) Type the number of copies (using a two-digit number), and press ENTER.

The new number of copies appears as the default.

- (13) On the Default Selection screen, press <Return to Profile>.

New softkeys appear.

- (14) Press <Save & Exit>. To abandon your entries, press <Ignore & Exit>.

The system redisplay the User Profile Lists screen.

- (15) Press <Exit Screen>.

The system redisplay the Change a User screen.

Assigning a Default Print Time for a User's Print Jobs

This is how to specify a default print time for a user's print jobs:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Press arrow keys to select User Access and Security, and press ENTER.

The system displays the Group List screen, with page one of the list.

- (6) Starting on the Group List screen, press <More Softkeys>.

New softkeys appear.

- (7) Press <List All Users>.

The system displays the User List screen.

- (8) Use the arrow keys to select the user's name, and press <Change User>.

The system displays the Change a User screen.

- (9) Press <More Profiles>.

The system displays the User Profile Lists screen.

- (10) Use the arrow keys to select User Printer Settings and press ENTER.

The system displays the Default Selection screen for the user.

- (11) Press <Set Prt Time>.

New softkeys appear, and the system displays a prompt for the time.

- (12) Type the desired default print time, and press ENTER.

The new time becomes the default.

- (13) If the new setting is to be 'Hold', press <Place Job on Hold>.

'Hold' becomes the default.

To change the default setting back to 'No Hold', press <Release from Hold>.

- (14) On the Default Selection screen, press <Return to Profile>.

New softkeys appear.

- (15) Press <Save & Exit>. To abandon your entries, press <Ignore & Exit>.

The system redisplay the User Profile Lists screen.

- (16) Press <Exit Screen>.

The system redisplay the Change a User screen.

Managing Your Own Print Jobs

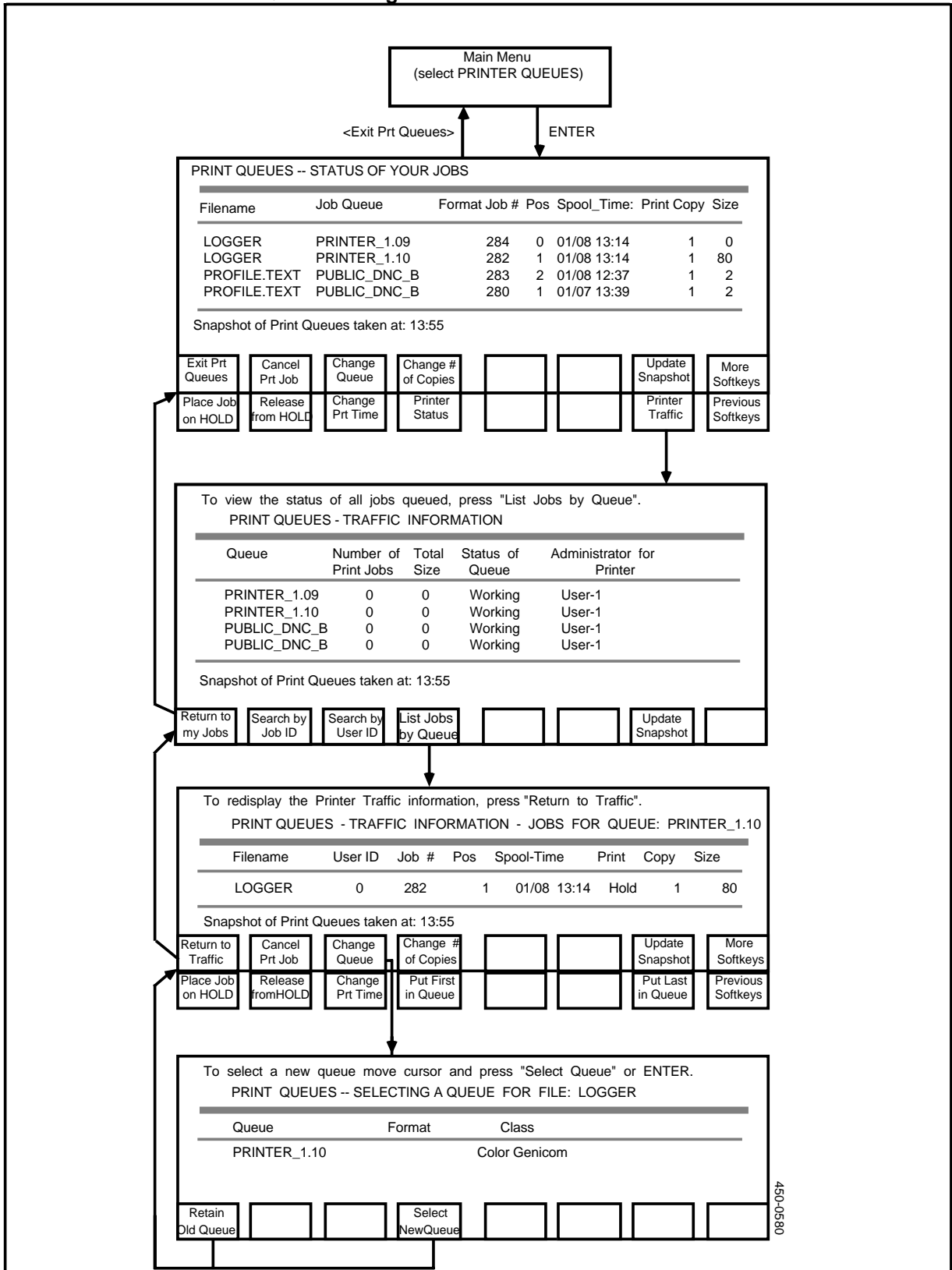
A print queue is a list of print jobs waiting to be printed, usually sequenced in the order in which the jobs were requested. Each queue can hold up to 255 print jobs at any one time. When you select Printer Queues on the main menu, the system takes a 'snapshot' of the print queues, and displays the queue information and the time of the snapshot on the Status of Your Jobs screen (see Figure 14-7). To make the system update the information, press <Update Snapshot>.

Using the Status of Your Jobs screen and the related lower-level screens, any user can manage his or her own print jobs. The print jobs are in printer queues to which the user has user access. The user can perform the following operations on his or her own print jobs:

- list the jobs that are waiting to print
- cancel a print job
- change the number of copies to be printed
- place a job on hold
- change a job's print time, that is, place it on hold for a specified length of time
- release a job that is on hold
- view printer traffic
- switch a job to another print queue
- list print jobs by queue.

The menu structure is shown in Figure 14-8.

Figure 14-8
Menu Structure for Print Queue Management



Listing Your Jobs Waiting to Print

To make the system display a list of your print jobs that are waiting to print, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

The information displayed on the Status of Your Jobs screen is for your jobs only. If you have no print jobs, no queue information is displayed.

Canceling Your Own Print Job

To cancel one of your own print jobs, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Use the arrow keys to select the job that is to be canceled, and then press <Cancel Prt Job>.

New softkeys appear, the screen heading changes to 'CANCELING A PRINT JOB', and a prompt at the top of the screen asks you to press a softkey to confirm the cancellation.

- (4) Confirm the cancellation by pressing <Yes>.

The print job disappears from the list. The previous softkeys reappear.

Changing the Number of Copies

To change the number of copies to be printed, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Use the arrow keys to select the print job and press <Change # of Copies>.

New softkeys appear, the screen heading changes to 'CHANGING NUMBER OF COPIES', and the cursor moves to the copy field, prompting for the new number.

- (4) To change the number, type in the number and press <Accept New Value>.

The system generates new print jobs so as to print the required copies, and the previous softkeys reappear.

Placing Your Print Job on Hold

By default, a job prints as soon as it reaches the top of the print queue. If you place a job on hold, it remains in the queue but does not print.

To place one of your jobs on hold, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Use the arrow keys to select the job, and then press <Place Job on HOLD>.

The system displays a message near the bottom of the screen stating that the job has been placed on hold, and displays 'Hold' in the Print field.

Changing Your Job's Print Time

The print time is not the time when the printer prints the job. It is the time when the system gives the job a position number in the queue. By default, each job receives a position number when it is added to the queue, and it prints when its turn comes (that is, after other jobs with earlier position numbers). If you specify a print time, you specify the time when the job receives its position number.

To change the print time of one of your jobs, take these steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Use the arrow keys to select the job, and then press <Change Prt Time>.

New softkeys appear, the screen heading changes to 'CHANGING THE PRINT TIME', and the system prompts for the new time in the Print field.

- (5) Type in the new time using 24-hour clock time, as in 19:00. Then press <Accept New Time>.

The system displays the newly entered print time in the Print field. The job remains on hold until the specified time (unless you release it from hold).

Releasing Your Print Job from Hold

A job that is on hold remains in the print queue but does not print because it lacks a position number. When you release a job that is on hold, the system gives that job the next available position number. The job prints when it reaches the top of the queue.

To release a job that is on hold, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Use the arrow keys to select the job, and then press <Release from HOLD>.

The system displays a message near the bottom of the screen stating that the job has been released from hold. The previous softkeys reappear. The Print field goes blank. The system assigns a position number to the job, and the number appears in the Pos field.

Viewing Printer Traffic

Printer traffic information tells you each printer's in-service queue and the number of jobs in the queues. (Each queue can hold up to 255 print jobs at any one time.)

To display printer traffic information, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Traffic>.

The system displays the Traffic Information screen. Note that this screen lists only the printers that you can use that is, the printers that are in-service for the queues to which you have user access. There is one in-service printer for each print queue.

- (5) To return to the Status of Your Jobs screen, press <Return to my Jobs>.

Switching Your Job to Another Queue

If you have user access to more than one print queue, you can switch one of your print jobs from one of those queues to another. For example, if a print job is in a queue that has very heavy traffic, you may want to switch it to another queue so that it will be printed sooner.

To switch a print job to another queue, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Use the arrow keys to select the print job that you want to move to another queue, and then press <Change Queues>.

The system displays a screen listing the queues to which you have user access.

- (4) Use the arrow keys to select the desired queue, and then press <Select New Queue>.

The system accepts the queue information for the print job and redisplay the Status of Your Jobs Screen.

Listing Your Print Jobs by Queue

Listing your print jobs by queue shows you the status of your print jobs, their number and size, and the working status of the printers. To list your print jobs by queue, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Traffic>.

The system displays the Traffic Information screen.

- (5) Use the arrow keys to select the queue where the job is currently located, and then press <List Jobs by Queue>.

The system displays the Jobs for Queue screen. If the list of print jobs extends beyond a single screen, press <Next Page> or <Final Page> to display the page you want.

- (6) To return to the Status of Your Jobs screen, press <Return to Traffic>, and then press <Return to my Jobs>.

Managing Print Jobs in the Queues You Administer

If you have administrator access to a print queue, you can carry out operations on any print job in the queue. If you have administrator access to multiple queues, then you can transfer users' jobs from one queue to another.

The print queue administrator can perform the following operations:

- cancel a user's print job
- place a user's job on hold
- change a job's print time, that is, place it on hold for a specified length of time
- release a job that is on hold
- view printer traffic
- view printer status
- switch a job to another queue
- list print jobs by queue
- take a printer out of service
- select a different queue for a printer
- put a printer into service.

The menu structure is shown in Figure 14-8.

Canceling a User's Print Job

To cancel a user's print job, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Traffic>.

The system displays the Traffic Information screen.

- (5) Use the arrow keys to select the queue where the job is located, and then press <List Jobs by Queue>.

The system displays the Jobs for Queue screen. If the list of print jobs extends beyond a single screen, press <Next Page> or <Final Page> to display the page you want.

- (6) Use the arrow keys to select the job that is to be canceled, and then press <Cancel Prt Job>.

New softkeys appear and a prompt at the top of the screen asks you to press a softkey to confirm the cancellation.

- (7) Confirm the cancellation by pressing <Yes>.

The print job disappears from the list. The previous softkeys reappear.

Placing a User's Job on Hold

By default, a job prints as soon as it reaches the top of the print queue. If you place a job on hold, it remains in the queue but does not print.

To place a user's job on hold, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Traffic>.

The system displays the Traffic Information screen.

- (5) Use the arrow keys to select the queue where the job is located, and then press <List Jobs by Queue>.

The system displays the Jobs for Queue screen. If the list of print jobs extends beyond a single screen, press <Next Page> or <Final Page> to display the page you want.

- (6) Press <More Softkeys>.

New softkeys appear.

- (7) Use the arrow keys to select the job that is to be placed on hold, and then press <Place Job on HOLD>.

The system displays a message near the bottom of the screen stating that the job has been placed on hold, and displays 'Hold' in the Print field.

Changing the Print Time for a User's Job

The print time is not the time when the printer prints the job. It is the time when the system gives the job a position number in the queue. By default, each job receives a position number when it is added to the queue, and it prints when its turn comes (that is, after other jobs with earlier position numbers). If you specify a print time, you specify the time when the job receives its position number.

To change the print time of a user's job, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Traffic>.

The system displays the Traffic Information screen.

- (5) Use the arrow keys to select the queue where the job is currently located, and then press <List Jobs by Queue>.

The system displays the Jobs for Queue screen. If the list of print jobs extends beyond a single screen, press <Next Page> or <Final Page> to display the page you want.

- (6) Press <More Softkeys>.

New softkeys appear.

- (7) Use the arrow keys to select the print job, and then press <Change Prt Time>.

New softkeys appear, and the system prompts for the new time in the Print field.

- (8) Type in the new time using 24-hour-clock notation, in the range 00:01 to 24:00. Then press <Accept New Time>.

The system displays the newly entered print time in the Print field. The job remains on hold until the specified time (unless you release it from hold).

Releasing a User's Job from Hold

A job that is on hold remains in the print queue but does not print because it lacks a position number. When you release a job that is on hold, the system gives that job the next available position number. The job prints when it reaches the top of the queue.

To release a user's job from hold, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select **PRINTER QUEUES** and press **ENTER**.

The system displays the **Status of Your Jobs** screen, listing your print jobs.

- (3) Press **<More Softkeys>**.

New softkeys appear.

- (4) Press **<Printer Traffic>**.

The system displays the **Traffic Information** screen

- (5) Use the arrow keys to select the queue where the job is located, and then press **<List Jobs by Queue>**.

The system displays the **Jobs for Queue** screen. If the list of print jobs extends beyond a single screen, press **<Next Page>** or **<Final Page>** to display the page you want.

- (6) Press **<More Softkeys>**.

New softkeys appear.

- (7) Use the arrow keys to select the job that is to be released from hold, and then press **<Release from HOLD>**.

The system displays a message near the bottom of the screen stating that the job has been released from hold. The previous softkeys reappear. The Print field goes blank. The system assigns a position number to the job, and the number appears in the Pos field.

Viewing Printer Traffic

Printer traffic information tells you each printer's in-service queue, and the number of jobs in the queues. (Each queue can hold up to 255 print jobs at any one time.)

To display printer traffic information, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select **PRINTER QUEUES** and press **ENTER**.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press **<More Softkeys>**.

New softkeys appear.

- (4) Press **<Printer Traffic>**.

The system displays the Traffic Information screen.

- (5) To return to the Status of Your Jobs screen, press **<Return to my Jobs>**.

Viewing Printer Status

The Printer Status screen lists the printers that are in service to the print queues, and shows the status of each printer.

To view printer status, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select **PRINTER QUEUES** and press **ENTER**.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press **<More Softkeys>**.

New softkeys appear.

- (4) Press **<Printer Status>**.

The system displays the Printer Status screen.

Switching a Job to Another Queue

You can switch a user's job to another queue, but the new queue must be one that the user has access to. To switch a job to another queue, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select **PRINTER QUEUES** and press **ENTER**.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press **<More Softkeys>**.

New softkeys appear.

- (4) Press **<Printer Traffic>**.

The system displays the Traffic Information screen.

- (5) Use the arrow keys to select the queue where the job is currently located, and then press <List Jobs by Queue>.

The system displays the Jobs for Queue screen. If the list of print jobs extends beyond a single screen, press <Next Page> or <Final Page> to display the page you want.

- (6) Use the arrow keys to select the job that is to be switched, and then press <Change Queue>.

The system displays the Selecting a Queue for File screen.

- (7) Use the arrow keys to select the new queue. Note that the new queue must be one to which the user has user access. Then press <Select New Queue>.

The Jobs for Queue screen reappears.

Listing Jobs by Queue

Listing print jobs by queue shows you the status of the print jobs in a queue, their number and size, and the working status of the printers. To list print jobs by queue, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Traffic>.

The system displays the Traffic Information screen.

- (5) Use the arrow keys to select the queue where the job is currently located, and then press <List Jobs by Queue>.

The system displays the Jobs for Queue screen. If the list of print jobs extends beyond a single screen, press <Next Page> or <Final Page> to display the page you want.

- (6) To return to the Status of Your Jobs screen, press <Return to Traffic>, and then press <Return to my Jobs>.

Changing the Pairings of Printers and Print Queues

If you want a different printer to print the jobs in a given print queue, then you must:

- take the printer out of service
- select a new queue for the printer

- put the printer back into service.

These procedures are explained in the following sections.

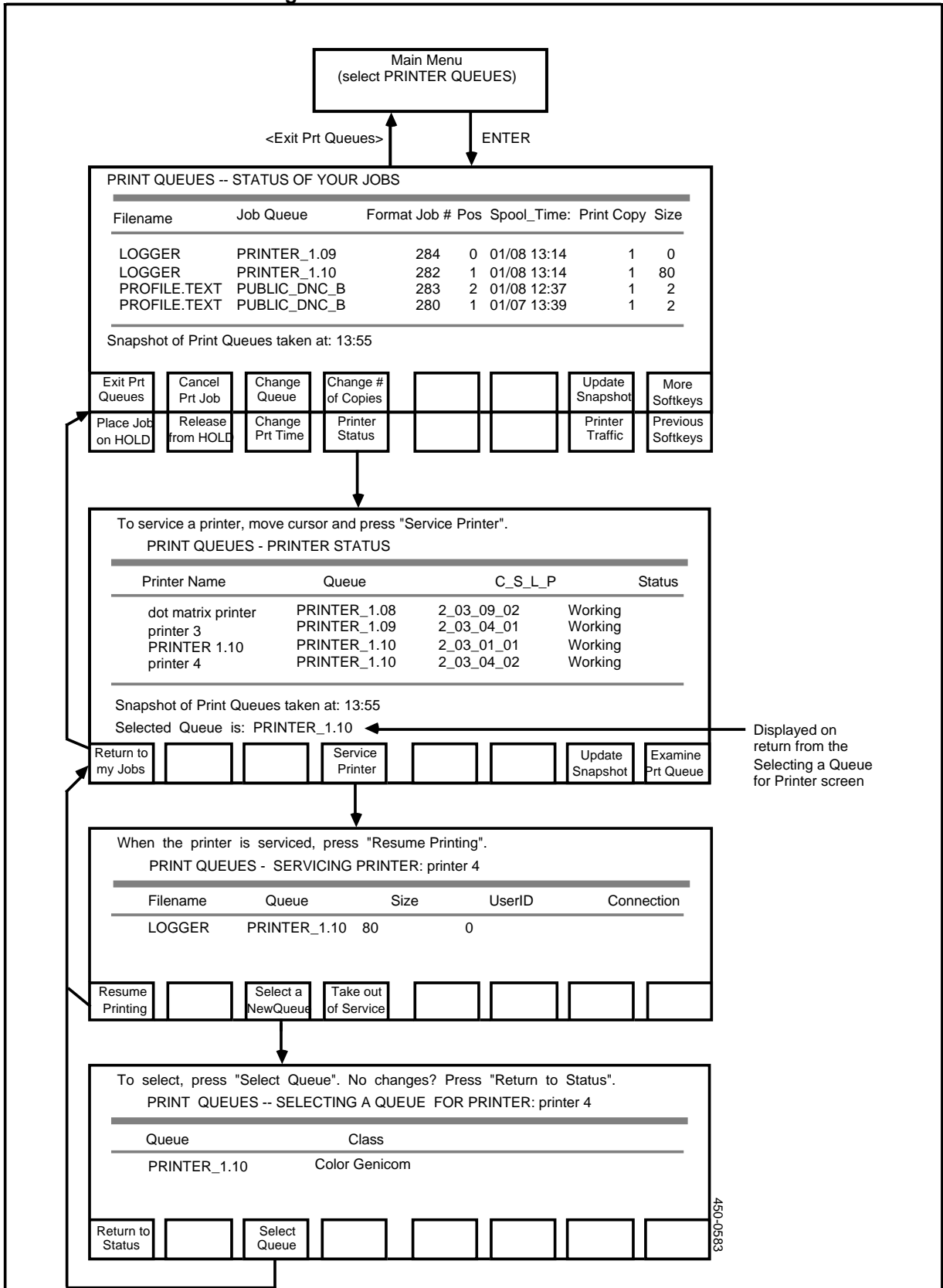
Note: It is assumed that the system administrator has already used Configuration Services to change the configured queue assignments, as explained earlier in this part, in 'Terminating the Association of a Printer and a Print Queue', and 'Specifying a Printer's In-service Queue'.

Taking a Printer out of Service

You must take a printer out of service when you change its print queue, or when you must perform maintenance on the printer.

The menu structure for this procedure is shown in Figure 14-9.

Figure 14-9
Menu Structure for Servicing the Printer



To take a printer out of service, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Status>.

The system displays the Printer Status screen, listing each printer and its queue.

- (5) Use the arrow keys to select the printer and press <Service Printer>.

The system displays the Servicing Printer screen.

- (6) Press <Take out of Service>.

The Printer Status screen shows that the printer is out of service.

- (7) If you want to select a different queue for the printer, then proceed directly to the next section, 'Selecting a Different Print Queue for a Printer'.

If you do not want to select a different queue, press <Return to my Jobs>.

The system redisplay the Status of Your Jobs screen.

- (8) Press <Exit Prt Queues>.

The system redisplay the main menu.

Selecting a Different Print Queue for a Printer

The menu structure for this procedure is shown in Figure 14-9.

To select a new queue for a printer, proceed as follows:

- (1) Take the printer out of service, as explained in Steps 1 to 6 of the preceding section, 'Taking a Printer out of Service'.
- (2) After taking the printer out of service, press <Select a New Queue> on the Servicing Printer screen.

The system displays the Selecting a Queue for Printer screen, which lists the newly assigned in-service queue.

- (3) Press <Select Queue>.

The system displays the Printer Status screen with only two softkeys <Resume Printing> and <Take out of Service>. A message displayed in the lower portion of the screen shows the name of the selected queue.

- (4) Proceed to Step 6 of the next section, 'Putting a Printer into Service'.

Putting a Printer into Service

The menu structure for this procedure is shown in Figure 14-9.

To put a printer back into service, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select PRINTER QUEUES and press ENTER.

The system displays the Status of Your Jobs screen, listing your print jobs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Printer Status>.

The system displays the Printer Status screen, listing each printer and its queue.

- (5) Use the arrow keys to select the printer and press <Service Printer>.

The system displays the Servicing Printer screen.

- (6) Press <Resume Printing>.

The system displays the Printer Status screen with the softkeys <Return to my Jobs>, <Service Printer>, <Update Snapshot>, and <Examine Prt Queue>.

- (7) If the printer's status is not 'Working', wait five seconds, and then press <Update Snapshot>.

The printer's status changes to 'Working'.

- (8) Press <Return to my Jobs>.

The system redisplay the Status of Your Jobs screen.

- (9) Press <Exit Prt Queues>.

The system redisplay the main menu.

If Print Jobs Get Lost

If print jobs go to the wrong printer, or simply never come out, check the following possible causes:

- failure to service a printer after modifying one of its parameters

- inadequate program heap size.

When print jobs come out at the wrong printer, that indicates that a printer has not been serviced. After changing a printer's class, its in-service queue, or any of its configured parameters, a printer queue administrator must service the printer. See 'Servicing the Printer', earlier in this part.

If the system issues log messages stating that it is failing to spool files, then the program heap size may be inadequate. The heap size determines the number of files that can be open simultaneously.

The heap size is controlled by an initialization file. If you are the superuser, you can edit the file to increase the program heap size. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.)

To increase the program heap size, take the following steps: Proceed as follows:

- (1) Sign on as the superuser.
- (2) Select System Administrative Services and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

- (4) Select Helix Command Interpreter and press ENTER.

The system prompt appears. (It is usually '>'.)

- (5) To start the editor, type in the following command on the Helix command line:

ED :LOCAL:PRU:OAPRINT:QMAN.PD.TEXT

and press ENTER.

Note: You can make a copy of the file and edit the copy, if you are familiar with the XMS file system. Otherwise, follow the subsequent steps exactly.

- (6) Edit the copy or the original using the XMS editor. The last line of the file sets the heap size. It should be

HEAPSIZE n

where n is an integer. Every time you increase the heap size by 5120 (5K), you increase the number of files that can be open simultaneously by about 4. You should increase the heap size as required.

- (7) To save the edited file, press the RESET key, then press Q, and then type in S.

- (8) Exit from the editor by typing in E.

You exit to the Helix Command Interpreter. The system prompt reappears.

- (9) To exit from the Helix Command Interpreter, type in EXIT and then press ENTER.

The Utilities Service - Main Menu reappears.

- (10) Press the <Exit> softkeys until you arrive at the main menu.

You can now compile the file as described later in this part.

Printing Screens from an M4000-series Terminal

You can set up a graphics-capable printer so that it will print the screen display from an M4000-series terminal when you press the PRINT SCREEN key. (This key is the first key to the right of the softkeys in the top row of the M4000 keyboard.)

The major steps in setting up the printer are:

- connecting the RS-232-C cable from the terminal to the printer
- configuring and activating the terminal's printer port
- specifying the printer's parameters
- specifying the printer queue for screen prints
- specifying that queue as the in-service queue for the printer.

Cabling for Screen Printing

Use an RS-232-C cable to link the printer to the RS-232-C port on the rear of the M4000-series terminal.

Configuring and Activating the Terminal's Printer Port

To print screens, you must configure a port in the M4000-series terminal just as if it were an LIU. To configure the terminal's printer port, take the following steps:

- (1) Sign on as a system administrator.

The system displays the main menu.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select System Map, and then press ENTER.

The system displays the Hardware Map screen.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the screen for the cabinet containing the LANlink to which the M4000-series terminal is connected.
- (7) Use the arrow keys to select the LANlink, and then press <Next Level>.

On the Hardware Map screen, the system displays the line list for the LANlink.

- (8) Use the arrow keys to select the LANlink line for the M4000-series terminal, and press <Next Level>.

The system displays the Port Map for the terminal.

- (9) Press <Insert Item>.

The system displays the Selection List screen, listing the single available port personality, which is 'Printer Port'.

- (10) Press <Select Item>.

The system redisplay the Port Map. The newly selected port personality is in the lower part of the screen, and the cursor is to the right, prompting for a name.

- (11) Enter a name (required; the default is '---'), and press RETURN.

The cursor moves to the right, to prompt for a port number.

- (12) Enter 1 as the port number and then press ENTER.

On the terminal's Port Map, the printer port personality appears on port number 1, in the defined state.

- (13) Press <More Softkeys>.

New softkeys appear.

- (14) Press <Change Status>.

The status of the port personality changes to active, and the previous softkeys reappear.

- (15) To exit, press <Previous Softkeys>, and then press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. You must exit to this menu to make the system save the new information.

Setting the Printer Parameters

After configuring the port for the printer, you must specify the printer's class and communications parameters. The menu structure for this procedure is shown in Figure 14-5.

To specify the printer's class and communications parameters, take the following steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues and press ENTER.

The system displays the Printer Assignments screen.

- (6) The printer for printing screens will have 'UNASSIGNED' in the Printer Class field. Select the printer and press <Assign Class>.

The system displays the Assign a Printer Class screen. On this screen you specify the printer's characteristics, including its class.

- (7) Press <Next Selection> repeatedly until the correct printer class is displayed. Only a graphics-capable printer, such as an HP Thinkjet, Color Genicom, or Monochrome Genicom, can be used for printing screens.

- (8) Specify the printer's characteristics in the remaining fields on the screen. Use the arrow keys to advance from field to field on the screen. To change the value of a parameter, move to the field and press <Next Selection>.

Select the following values:

- in the Interface Type field, 'Serial'
- in the Banner Page field, 'No'
- in the Initial Screen Feed field, 'No'
- in the Post Screen Feed field, 'No'.

- (9) After setting the parameters on the Assign a Printer Class screen, press <More Details>.

The system displays the Printer Communications Settings screen.

- (10) Specify the printer's communications parameters in the fields on this screen. Use the arrow keys to advance from field to field on the screen. To change the value of a parameter, move to the field and press <Next Selection>.

Select the following values:

- in the Baud Rate field, 9600
- in the # of Stop Bits field, 1

- in the # of Bits/Character field, 8
- in the Type of Parity field, 'None'
- in the Flow Control field, 'XON/XOFF'
- in the Laser Format field, 'Portrait'
- in the Perforation Skip field, 'No'.

(11) Press <Exit Level>.

The system redisplay the Assign a Printer Class screen.

(12) On the Assign a Printer Class screen, press <Exit Level>.

New softkeys appear.

(13) If all entries for this printer are correct, press <Save & Exit>. If any entries for this printer are incorrect, press <Ignore & Exit>.

The system redisplay the Printer Assignments screen, with the printer's class.

Defining the Print Queue for Screen Prints

This procedure describes how to define a print queue for screen prints. The menu structure for this procedure is shown in Figure 14-6.

To define the queue, proceed as follows:

(1) Sign on as a system administrator.

The main menu appears.

(2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

(3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

(4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

(5) Select Printer Queues, and press ENTER.

The system displays the Printer Assignments screen.

(6) Select the printer that is to be used for screen prints and press <Assign Queue>.

The system displays the Assign a Printer Queue screen.

(7) Press <Add Queue>.

The system displays the Printer Queue Definition screen, with the cursor in the Printer Queue Name field.

- (8) Type the name of the queue. Make sure that there are no blank spaces in the name. Once a name is assigned, the only way to change it is by deleting and re-adding the queue. Check the spelling.

- (9) Press TAB.

The cursor moves to the next field, Admin Contact Name.

- (10) Type the printer administrator's name.

Note: The Admin Contact Name field is used for information only.

- (11) Press TAB.

The cursor advances to the next field, Open User Access.

- (12) Grant open user access to the queue by pressing the space bar. Then press TAB.

The cursor advances to the next field, Open Admin Access.

- (13) Grant open administrator access to the field by pressing the space bar. Then press TAB.

The cursor advances to the Printer Class field.

- (14) Press <Toggle Prt Class> until the correct printer class is displayed in the Printer Class field.

Note: The queue must have the same printer class as the printer that is to do the screen prints.

- (15) On the Printer Queue Definition screen, press <Exit Level>.

New softkeys appear.

- (16) If all entries for this printer queue are correct, press <Save & Exit>. If any entries for this printer queue are incorrect, press <Ignore & Exit>.

The system displays the Assign a Printer Queue screen.

- (17) Press <Exit Level> on the Assign a Printer Queue screen.

The system redisplay the Printer Assignments screen.

Specifying the Printer's In-service Print Queue

Now that you have defined the printer and the print queue, you must establish the connection between the two. You must specify that this is the queue whose print jobs the printer will output. This queue becomes the printer's 'in-service' queue.

To assign a print queue to the printer, take these steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Printer Queues and press ENTER.

The system displays the Printer Assignments screen with the first printer selected.

- (6) On the Printer Assignments screen, use the arrow keys to select the printer that is to do the screen printing. Then press <Assign Queue>.

The system displays the Assign a Printer Queue screen.

- (7) Use the arrow keys to select the queue that is to be used for screen printing, and then press <Select>.

The system redisplay the Printer Assignments screen. On this screen, the selected queue appears in the Printer Queues column for the printer.

- (9) Exit by pressing the <Exit> softkeys until you arrive at the Configuration Services Menu.

15. Data Net

Data Net is a data-only connection that allows multiple DNCs within 600 m (2000 ft) of each other to be connected using dual twisted pair wiring. Up to six DNC systems can be interconnected in a network, in a ring or line topology. The systems can communicate with each other at aggregate data rates up to 2.56 Mb/s. The Campusnet Manager PRU, running in the Primary Processor SRU of each DNC in the network, collects and distributes the topological information for the network. This allows application software to access services throughout the network.

Ring and Line Network Topologies

A Local Data Net network can have a ring topology or a line topology. The advantage of the ring topology is that the network can continue to function even if a node in the ring goes out of service. With line topology, when a node goes out of service, the network connection is broken. You must use line topology if the last DNC in the network is more than 600 m (2000 ft) from the first DNC.

Adding a DNC to a Local Data Net Network - Major Steps

To add a DNC to a Local Data Net network, you must:

- install the twisted-pair connections as explained in 450-1011-201
- install, configure, and activate the Local Data Net SRU in the DNC.
- configure and activate the Campusnet Manager PRU in the Primary Processor SRU
- configure the DNC as a network node
- reboot the DNC.

Configuring the Local Data Net SRU and the Required PRUs

For information on configuring SRUs, see Part 6, 'Configuring Shared Resource Units'. When configuring the Local Data Net SRU, keep these points in mind:

- (a) When configuring the SRU in the system map, select 'Twisted Pair Network L.M.' on the Selection List screen. (The Local Data Net SRU is also known as the Twisted Pair Network Line Module SRU.)
- (b) The SRU, which occupies two slots, should be addressed at the odd-numbered slot. For example, if it is occupying slots 5 and 6, then on the Hardware Map screen, specify slot 5 as its address.
- (c) The SRU must not be installed in slots 1 and 2 of cabinet 2.

For information on configuring PRUs, see Part 7, 'Configuring Program Resource Units'. When configuring the Campusnet Manager PRU, remember that it must reside in the Primary Processor SRU.

Subsequent sections in this part explain how to configure a DNC as a network node and reboot the DNC.

Configuring a DNC as a Network Node

A DNC that is to be added to a Local Data Net network must be configured as a network node with a unique node number and a unique routing name. Proceed as follows:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The Configuration service - Main Menu appears.

- (4) Select Online Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select Data Net and press ENTER.

The Campusnet LAN Configuration screen appears with the cursor in the Node Number of this LAN field.

- (6) Type in the node number. Each DNC in the network must have a node number that is unique within the network. The node number can be in the range 1 to 255. Zero is an invalid node number. After typing in the number, press ENTER.

The cursor moves to the Routing Name of this LAN field.

- (7) Type in the routing name. Each DNC in the network must have a routing name that is unique within the network. The routing name can be up to eight characters. You can use alphanumeric characters and most punctuation marks. Colons and spaces are invalid. After typing in the routing name, press ENTER.

The cursor moves to the LAN Description field.

- (8) The LAN description is an optional entry. It is for information only. It can be up to 240 characters (approximately 50 words). After typing in the LAN description, press <Commit Changes>.

The Configuration Services Menu reappears.

- (9) To exit, press the <Exit> softkeys until you arrive at the main menu.

Rebooting the System

After configuring a DNC as a network node, you must reboot it. After you reboot it, the network will recognize it. To reboot the DNC, proceed as follows:

- (1) To ensure that all your updates have been written to the system disk, you must exit at least as far as the System Administrative Services Main Menu.
- (2) Ensure that there are no tape cartridges in SRUs that have tape slots (such as the Mass Storage .SRU, the 1/4 Shelf Disk/Tape SRU ,and the Cartridge Tape SRU)
- (3) Power the system down and wait for the cabinet fans to stop turning. (See 'Powering up and Powering down the System' in Part 3.)
- (4) Power the system up and sign back on. If necessary, reset the system time. turning. (See 'Changing the System Time and Date', in Part 3.)

Centralized Log Collection in a Local Data Net Network

You can designate one of the DNCs in a Local Data Net network as the collector system for the logs generated in all the systemd in the network. For information on this topic, see 'Configuring Centralized Log Collection for a Local Data Net Network', in Part 20.

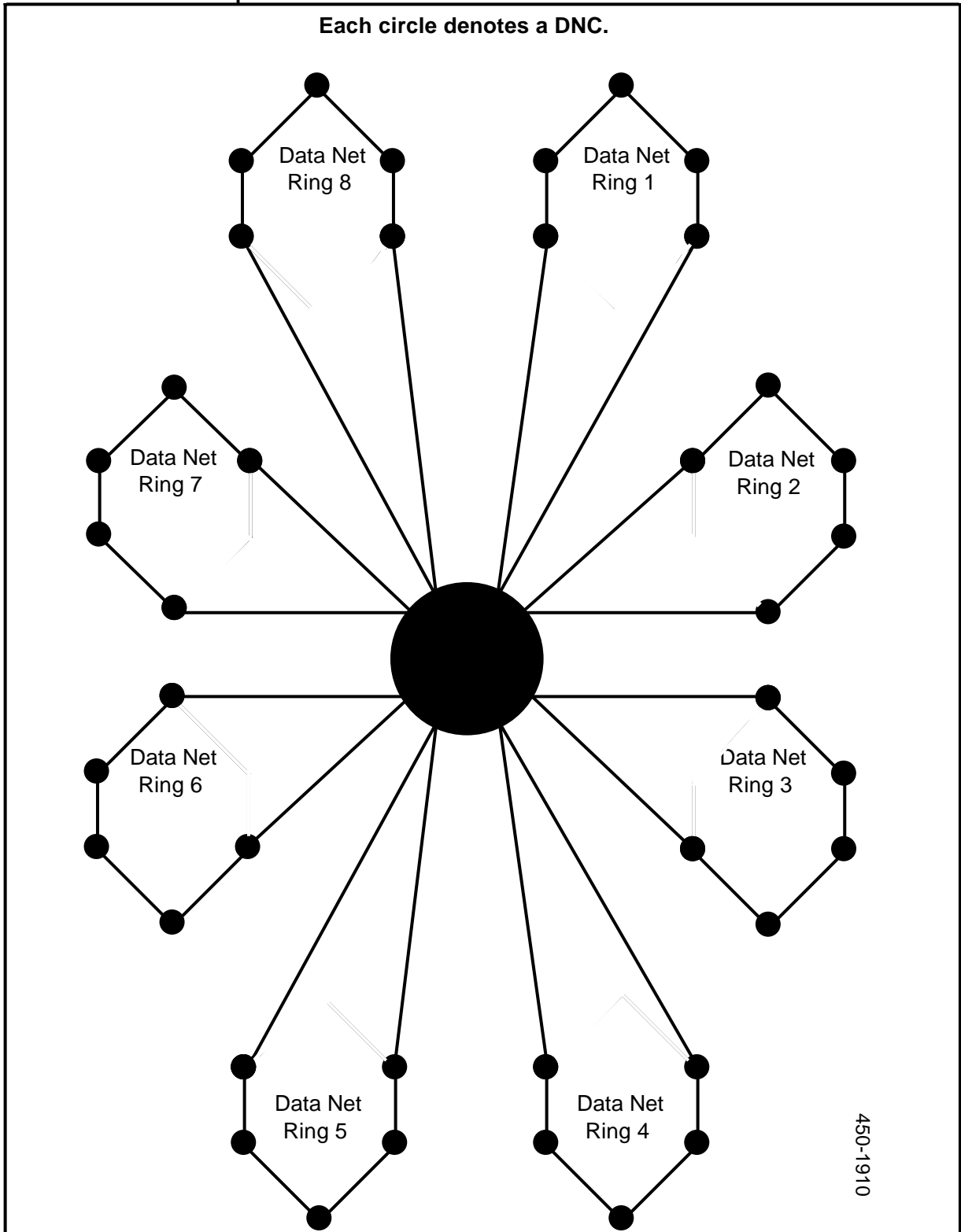
Network Tandeming

You can link multiple Local Data Net ring-topology networks, thus forming a tandem network. Users of the tandem network then have access to the services provided by each of the DNCs in the tandem network.

In a tandem network, a central DNC is connected to two or more Local Data Net ring-topology networks. The central DNC is the tandem node. The tandem node can be connected to as many as eight Local Data Net ring networks, as illustrated in Figure 15-1, and each of the rings can have a maximum of six DNCs including the tandem node, so the maximum size of the tandem network is 41 DNCs.

Each DNC in the tandem network must have the Campusnet Manager PRU and the TPNLM SRU. The tandem node must have one TPNLM SRU for each of the ring networks to which it is connected. No other special hardware or software is required.

Figure 15-1
Tandem Network Composed of 41 Nodes



16. Setting Up X.25 Gateway and NOP Ports

DNC systems often use a form of X.25-based communications when communicating with each other and with other types of system over a public network. These communications take the form of a specialized protocol called Network Operations Protocol, or NOP. NOP is implemented in DNC through the base DVS service called X.25 Gateway.

X.25 itself is a communications protocol used for transmitting data between a computer system and a packet switched data network, or between two computer systems. In the DNC system, the X.25 Gateway service allows you to configure communications links with packet switched networks or with other computer systems.

This part describes how to implement both NOP and other services using X.25 Gateway. For instructions on how to set up a NOP port, see 'Setting up a NOP Port', later in this part. (For a detailed description of NOP, see NTP 450-1011-100.)

If you want to set up an X.25 communications link other than a NOP port, read this part straight through.

The X.25 Access Protocol

X.25 is an access protocol based on recommendation X.25 of the International Telegraph and Telephone Consultative Committee (CCITT). The protocol is used for transmitting information in packets between a computer system and a packet switched network, or between two computer systems. X.25 is based on the International Standards Organization's 'Reference Model for Open Systems Interconnection' (OSI), which defines a seven-level plan for protocols. X.25 defines only the three lowest levels of OSI.

Packet Switched Networks

Packet switching is a means of transferring data over a network. Packet switched networks evolved because data terminal users needed a network in which they can communicate as easily as voice users communicate over the telephone network. A packet switched network allows a subscriber's terminal to communicate with any other subscriber's equipment simply by presenting the data to the network in a prescribed manner.

The data is sent as packets. Each packet includes the address of its destination. The network sends each individual packet toward its destination via the route of least delay.

The data is transmitted through the network over virtual circuits. A virtual circuit differs from a physical circuit in that no single physical connection is established between the sending and receiving stations. As each packet is transmitted, a temporary physical link is established through the network to the receiving station. Successive packets may travel through different physical paths to reach their destination. But a virtual circuit is maintained for the duration of each virtual call. The network provides management of virtual calls.

A single physical link can carry multiple virtual circuits. Each virtual circuit on a physical link is referred to as a logical channel.

There are two kinds of virtual circuits in a packet switched network: permanent virtual circuits (PVCs), which are like dedicated leased lines, and switched virtual circuits (SVCs), which are like dial-up lines.

Recommendation X.25

The X.25 access protocol provides a precise set of procedures for communication between Data Terminal Equipment (DTE) and Data Communications Equipment (DCE) in a packet environment. A DTE is a programmable device on the user side of the user/network interface. A DTE is located at the user site, and can be a computer (like the DNC), a front-end processor, or an intelligent terminal. A DCE is on the network side of the user/network interface. It is a node processor or switch that serves as an entry and exit point for the network.

When the X.25 protocol is used for point-to-point connections between computer systems, the sending system acts as a DTE and the receiving system acts as a DCE.

Levels 1, 2, and 3 of X.25

Recommendation X.25 uses the International Standards Organization's Reference Model for Open System Interconnection. The model has seven levels, but recommendation X.25 defines operations only for levels 1, 2, and 3 (the lowest levels).

- (a) **Level 1** defines the electrical, mechanical, and functional characteristics of the physical interface between the DTE and the DCE. It specifies how to activate, maintain, and deactivate a physical connection to the network. The physical connection to the network is a four-wire, point-to-point, synchronous circuit. The connection can use a V.35 link, which supports data rates up to 56 kb/s, or an RS-232-C link, which supports data rates up to 19.2 kilobytes per second (kb/s). (NOP links are based on an RS-232-C link.)
- (b) **Level 2** is the lower logical level of the DTE/DCE interface. It describes the access procedures used by the DTE and DCE for data interchange over a single physical link. The procedures provide synchronization and error control for the information transmitted over the physical interface. The principles and terminology of the High-level Data Link Protocol (HDLC) are

used for the link access procedures. The procedures require a full-duplex facility so that the DTE and DCE can handle two-way, simultaneous, independent transmissions.

Level 2 software resides in both the DTE and the DCE. It appends control information to packets that are to be transmitted, thus forming frames. It also controls transmissions and performs error checking. When data is received, the Level 2 software removes the control information from successfully received frames, producing packets. This software is not concerned with the content of the frames. Its only concern is that they be delivered without errors.

- (c) **Level 3** is the upper logical level of the DTE/DCE interface. This level describes the packet formats and the control procedures for the exchange of packets between the DTE and the DCE over multiple logical channels (that is, over multiple virtual circuits on a physical link).

Level 3 software resides in both the DTE and the DCE. It addresses and routes packets, and provides the means to establish, maintain, and terminate virtual circuits.

The level 3 software in the DTE appends packet-control information, including an address, to the data that is to be transmitted. The level 3 software in the DCE checks the destination address carried in the header of each incoming packet, and then sends each packet toward its destination via the route of least delay.

System Requirements for X.25 and NOP

If a DNC system is to use a NOP port, it requires the following software and hardware components:

- the X.25 PRU
- the Host Agent (HAG) PRU
- the Network Resource Manager (NRM) PRU
- an LIU dedicated to X.25 communications
- an appropriate port personality in the dedicated LIU.

Software Components for X.25 and NOP

There are two separate pieces of X.25 software: a PRU and a port personality.

The **X.25 PRU** represents Level 3 of the X.25 access protocol. (In DNC terminology, Level 3 is known as the 'gateway' level.) The X.25 PRU resides in an Applications Processor SRU.

The **port personality (LIU PORT - LAPB/SDLC L2)** represents Level 2 of the X.25 access protocol. (In DNC terminology, Level 2 is known as the 'link' level.) The port personality resides in a LAN Interface Unit (LIU).

Together, the PRU and the port personality make up an **X.25 Gateway**. The system must have a separate X.25 Gateway for each packet switched network that is to be accessed. In addition, it must have a separate X.25 Gateway for each DVS system to which it is to have point-to-point connection. Each gateway is composed of one X.25 PRU and one to six port personalities of the type LIU PORT - LAPB/SDLC L2. Gateways cannot share their X.25 software with one another. Each gateway must have its own X.25 PRU, and its own port personality (or personalities).

The system can support as many as 50 gateways. This means you can have multiple connections to packet switched networks, and multiple point-to-point connections to other DVS systems. Each gateway can support up to 64 active virtual circuits.

X.25 Configuration Overview

There are certain major steps involved in configuring a DNC system to permit X.25 and NOP communications. Each of these steps is discussed in detail later in this part. The major steps are:

- ensuring that enough Applications Processor SRUs are configured in the system map to accommodate the PRUs
- configuring and activating the PRUs in the system map
- configuring and activating the dedicated LIU in the system map
- configuring one or more appropriate port personalities on the LIU
- using the X.25 Configuration Utility to set the X.25 communications parameters
- loading the X.25 parameters into the X.25 PRU and into each dedicated LIU by courtesying them down and putting them back into service.

Configuring the System Map for X.25 or NOP

To configure the system map for X.25 and NOP, you must have adequate SRUs, appropriate PRUs, at least one dedicated LIU, and the appropriate port personality (or personalities).

SRUs for X.25 and NOP

A dedicated Applications Processor SRU is not required for X.25 or NOP. If you have unused capacity on the SRUs that are already configured, you can put the PRUs on those SRUs. If you do not have adequate capacity, then add SRUs as necessary. For detailed instructions, see Part 6, 'Configuring Shared Resource Units'.

Configuring the PRUs for X.25 and NOP

For X.25 and NOP, you need to configure the following PRUs:

- Host Agent (HAG) PRU
- Network Resource Manager (NRM) PRU
- X.25 PRU

The Host Agent PRU. This PRU manages the interconnection among data-communication components in the system. Only one Host Agent is required for the entire system. If another data communications service (such as 3274 Emulation) is already configured on the system, then the Host Agent is already present. If this PRU is not already on the system, then you must configure it and activate it. For detailed instructions, see Part 7, 'Configuring Program Resource Units'.

The Network Resource Manager PRU. You must configure and activate this PRU, which manages the virtual circuits that use the X.25 access protocol. For detailed instructions, see Part 7, 'Configuring Program Resource Units'.

The X.25 PRU. This is the software that enables the system to appear as a packet-mode DTE to a packet switched data network, or as either a DTE or DCE in an X.25 point-to-point connection. This PRU performs gateway-level functions, that is, the functions described by Level 3 of the X.25 protocol.

A separate X.25 PRU is required for each network connection and for each point-to-point connection. For example, if you intend to connect to two different packet switched networks, you need two X.25 PRUs. If you also intend to use X.25 point-to-point connections to two different systems, then you need two more X.25 PRUs.

The Object Index. The object index of each X.25 PRU must be unique among the instances of that PRU within the system. The system uses the object index to associate the PRU with the correct set of operating parameters. The range of valid object index values for these PRUs is 0 to 49. The default value is 0.

Information on configuring PRUs, editing the object indexes of PRUs and activating PRUs, can be found in Part 7, 'Configuring Program Resource Units'.

Configuring the Dedicated LIU

The X.25 software requires a dedicated LIU for the physical connection to the packet switched network (or to the remote system in a point-to-point connection). The LIU contains the software that implements the link level, which is Level 2 of the X.25 recommendation. The link-level software takes up all the available memory in an LIU.

An LIU must be connected to a LANlink line. The LANlink must be configured before you can configure the LIU. If you need to configure a LANlink SRU, see Part 6, 'Configuring Shared Resource Units', for detailed instructions.

After ensuring that there is a LANlink to which to connect the LIU, configure and activate the LIU. When configuring an LIU for X.25, select LIU - HDLC/RS-232 or LIU - HDLC/V.35 from the Selection List screen. For detailed instructions on configuring LIUs, see Part 8, 'Configuring RRUs'.

Configuring an LIU Port for X.25

Each X.25 Gateway needs at least one LIU port for its connection, regardless of whether that connection is a network connection (that is, to a packet switched network) or a point-to-point connection (that is, to another DVS system or X.25-

compatible device). The port personality is software residing in the dedicated LIU. The port personality represents Level 2 of the X.25 access protocol.

When configuring LIU ports for X.25, remember these points:

- The port personality for X.25 is LIU PORT - LAPB/SDLC L2.
- On an LIU of type LIU - HDLC/RS-232, only ports 02 and 03 can be used.
- On an LIU of type LIU - HDLC/V.35, only ports 04 and 05 usable.

For detailed instructions on configuring the ports, see Part 9, 'Configuring Port Personalities for External Devices'.

There is normally a one-to-one correspondence between X.25 PRUs and the ports on the dedicated LIUs. However, if Multiple Link Procedure (MLP) is specified for an X.25 Gateway, then up to six LIU ports can be associated with a single X.25 PRU. (This requires one LIU for each two ports.) The two RS-232-C ports on a dedicated LIU can be connected to the same device or to different devices.

Committing the Configuration Information to the System Map

After configuring the necessary SRUs, PRUs, LIUs, and port personalities for X.25, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. The configuration information that you entered for the X.25 components is then committed to the system map.

The X.25 Configuration Utility

After you have configured the X.25 components in the system map, you use the screens of the X.25 Configuration Utility to specify the operating parameters for the X.25 software (X.25 PRUs and LAPB/SDLC L2 port personalities).

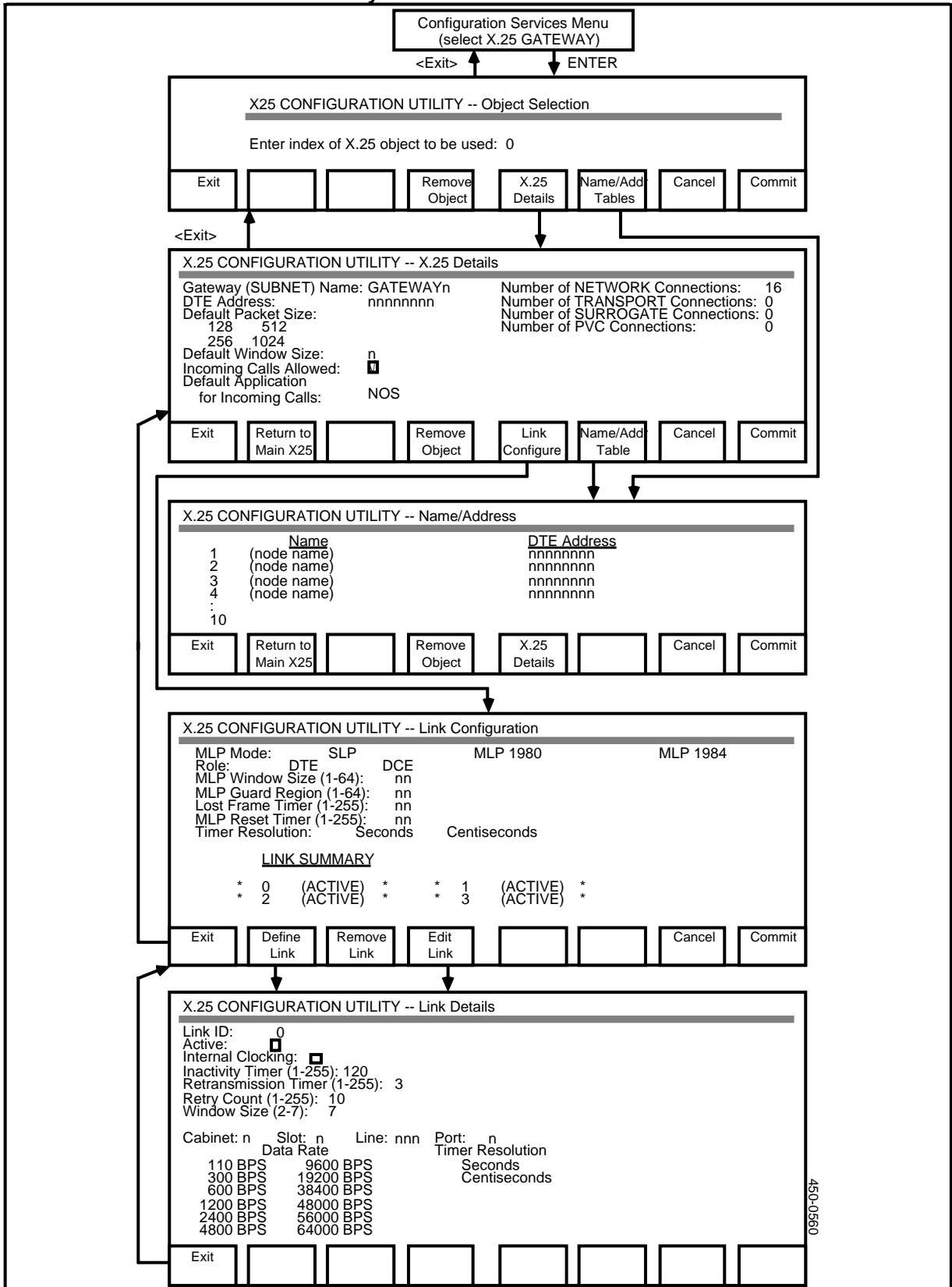
The X.25 Configuration Utility has several screens. You enter the operating parameters for the Level 3 software on the the X.25 Object Selection screen, the X.25 Details screen, and the Name/Address screen; you enter the operating parameters for the Level 2 software on the Link Configuration screen and the Link Details screen.

In the DNC, the X.25 PRU (residing in an Applications Processor SRU) is the Level 3 software, and the LAPB/HDLC L2 port personality (residing in an LIU) is the Level 2 software.

Specifying the Operating Parameters for the X.25 Software

This procedure explains how to specify the operating parameters for the X.25 software. The menu structure for this procedure is shown in Figure 16-1.

Figure 16-1
Menu Structure for the X.25 Gateway



450-0560

To specify the operating parameters, proceed as follows:

- (1) Access the System Administrative Services Main Menu.

If you have just configured the components (SRUs, PRUs, LIUs, port personalities) that are to be used for X.25, then you must exit to the System Administrative Services Main Menu by pressing the <Exit> softkeys.

If you are signing on to the system, then

- sign on as a system administrator
- select SYSTEM ADMINISTRATIVE SERVICES on the Main Menu, and press ENTER.

- (2) On the System Administrative Services Main Menu, select CONFIGURATION, and then press ENTER. The system displays the Configuration Service - Main Menu.

- (3) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services Menu.

- (4) Select X.25 GATEWAY, and press ENTER.

The system displays the X.25 Object Selection screen.

- (5) Enter the value of the object index of the X.25 PRU whose operating parameters are to be specified.

- (6) Press <X.25 Details>.

The system displays the X.25 Details screen. On this screen you enter the operating parameters used by the X.25 PRU.

To advance from field to field on this screen, press TAB or RETURN. To move back to the previous field, hold down SHIFT and press TAB.

- (7) Set the X.25 parameters as defined below. The exact settings depend on the application. Refer to the application's documentation for further information.

The fields on this screen are:

Gateway SUBSET Name. This is a symbolic name that identifies the gateway. The name can be up to eight characters, and can include letters (in upper and lower case) and numbers. The default name is X25nn where nn is the object index of the PRU. The name may also be referred to as the 'subnet' name for an X.25 Gateway.

DTE Address. This address identifies the gateway in the X.25 network. Assign a unique address to each gateway (that is, to each X.25 PRU). The address can be up to 15 digits, and can include any digit from 0 to 9.

If the gateway is to be used for a point-to-point connection to another DVS system, then a value is required for this field. The gateways at the two ends of the connection must have different addresses.

If this gateway is to be connected to a packet switched network, type in the data network address that has been assigned to the gateway. The default is no address; the network knows your address.

Default Packet Size. Use the arrow keys to select the packet size that has been agreed upon between this gateway and the attached DTE or DCE, and then press RETURN. The default value of this parameter is 128.

Default Window Size. This is the maximum number of data packets that can be outstanding and unacknowledged on a virtual circuit. (This value must be agreed upon between this gateway and the attached DTE or DCE. The range is 1 to 7, and the default is 2.

Incoming Calls Allowed. This field controls whether this gateway accepts incoming calls. If incoming calls are to be accepted, ensure that there is a checkmark in the box. This is the default setting of the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.) If incoming calls are to be automatically cleared, ensure that there is no mark in the field. To change the value in the field, press the space bar.

Default Application for Incoming Calls. This is a character string that identifies the name of the application to be used for incoming calls that contain no protocol ID. The default is NONE.

Note: If this X.25 PRU is to be associated with a NOP port, enter NOS.

The next four fields refer to the number of virtual circuits that the gateway can support at one time. The combined total of network, surrogate, and PVC (permanent virtual circuit) connections must not exceed the maximum number of virtual circuits for a gateway. If the gateway is to be connected to a packet switched network, the number of virtual circuits cannot exceed the number set in the terms of your subscription to the network. A gateway can handle up to 64 virtual circuits, regardless of the settings of the other X.25 parameters. A gateway can handle up to 190 virtual circuits if the Default Packet Size does not exceed 256 and if the Default Window Size is set to 2.

Number of NETWORK Connections. Type in the number of network connections supported by this gateway. The default is 1. If the gateway is to be connected to a packet switched network, the X.3 Packet Assembler/Disassembler (X.3 PAD) uses network connections and the X.25 interface for outgoing and incoming calls. X.3 PAD enables the user to make an outgoing call to a packet switched network from an asynchronous terminal connected to the system. With NSR26 and later, X.3 PAD can also receive incoming calls to the system from terminals connected to the network. (For information on X.3 PAD, see Part 17.)

Number of SURROGATE Connections. Type in the number of surrogate connections supported by this gateway. The default is 0.

Number of PVC Connections. Type in the number of permanent virtual circuit connections supported by this gateway. The default is 0.

Steps 8 to 10 fill the Name/Address screen, which associates symbolic names with the addresses of other DTEs to which calls are made by this X.25 PRU.

If the gateway is to be connected to a packet switched network, the name/address table is the basis of the 'call by name' capability of the X.3 Packet Assembler/Disassembler (X.3 PAD). (X.3 PAD enables an asynchronous terminal to access a packet switched network through an X.25 interface. For information on X.3 PAD, see Part 17.)

- (8) On the X.25 Details screen, press <Name/Addr Table>.

The system displays the Name/Address screen.

To advance from field to field on this screen, press TAB or RETURN. To move back to the previous field, hold down SHIFT and press TAB.

- (9) Enter values in the fields on the Name/Address screen.

The fields are:

Name. A name can be up to 16 characters, and can include numeric and alphabetic characters, blanks, and underscores. Each name listed in the table should be the same name as listed in the node tables of applications (including upper and lower case letters and embedded and trailing blanks).

DTE Address. This is the address of the node on the X.25 network that is associated with the symbolic name. The address can be up to 14 digits long, and can include all digits from 0 to 9.

- (10) After entering all the information for the Name/Address screen, press <X.25 Details>.

The system redisplay the X.25 Details screen.

Steps 11 and 12 are for specifying the Level 2 operating parameters that are shared by all ports associated with the X.25 PRU. The Level 2 software is the LAPB/SDLC L2 port personality in the LIU.

- (11) On the X.25 details screen, press <Link Configure>.

The system displays the Link Configuration screen. On this screen you enter the operating parameters that are shared by all the physical links associated with the gateway.

To advance from field to field on this screen, press TAB or RETURN. To move back to the previous field, hold down SHIFT and press TAB.

- (12) Enter values in the fields on the Link Configuration screen.

The fields on the screen are:

MLP Mode. Use the arrow keys to select the mode: Single Link Procedures (SLP), Multiple Link Procedures 1980 (MLP 1980), or Multiple Link Procedures 1984 (MLP 1984). Then press RETURN. The selection is marked by a triangular pointer.

Multiple Link Procedure (MLP) groups as many as six physical links into a 'logical link' to a packet switched network. Multiple Link Procedure provides higher reliability, because virtual circuit connections are not tied to any one

physical link. You can use MLP for a connection to a network only if the local DCE also supports it.

Role. In any data link, one end is the Data Terminal Equipment (DTE) and the other end is the Data Communications Equipment (DCE). DCE causes the LIU to use the 'A' address for command frames (X'03' for SLP mode and X'0F' for MLP mode). At the packet level, DCE causes outgoing calls to use the lowest available LCN for outgoing calls. DNC-500 is generally set to DCE, and Nodes and DNC-100 are set to DTE. The default is DTE. Use the arrow keys to select DCE or DTE, and then press RETURN.

MLP Window Size. This parameter is used only if one of the MLP modes was selected. This is the maximum number of frames that can be outstanding across all links in the MLP group. This is sometimes referred to as 'mw' in CCITT documents. The range 1 to 64, and the default is 16.

MLP Guard Region. This parameter is used only if one of the MLP modes was selected. It determines the range of received MLP sequence numbers which will be considered invalid. This is referred to as 'mx' in CCITT documents. The range 1 to 64, and the default is 16.

Lost Frame Timer. This parameter is used only if one of the MLP modes was selected. It determines maximum amount of time to wait for an out-of-sequence packet to arrive on this MLP link. This value of this parameter represents a number of seconds or centiseconds, depending on the setting of the Timer Resolution parameter. (A centisecond is 1/100th of a second.) The expiration of this timer indicates the loss of one or more packets. This is referred to as 'T3' in CCITT documents.

MLP Reset Timer. This field is not currently used.

Timer Resolution. This parameter is used only if one of the MLP modes was selected. It determines the units of time that are counted by the Lost Frame Timer and the MLP Reset Timer. It can be set to either seconds or centiseconds. (A centisecond is 1/100th of a second). Use the arrow keys to select a choice, and then press RETURN.

Steps 13 to 15 define the Level 2 operating parameters that are specific to a single physical link (that is, to a single LIU port).

- (13) After entering the proper values in the fields on the Link Configuration screen, press <Define Link>.

The system displays the Link Details screen.

The system creates a separate set of the parameters listed on this screen for each link used by the gateway (that is, for each port associated with the X.25 PRU. For a gateway that uses SLP mode, you complete this screen only once. For a gateway that uses MLP mode, you complete this screen once for each LIU port used by the link (to a maximum of six). The procedure for the screen is the same regardless of the link mode.

To advance from field to field on this screen, press TAB or RETURN. To move back to the previous field, hold down SHIFT and press TAB.

- (14) Enter values in the fields on the Link Details screen.

The fields on the screen are:

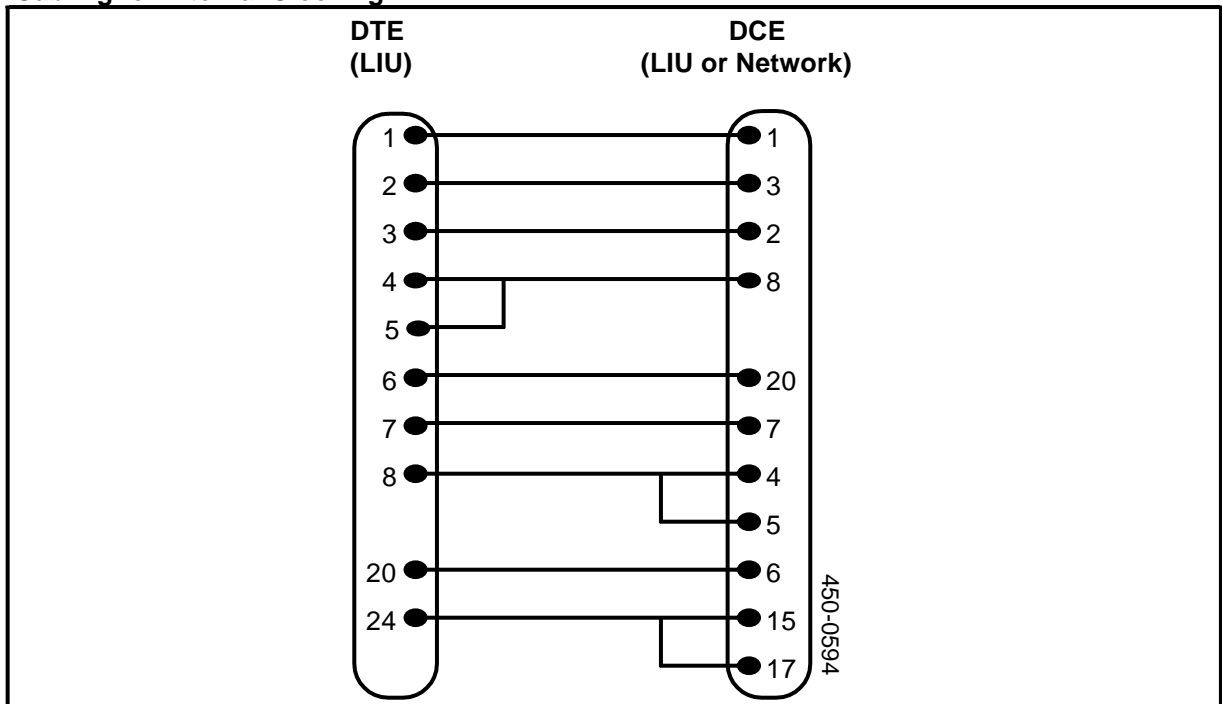
Link ID. This number uniquely identifies the physical link. The range is 0 to 255, and the default is 0.

Active. This field indicates whether this link is active or defined. Before activating the field, ensure that all other data about the link has been entered. Use the space bar to change the setting of this field. If the link is to be activated, press the space bar to make a checkmark to appear in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.) If the link is not to be activated, leave the field blank. The link remains in the defined state, which is the default.

Internal Clocking. This field indicates whether the physical link uses internal clocking. Use the space bar to change the setting of this field. If the clocking signal is generated internally by the LIU, press the space bar to make a checkmark to appear in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.) If the clocking signals are to be generated by a modem, leave the field blank, which is the default.

Note: When internal clocking is used, a specially wired cable must be used between the LIU and the network or other LIU (see Figure 16-2). Where Figure 16-2 indicates that two pins at one end must be connected to one pin at the other end, then connect the two pins at the one end, and run a single wire to the pin at the other end.

Figure 16-2
Cabling for Internal Clocking



Inactivity Timer. This parameter determines the amount of idle time after which this physical link becomes idle. This value of this parameter represents a number of seconds or centiseconds, depending on the setting of the Timer Resolution parameter. The range is 1 to 255, and the default is 120.

Retransmission Timer. The retransmission timer (LAPB 'T1' timer) defines the maximum amount of time to wait for acknowledgement of a command frame on this physical link. This value of this parameter represents a number of seconds or centiseconds, depending on the setting of the Timer Resolution parameter. The range is 1 to 255, and the default is 3.

Retry Count: This is the maximum number of times to retransmit a frame after the retransmission timer expires. The range is 1 to 255, and the default is 10.)

Window Size: This is the maximum number of I-frames that can be outstanding on this physical link at any one time. This is referred to as 'k' in CCITT documents. The range is 2 to 7, and the default is 7.

Cabinet, Slot, Line, and Port. Enter the address of the LIU port being used for this link.

Data Rate. If internal clocking is to be in effect for this physical link, use the arrow keys to select the correct data rate, and then press RETURN. The default value is 9600. This parameter is ignored if internal clocking is not in effect.

Timer Resolution. This parameter determines the units of time that are counted by the inactivity timer and the retransmission timer. It can be set to either seconds or centiseconds. (A centisecond is 1/100th of a second). Use the arrow keys to select a choice, and then press RETURN.

- (15) After entering the proper values in the fields on the Link Details screen, press <Exit>.

The system redisplay the Link Configuration screen and prompts you to cancel or commit the data.

- (16) Press <Commit>.
(17) Press <Exit>.

The system redisplay the X.25 Details Screen.

- (18) If Multiple Link Procedure (MLP) has been specified for this gateway, and if you need to configure another link in the MLP group, then on the X.25 Details screen, press <Link Configure>. This makes the Link Configuration Screen reappear. You can then configure another physical link by repeating Steps 13 to 17.
- (19) If you do not need to configure further physical links for this gateway, then press <Commit> on the X.25 Details Screen.
- (20) After committing the information, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. You must exit as far as that menu to make the system save the changes on disk.

Note 1: When you use the X.25 Configuration Utility, the data that you enter remains in a temporary file until you exit as far as the System Administrative Services Main Menu. If the temporary file fills up while you are still entering data, the data will be lost. Therefore, it is a good idea to exit to the System Administrative Services Main Menu even if you still have more X.25 information to enter for other gateways.

Note 2: The newly entered operating parameters are not used by the X.25 software until you reload the X.25 PRU and the associated LIU (or LIUs).

Note 3: If you use the screens of the X.25 Configuration Utility to enter information, the system does not allow you to exit from the utility (and return to the Configuration Services Menu) unless you either cancel or commit the data.

Editing X.25 Operating Parameters

You can use the screens of the X.25 Configuration Utility to edit X.25 operating parameters that have been entered and saved on disk.

Note: The associated physical link should not be in use until after this procedure is finished.

To edit X.25 operating parameters, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select X.25 GATEWAY, and press ENTER.

The system displays the Object Selection screen.

- (6) Enter the object index of the X.25 PRU whose operating parameters are to be edited.
- (7) Press <X.25 Details>.

The system displays the X.25 Details screen.

- (8) Edit the values on the X.25 Details screen as required.
- (9) If you need to edit the name/address table for the gateway, then on the X.25 Details screen, press <Name/Addr Table>.

The system displays the Name/Address screen.

- (10) If you edit the name/address table, then when you are finished, press <X.25 Details> on the Name/Address screen.

The system redisplay the X.25 Details screen.

- (11) If you do not need to edit the Level 2 operating parameters (that is, the operating parameters of the one or more physical links associated with the gateway), proceed directly to Step 17. If you do need to edit the Level 2 operating parameters, press <Link Configure> on the X.25 Details screen.

The system displays the Link Configuration screen. On this screen you can edit the parameters that are shared by all the physical links associated with the gateway.

- (12) If you do not need to edit the operating parameters of an individual physical link, proceed directly to Step 14. If you do need to edit the operating parameters of an individual link, then use the arrow keys to select the link in the Link Summary field in the lower portion of the Link Configuration screen, and press <Edit Link>.

The system displays the Link Details screen. On this screen you can edit the parameters that are specific to the selected physical link.

- (13) Press <Exit>.

The system redisplay the Link Configuration screen, where the system prompts you to cancel or commit the data.

- (14) Press <Commit> on the Link Configuration screen.
- (15) Press <Exit> on the Link Configuration screen.

The system redisplay the X.25 Details Screen.

- (16) If Multiple Link Procedure (MLP) has been specified for this physical link, and if you need to edit the parameters of another link in the MLP group used by this gateway, then on the X.25 Details screen, press <Link Configure>. This makes the Link Configuration Screen reappear. You can then edit the parameters of another physical link, as explained in Steps 12 to 15.
- (17) If you do not need to edit the parameters of other physical links used by this gateway, then press <Commit> on the X.25 Details screen.
- (18) After committing the information, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. You must exit as far as that menu to make the system save the changes on disk.

Note 1: When you use the X.25 Configuration Utility, the data you enter remains in a temporary file until you exit as far as the System Administrative Services Main Menu. If the temporary file fills up while you are still entering data, the data will be lost. Therefore, it is a good idea to exit to the System Administrative Services Main Menu even if you still have more X.25 information to enter for other gateways.

Note 2: The newly edited operating parameters are not used by the X.25 software until you reload the X.25 PRU and the associated LIU (or LIUs).

Note 3: If you use the screens of the X.25 Configuration Utility to edit information, the system does not allow you to exit from the utility (and return to the Configuration Services Menu) unless you either cancel or commit the data.

Loading the Operating Parameters into the X.25 Software

The operating parameters you specify using the X.25 Configuration Utility must be loaded into the X.25 PRU and into the port personality of each LIU port associated with that PRU. As soon as you commit the data and exit as far as the System Administrative Services Main Menu, the parameters are written to disk, but they are not yet incorporated into the X.25 software.

To load X.25 parameters into a PRU or port personality, you must use the Maintenance system to reload the software by courtesying it down and putting it back into service. When the PRU or port personality is reloaded, it consults the information on disk, and the new operating parameters take effect.

Reloading X.25 PRUs by Reloading the Applications Processor SRU

If an Applications Processor SRU contains one or more X.25 PRUs, and contains no other non-X.25 software, you can reload the X.25 PRU or PRUs by reloading the SRU. Proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select MAINTENANCE, and press ENTER.

The system displays the Faulty Units screen.

- (4) Press <Cabinet State>.

The system displays the SRU State Display screen for the first cabinet.

- (5) If necessary, press <Next Cabinet> to locate the cabinet containing Applications Processor SRU that contains the X.25 PRUs.
- (6) Use the arrow keys to select the Applications Processor SRU, and press <Courtesy Down>.

The system takes the Applications Processor SRU out of service. The PRUs that reside on the SRU are also taken out of service.

- (7) Press <Put into Service>.

The system puts the SRU and its PRUs back into service. As the PRUs are

reloading, each PRU consults its operational parameters stored on disk. The new parameters take effect.

- (8) To exit, press the <Exit> softkeys until you arrive at the main menu.

Reloading an Individual X.25 PRU

If an X.25 PRU resides on an Applications Processor SRU that contains other non-X.25 software, then you must reload only the X.25 PRU. Proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select MAINTENANCE, and press ENTER.

The system displays the Faulty Units screen.

- (4) Press <Cabinet State>.

The system displays the SRU State Display screen for the first cabinet.

- (5) If necessary, press <Next Cabinet> to locate the cabinet containing the Applications Processor SRU the X.25 PRU (or PRUs).
- (6) Use the arrow keys to select the Applications Processor SRU, and press <Next Level>.

The system displays the PRU State Display screen, listing the PRUs that reside on the Applications Processor SRU.

- (7) Use the arrow keys to select the X.25 PRU. Then press <Courtesy Down>.

The system takes the PRU out of service.

- (8) Press <Put into Service>.

The system puts the PRU back into service. As the PRU is reloading, it consults its operational parameters stored on disk. The new parameters take effect.

- (9) To exit, press the <Exit> softkeys until you arrive at the main menu.

Reloading the Port Personalities for X.25

Because each LIU used for X.25 must be dedicated exclusively to that purpose, you can reload the port personalities contained in the LIU by reloading the LIU. Proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select MAINTENANCE, and press ENTER.

The system displays the Faulty Units screen.

- (4) Press <Cabinet State>.

The system displays the SRU State Display screen for the first cabinet.

- (5) If necessary, press <Next Cabinet> to locate the cabinet containing the LANlink SRU that is connected to the LIU that is dedicated to X.25.

- (6) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

The system displays the RRU State Display screen, listing the RRU's (LIUs and M4000-series terminals) connected to the LANlink SRU.

- (7) Use the arrow keys to select the LIU. (The LIU is type LIU - HDLC/RS-232 or type LIU - HDLC/V.35.) Then press <Courtesy Down>.

The system takes the LIU out of service. The port personalities that reside on the LIU are also taken out of service.

- (8) Press <Put into Service>.

The system puts the LIU and its port personalities back into service. As the port personalities are reloading, each personality consults its operational parameters stored on disk. The new parameters take effect.

- (9) To exit, press the <Exit> softkeys until you arrive at the main menu.

Setting up a NOP Port

To set up a NOP port, you must:

- configure and activate the necessary PRUs (X.25, NRM, and HAG)
- configure and activate the port personality of the LIU port
- use the X.25 Configuration Utility to specify the operating parameters to be used by the X.25 software
- load the operating parameters into the X.25 software.

Configuring and Activating an X.25 PRU for a NOP Port

To configure an X.25 PRU that is to be associated with a NOP port, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the Hardware Map screen for the cabinet containing the Applications Processor on which the X.25 PRU is to reside.
- (7) Use the arrow keys to select the Applications Processor, and press <Next Level>.

The system displays the Software Map screen, listing the PRUs that reside on the Applications Processor.

- (8) Press <Insert Item>.

The system displays the Selection List screen.

- (9) Use the arrow keys to select X.25, and then press <Edit Item>.

The system displays the Item Definition screen.

- (10) Edit the parameter values on the Item Definition screen. The object index must be unique among instances of the X.25 PRU within the DNC. Modify the unit name field to reflect the new object index (for example, 'X.25 - Object 1').

To advance from field to field on the screen, press TAB or RETURN. To move back to the previous field, hold down SHIFT and press TAB.

- (11) On the Item Definition screen, press <Define as New Item>.

The system redisplay the Selection List screen, with the new item added.

- (12) Select the new item, and then press <Select Item>.

The system redisplay the Software Map screen, listing the PRUs that reside on the Applications Processor SRU. The X.25 PRU is selected, and the system is prompting for a name.

- (13) Enter a new name. (A name is required; the default name is '---'). Then press RETURN twice.

The X.25 PRU is added to the list of PRUs for the Applications Processor, in a defined state.

Steps 14 and 15 activate the X.25 PRU.

- (14) Starting on the Software Map screen, press <Change Softkeys>.

New softkeys appear.

- (15) Use the arrow keys to select the X.25 PRU that is in the defined state, and press <Change Status>.

The status of the X.25 PRU changes to active, and the previous softkeys reappear.

- (16) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the changes on disk.

Configuring and Activating the Port Personality for a NOP Port

This procedure describes how to configure a new Network Operations Protocol (NOP) port on a DNC system.

The menu structure for this section is shown in Figure 16-1.

Note: The new hardware should be completely installed, connected, and powered up as described in 450-1011-201 before this procedure is carried out.

To add a NOP port, take the following steps:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) Use the <Previous Cabinet> and <Next Cabinet> softkeys to find the Hardware Map screen for the cabinet containing the LANlink SRU to which is connected the LAN Interface Unit (LIU) that is to have the NOP port.
- (7) Use the arrow keys to select the LANlink, and then press <Next Level>.

The system displays the LANlink line list on the Hardware Map screen, listing the RRU's (LIUs and M4000-series terminals) that are connected to the LANlink.

- (8) Use the arrow keys to select the LIU's line. (The LIU must be type LIU - HDLC/RS-232 or type LIU - HDLC/V.35.) Then press <Next Level>.

The system displays the Port Map, listing the ports on the LIU.

- (9) Press <Insert Item>.

The system displays the Selection List screen.

- (10) Select 'LIU PORT - LAPB/SDLC L2' and press <Select Item>.

The system redisplay the Port Map. The newly selected port personality is in the lower part of the screen, and the cursor is to the right, prompting for a name.

- (11) Enter a name that reflects the object index of the X.25 PRU with which the port is to be associated, and then press RETURN.

The cursor moves to the right, to prompt for the port number.

- (12) Enter the number of the LIU port. (For the RS-232-C connection used by NOP, only ports 02 and 03 of the LIU can be used.) Then press ENTER.

The new port personality appears on the LIU port.

Steps 13 and 14 activate the NOP port.

- (13) Starting on the Port Map, press <Change Softkeys>.

New softkeys appear.

- (14) Select the newly defined port personality, and press <Change Status>.

The status of the port changes to active, and the previous softkeys reappear.

- (15) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the changes on disk.

Specifying the X.25 Operating Parameters for NOP

After using the System Map Utility to configure the X.25 PRU and the LAPB/HDLC L2 port personality for the NOP port, use the X.25 Configuration Utility to specify the operating parameters for the PRU and the port personality.

For instructions, see 'The X.25 Configuration Utility', earlier in this part.

Loading the Operating Parameters for NOP into the X.25 Software

After configuring the system components for NOP in the system map, and after using the X.25 Configuration Utility to specify the operating parameters for the software, reload the software to make the operating parameters take effect.

For instructions, see 'Loading the Operating Parameters into the X.25 Software', earlier in this part.

Moving or Deleting a NOP Port

Moving a NOP Port

You move a NOP port by moving the LIU PORT - LAPB/SDLC L2 port personality. You can move the port personality by changing the address of the LIU that contains it, or by assigning the personality to a different port on the LIU. For detailed instructions, see Part 9, 'Configuring Port Personalities for External Devices'.

Deleting a NOP Port

You delete a NOP port by deleting the LIU PORT - LAPB/SDLC L2 port personality. You can delete the port personality itself, or you can delete the LIU that contains it. For detailed instructions, see Part 9, 'Configuring Port Personalities for External Devices'.

17. Configuring the X.3 PAD

A Packet Assembler/Disassembler (PAD) is a facility that allows non-packet-mode terminals to send and receive calls through packet switched data networks. A PAD assembles data characters from your terminal into packets that can be sent to a packet switched network, and disassembles packets received from the network into data characters that can be sent to your terminal.

This part of the manual covers the following topics:

- the X.3 PAD, and its relation to X.25 and packet switched networks
- configuring the X.3 PAD components (PRUs and SRUs) in the system map
- using the X.3 PAD Configuration Utility.

What Is X.3 PAD?

CCITT Recommendation X.25 defines the procedures for interfacing packet-mode terminals to a packet switched data network. However, that interface cannot accommodate many of the terminals currently in use because they do not operate in packet mode. Therefore, the CCITT adopted additional recommendations to define a packet assembly/disassembly facility that performs X.25 functions for non-packet-mode devices.

Recommendations X.3, X.28, and X.29, known collectively as the Interactive Terminal Interface (ITI), define the support of low-speed, asynchronous devices by packet switched data networks. The PAD can be configured to interface properly with the protocol and physical characteristics of a user's terminal. It uses X.25 procedures and packet formats to establish virtual calls and present data to the network.

Recommendations X.3, X.28, and X.29

Recommendation X.3 defines 18 parameters that the PAD uses to tailor its control of the terminal. A set of the X.3 parameters is known as a PAD profile. You can use the X.3 PAD Configuration Utility to define PAD profiles.

Recommendation X.28 defines procedures for establishing the connection between the terminal and the PAD, and for exchanging control information, commands, and user data between the terminal and the PAD.

Recommendation X.29 defines the control messages sent between the PAD and a remote terminal during a virtual call.

Outgoing Calls and Incoming Calls

The X.3 PAD in the DNC handles both outgoing calls and incoming calls. An outgoing call is one by which a user at a terminal connected to the DNC accesses a remote system either via a point-to-point connection or via a packet switched network. An incoming call is one by which a user at a remote terminal establishes a connection to the DNC via a packet switched network. The user dials a network PAD, calls the DNC's X.3 PAD, and receives on the terminal screen a menu from which a DNC application can be selected. Once connected to the DNC, the remote terminal shares the same functionality as if it were connected to the DNC via an LIU.

PAD Profiles

Recommendation X.3 defines 18 parameters that determine how data is to be processed by the PAD. A PAD profile is a set of values that define the initial settings of these parameters. Profiles are a convenient means of prepackaging parameter values so that a user does not have to fully reconfigure his or her terminal before making each call. When a user makes a virtual call, he or she can specify which profile to use. The user can also modify the parameters on a per-call basis if required. (For user instructions, see the X.3 PAD User Guide, document P6235.)

There are two default profiles, Profile 1 and Profile 2. They are included with the PAD software. (Profile 2 is included with NSR26 and later versions.) Profile 1 is for outgoing calls, and satisfies a minimum of terminal requirements. Profile 2 is for incoming calls. Table 17-A lists the parameter values of the default profiles.

You may need to build additional profiles, depending on the terminal devices that you use and the networks that you subscribe to. There can be up to 50 profiles in the system. See 'Building PAD Profiles', later in this part.

System Requirements for X.3 PAD

If a system is to use X.3 PAD, it requires the following software and hardware components:

- one instance of the PAD Agent PRU
- at least one instance of the PAD PRU
- sufficient Applications Processor SRUs to run the X.3 PAD software.

Note: If X.3 PAD is to run on your system, then the X.25 software is also necessary. This includes the Host Agent PRU (HAG) and the Network Resource Manager PRU (NRM). The X.25 software provides access to the packet switched network. For information on configuring the X.25 software, see Part 16, 'Setting up X.25 Gateway and NOP Ports'.

X.3 PAD Configuration Overview

There are certain major steps involved in configuring X.3 PAD on the system.

- ensuring that enough Applications Processor SRUs are configured in the system map to accommodate the PRUs

- configuring and activating the PRUs in the system map
- using the X.3 PAD Configuration Utility to specify the operating parameters of the PAD software, and to specify PAD profiles
- loading the operating parameters into the PAD software by courtesying the PRUs down and putting them back into service.

Applications Processor SRUs for X.3 PAD

A dedicated Applications Processor SRU is not required for X.3 PAD. If you have unused capacity on the SRUs that are already configured, you can put the PRUs on those SRUs. If you do not have adequate capacity, then add SRUs as necessary. For detailed instructions, see Part 6, , 'Configuring Shared Resource Units'.

Configuring and Activating the PRUs for X.3 PAD

For X.3 PAD you must configure and activate one PAD Agent PRU and at least one PAD PRU.

The **PAD Agent PRU** manages applications' requests for PAD service. The PAD Agent is primarily responsible for connecting terminals to the PAD and disconnecting terminals from the PAD. Only one PAD Agent PRU is required for the entire system. Instructions on configuring and activating PRUs can be found in Part 7, 'Configuring Program Resource Units'.

The **PAD PRU** processes data transfers between terminals and a packet switched network. Each PAD PRU can support up to 16 active terminals at one time. There can be up to five PAD PRUs in the system. If there are two or more PAD PRUs in the system, they must be differentiated by their object indexes. Valid object index values for the PAD PRU are in the range 0 to 4, and the default is 0. Instructions on configuring PRUs, editing the object indexes of PRUs, and activating PRUs can be found in Part 7, 'Configuring Program Resource Units'.

Note: The performance of the PAD may be adversely affected if you configure a PAD PRU on an Applications Processor that also has a heavily loaded X.25 gateway running on it.

Committing the Configuration Information to the System Map

After configuring the SRUs and PRUs needed for X.3 PAD, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. The configuration information that you entered for the X.3 PAD components is then committed to the system map.

The X.3 PAD Configuration Utility

After you have configured the X.3 PAD components in the system map, you use the screens of the X.3 PAD Configuration Utility to specify the operating parameters of each PAD PRU. You also use the utility to build PAD profiles if the default profiles do not meet your needs.

The X.3 PAD Configuration Utility has four data-entry screens:

on the first screen, you select a PAD PRU by specifying its object index

on the second screen, you specify the number of users the PAD PRU supports, and the mix of M4020 and asynchronous terminals it supports

on the third and fourth screens, you build PAD profiles.

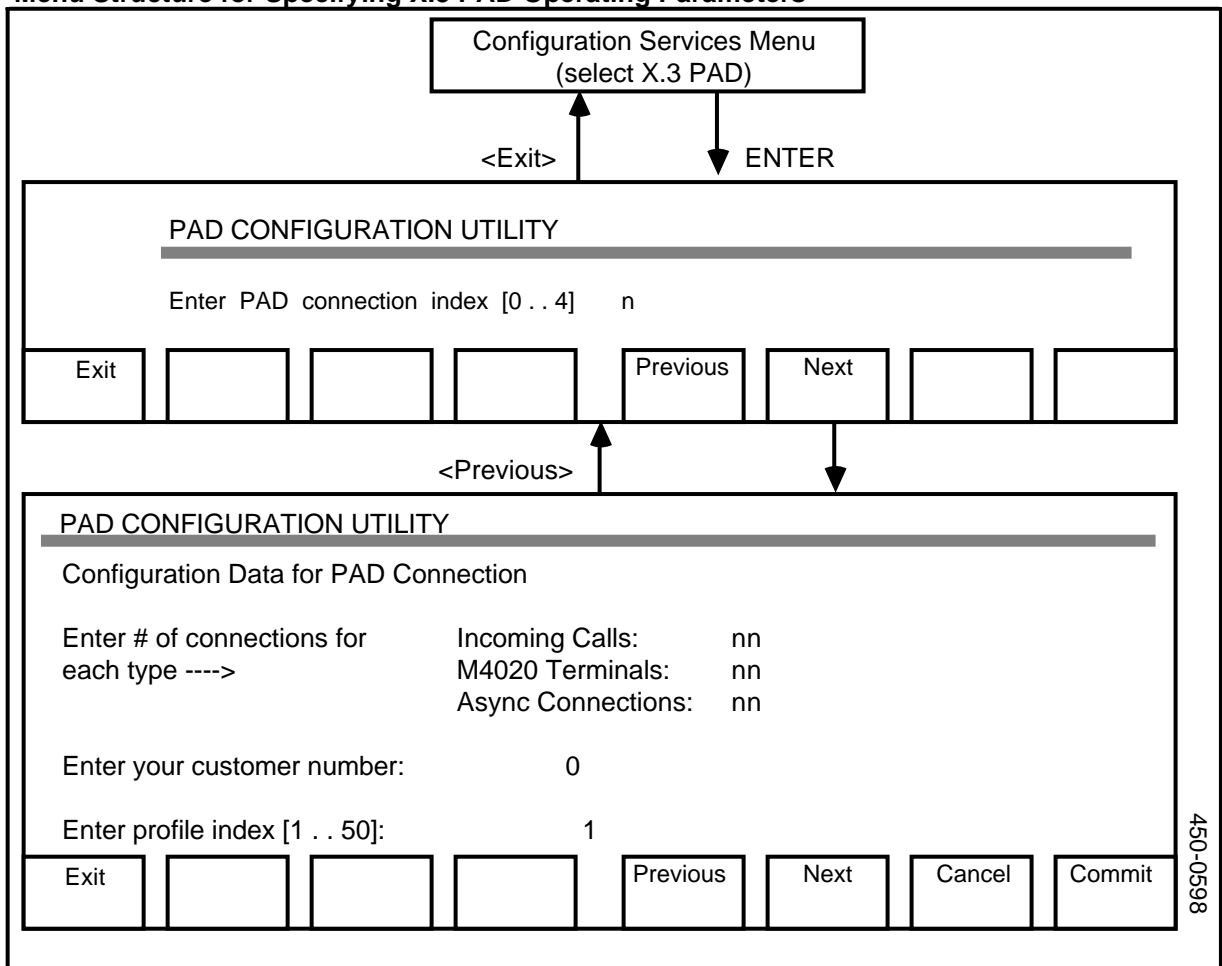
Specifying the Operating Parameters of a PAD PRU

This procedure explains how to specify the operating parameters of a PAD PRU. These parameters control the number of concurrent active users that a PAD PRU supports (to a maximum of 16), and the mix of M4020 and asynchronous terminals it supports.

After initially configuring one or more PAD PRUs in the software map, you must carry out Steps 5 to 8 of this procedure once for each PRU. You can also use this procedure at a later date to change the number of users a PAD PRU supports, or to change the mix of M4020 and asynchronous terminals it supports.

The menu structure for this procedure is shown in Figure 17-1.

Figure 17-1
Menu Structure for Specifying X.3 PAD Operating Parameters



To specify the operating parameters of a PAD PRU, proceed as follows:

- (1) Access the System Administrative Services Main Menu.

If you have just configured components (SRUs and PRUs) that are to be used for X.3 PAD, then you must exit to the System Administrative Services Main Menu by pressing the <Exit> softkeys.

If you are signing on to the system, then

- sign on as a system administrator
- select SYSTEM ADMINISTRATIVE SERVICES on the Main Menu, and press ENTER.

- (2) On the System Administrative Services Main Menu, select CONFIGURATION, and then press ENTER. The system displays the Configuration Service - Main Menu.
- (3) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

- (4) Select X.3 PAD Configuration and press ENTER.

The system displays the first X.3 PAD Configuration Utility screen, which prompts for the PAD connection index.

Steps 5 to 8 specify the operating parameters for a PAD PRU.

- (5) Type in the PAD connection index. This is the object index of the PAD PRU. The object index is in the range 0 to 4.
- (6) Press <Next>.

The system displays the second X.3 PAD Configuration Utility screen, with the cursor positioned in the Incoming Calls field. On this screen you specify the number of concurrent active users that the PAD PRU is to support.

To advance from field to field on the X.3 PAD Configuration Utility screens, press TAB or RETURN. To move back to the previous field, hold down SHIFT and press TAB.

Note that the Enter your customer number field on this screen has no function.

- (7) To specify the number of active users that the PAD PRU is to support, you use the Incoming Calls, M4020 Terminals, and Async Connections fields. (The latter two fields refer to outgoing calls.) The total of the values specified in the three fields must not exceed 16. The default values are 0,16, and 0, respectively.

Note 1: Incoming calls are supported only by NSR26 and later software.

Note 2: Calls to and from a packet switched network use network connections that are specified in the X.25 Configuration Utility. You must specify enough network connections to support the maximum

number of concurrent incoming and outgoing network calls. See 'Specifying the Operating Parameters of the X.25 Software', in Part 16. A DNC can support up to 80 concurrent network calls (five PAD PRUs at 16 calls per PRU).

- (8) After specifying the number of users, press <Commit>.

The system notes that you intend to save the parameters.

- (9) If there are other PAD PRUs for which you must specify the numbers of users, then you must repeat Steps 5 to 8 for each of them. To return to Step 5, press <Previous>.

If there are no more PADs to configure, proceed to Step 10.

- (10) If you need to configure PAD profiles, this is the time to do so. If you need to build PAD profiles, proceed to 'Building PAD Profiles'. If you do not need to build PAD profiles, then press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu, and then proceed directly to 'Loading the X.3 Operating Parameters into PAD PRUs', later in this part.

Building PAD Profiles

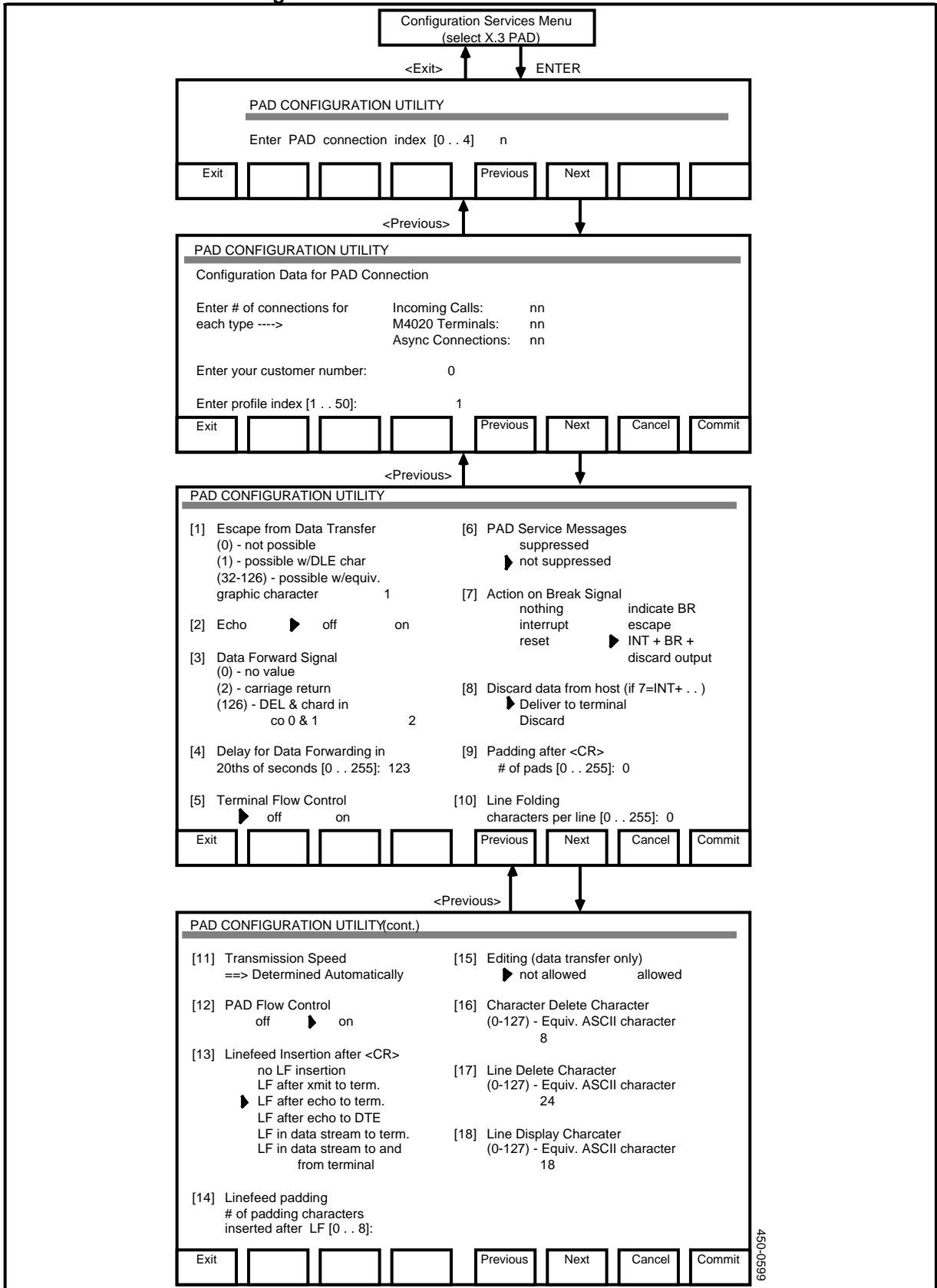
You will need to build customized PAD profiles only if the default profiles are not adequate for your needs. Your needs will be determined by the terminal devices that you use and the networks that you subscribe to. Most packet switched data networks support specialized profiles that are tailored to the characteristics of particular terminal devices. To determine whether you must define special profiles, consult the people who support the networks to which you subscribe, and those who support the remote DTEs that you intend to communicate with.

Regardless of the number of profiles in your system, any PAD PRU in the system can use any profile in the system.

The menu structure for building profiles is shown in Figure 17-2.

When you configure the X.3 PAD, you build any required profiles after you specify the operating parameters of the PAD PRUs. If you have just finished specifying those parameters, you are on the second X.3 PAD Configuration Utility screen, and you should proceed directly to Step 7 of this procedure.

Figure 17-2
Menu Structure for Building PAD Profiles



450-0599

If you need to build a PAD profile, take the following steps:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select X.3 PAD Configuration and press ENTER.

The system displays the first X.3 PAD Configuration Utility screen.

To advance from field to field on the X.3 PAD Configuration Utility screens, press TAB or RETURN. To move back to the previous field, hold down SHIFT and press TAB.

- (6) Press <Next>.

The system displays the second X.3 PAD Configuration Utility screen.

- (7) Press <Next>.

The system displays the third X.3 PAD Configuration Utility screen, listing X.3 parameters 1 to 10. Note: The CCITT has defined two standard PAD profiles, the Simple profile and the Transparent profile. These profiles are described in the following section, and their parameter values are listed in Table 17-A.

- (8) Use the TAB key or the RETURN key to advance the cursor from field to field on the screen, and specify the parameter values for the profile. The parameters on this screen are:
 - **Escape from data transfer.** This parameter determines whether the DLE (data link escape) character is recognized as an escape from data-transfer mode. You can specify 0 (not possible) or 1 (possible). Alternatively, you can specify that a graphic character is to be the escape character. To specify a graphic character, type in the decimal equivalent of the character's ASCII code. The default value of the parameter is 1 (possible with DLE). On an M4000-series terminal the DLE Character is transmitted by CONTROL P.
 - **Echo.** This parameter indicates whether input data from the terminal is to be echoed to the terminal screen. Move the cursor to indicate that echo is to be on or off. The default setting is on.
 - **Data Forward Signal.** This parameter indicates the set of terminal-generated characters and/or conditions that will cause data to be forwarded to the destination DTE. You can specify 0 (no value), 2 (carriage return), or 126. If you specify 126, then data is forwarded when any character

with a value less than 32 and the the character DEL is received. Type in the desired value. The default value is 2 (carriage return).

- **Delay for Data Forwarding in 20ths of seconds.** This parameter is used to set the idle timer value when data forwarding is based on timeouts. You can specify a value in the range 0 to 255. The default value is 0 (no data forwarding on timeout).
 - **Terminal Flow Control.** This parameter indicates whether the PAD can stop data flow from the terminal (using whatever mechanism has been specified in the terminal profile, usually XON/XOFF). Move the cursor to indicate either on or off. The default setting is off, meaning that the PAD cannot stop data flow from the terminal.
 - **PAD Service Messages.** This parameter indicates whether PAD service messages are to be transmitted to the terminal, or suppressed. Move the cursor to indicate your choice. The default is not suppressed, meaning that service messages are transmitted to the terminal.
 - **Action on BREAK Signal.** This parameter indicates how the PAD should process a BREAK signal received from the terminal while in data-transfer mode. (A BREAK while in command mode means that the input line is to be aborted.) Move the cursor to indicate your choice. If you choose to do nothing, or to send an interrupt, or to reset, you will remain in data-transfer mode following the break. The last option (INT + BR + Discard) is the default setting.
 - **Discard data from host.** This parameter is used in conjunction with the preceding one. If the preceding parameter is set to the default value, this parameter indicates what the PAD is to do with the output that is discarded on a BREAK. Move the cursor to indicate whether the output should be discarded or delivered to the terminal. The default setting of this parameter is 'Deliver to terminal'.
 - **Padding after <CR>.** This parameter is used to indicate the number of padding characters to be inserted by the PAD following a carriage return transmitted to the terminal. Type in a number in the range 0 to 255. The default setting is 2.
 - **Line Folding.** This parameter indicates the maximum number of printable characters that can be displayed on a terminal line before the PAD must send a format affector (such as CR or LF). Line folding is done in both command mode and data-transfer mode. Type in a number in the range 0 to 255. The default setting is 0, meaning that the PAD does not do line folding.
- (9) After specifying the values for the first ten parameters, press <Next>.

The system displays the fourth X.3 PAD Configuration screen, listing X.3 parameters 11 to 18.

- (10) Use the TAB key or the RETURN key to advance the cursor from field to field on the screen, and specify the parameter values for the profile. The parameters on this screen are:
- **Transmission Speed.** This parameter indicates the baud rate of the terminal. This is a read-only parameter. The baud rate of the terminal is determined automatically.

- **PAD Flow Control.** This parameter indicates whether the user can signal the PAD to temporarily stop sending data to the terminal. Move the cursor to set the parameter to on or off. The default setting is on. When this parameter is set to on, the user can transmit an XOFF code to request that the PAD stop sending data. The PAD restarts data transfer when it receives an XON code. On an M4000-series terminal, the XOFF code is transmitted by CONTROL S, the XON code, by CONTROL Q.
- **Linefeed Insertion after <CR>.** This parameter indicates if and when a linefeed character is to be inserted. It applies only in data-transfer mode. Move the cursor to indicate your choice. The default setting is LF after echo to term.
- **Linefeed Padding.** This parameter is used to specify the number of padding characters that the PAD is to insert following a linefeed transmitted to the terminal. Linefeed padding is applicable only in data-transfer mode. Type in a number in the range 0 to 8. The default value of the parameter is 0 (no padding after a linefeed).
- **Editing (data transfer only).** This parameter indicates whether editing is allowed in data-transfer mode. (Editing is always allowed in command mode.) Move the cursor to indicate whether editing is allowed or not allowed. The default value of the parameter is 'not allowed'.

The last three parameters are valid only if editing is allowed in data-transfer mode.

- **Character Delete Character.** If editing is allowed in data-transfer mode, this parameter is used to specify the character delete character. Type in the decimal equivalent of an ASCII character on the range 0 to 127. The default value of the parameter is 8. On an M4000-series terminal, this code is transmitted by the BACKSPACE key.
- **Line Delete Character.** If editing is allowed in data-transfer mode, this parameter is used to specify the line delete character. Type in the decimal equivalent of an ASCII character on the range 0 to 127. The default value of the parameter is 24. On an M4000-series terminal, this code is transmitted by CONTROL X.
- **Line Display Character.** If editing is allowed in data-transfer mode, this parameter is used to specify the line display character. Type in the decimal equivalent of an ASCII character on the range 0 to 127. The default value of the parameter is 18. On an M4000-series terminal, this code is transmitted by CONTROL R.

(11) Press <Commit>.

The system notes that you intend to save this profile.

(12) If you must define other PAD profiles, then press <Previous> to return to the third X.3 PAD Configuration Utility screen, and repeat Steps 8 to 11.

If there are no more PAD profiles to define, then press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu, and then proceed 'Loading the X.3 Operating Parameters into PAD PRUs', later in this part.

Default Profiles

The PAD software comes with two default profiles, Profiles 1 and 2.

Profile 1 is for outgoing calls, and satisfies a minimum of terminal requirements. It allows the user to escape from data-transfer mode and allows service messages to be issued by the PAD. Active PAD functions include echo and data forwarding whenever a carriage return is received by the PAD.

Profile 2 is for incoming calls.

Table 17-A lists the parameter values of the default profiles.

Loading the X.3 Operating Parameters into PAD PRUs

The configurable parameters that you specify on the X.3 PAD Configuration Utility screens must be loaded into the PAD PRU (or PRUs). As soon as you commit the data and exit as far as the System Administrative Services Main Menu, the parameters are written to disk, but they are not yet incorporated into the PRUs.

To load operating parameters into a PRU, you must use Maintenance Services to reload the PRU by courtesying it down and putting it back into service. When the PRU is reloaded, it consults the information on disk, and the new operating parameters take effect.

If at some time after initial configuration, you make changes to the X.3 operating parameters on the second X.3 PAD Configuration Utility screen, then after making the changes you must reload the affected PAD PRU.

Reloading PAD PRUs by Reloading the Applications Processor SRU

If an Applications Processor SRU contains one or more PAD PRUs, and contains no other nonPAD software, you can reload the PAD PRU or PRUs by reloading the SRU. Proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select MAINTENANCE, and press ENTER.

The system displays the Faulty Units screen.

- (4) Press <Cabinet State>.

The system displays the SRU State Display screen for the first cabinet.

- (5) If necessary, press <Next Cabinet> to locate the cabinet containing Applications Processor SRU that contains the PAD PRUs.

- (6) Use the arrow keys to select the Applications Processor SRU, and press <Courtesy Down>.

The system takes the Applications Processor SRU out of service. The PRUs that reside on the SRU are also taken out of service.

- (7) Press <Put into Service>.

The system puts the SRU and its PRUs back into service. As the PRUs are reloading, each PRU consults its operational parameters stored on disk. The new parameters take effect.

- (8) To exit, press the <Exit> softkeys until you arrive at the main menu.

Reloading an Individual PAD PRU

If a PAD PRU resides on an Applications Processor SRU that contains other nonPAD software, then you must reload only the PAD PRU. Proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and then press ENTER.

The System Administrative Services Main Menu appears.

- (3) On the System Administrative Services Main Menu, select MAINTENANCE, and press ENTER.

The system displays the Faulty Units screen.

- (4) Press <Cabinet State>.

The system displays the SRU State Display screen for the first cabinet.

- (5) If necessary, press <Next Cabinet> to locate the cabinet containing the Applications Processor SRU that contains the X.25 PRU (or PRUs).
- (6) Use the arrow keys to select the Applications Processor SRU, and press <Next Level>.

The system displays the PRU State Display screen, listing the PRUs that reside on the Applications Processor SRU.

- (7) Use the arrow keys to select the PAD PRU. Then press <Courtesy Down>.

The system takes the PRU out of service.

- (8) Press <Put into Service>.

The system puts the PRU back into service. As the PRU is reloading, it consults its operational parameters stored on disk. The new parameters take effect.

- (9) To exit, press the <Exit> softkeys until you arrive at the main menu.

Table 17-A
Parameter Values of the Default Profiles

Parameter	Profile 1 (Outgoing Calls)	Profile 2 (Incoming Calls)
Escape	possible w/DLE	not possible
2 Echo	on	off
3 Data Forwarding	carriage return	no value
4 Idle Timer	0 (no timeout)	20 (one second)
5 Terminal Flow Control	off	off
6 Service Messages	not suppressed	suppressed
7 Break	INT+BR+discard output	INT+BR+discard output
8 Discard output	Deliver to terminal	Deliver to terminal
9 CR Padding	two pads	no pads
10 Line Folding	0 (no)	0 (no)
11 Speed (auto)	1200 b/s	1200 b/s
12 PAD Flow Control	on	off
13 Linefeed	no LF insertion	no LF insertion
14 LF Padding	0 (no padding)	0 (no padding)
15 Editing	allowed	not allowed
16 Character Delete	127 (DEL)	N/A
17 Line Delete	24 (CAN)	N/A
18 Line Display	18 (DC2)	N/A

18. 3274 Emulation

The 3274 Emulation service gives your system an interactive interface to host computers that are compatible with IBM's 370-type architecture. The service also emulates IBM's 3278-type display station, so that M4000-series terminals and ASCII terminals connected to your system can access the IBM host.

Configuring the 3274 Emulation

You use the 3274 Emulation service to define:

- cluster controller emulators (CCEs), which emulate the 3274 Cluster Controllers in an IBM system
- display emulators (DEs), which emulate the 3287 display stations in an IBM system.

After you configure the Cluster Controller Emulator and the Display Emulator, the initial software configuration of the computer communications facility is complete. Refer to other procedures in this section to modify the facility.

Once the computer communications facility has been configured using procedures in this module, other procedures are required to configure an application to use the Cluster Controller Emulator facility. These procedures are application-specific. Refer to 450-yyyy-310 and 450-yyyy-311 for the specific application.

Setting Up and Activating a 3274 Emulation Port

The following procedures describe how to add a new 3274 Emulation port on a DNC system. The procedures are:

- adding the Applications Processor for 3274 operation
- adding the necessary PRUs
- configuring the hardware for 3274
- configuring the CCE parameters
- configuring display ports and printer ports on a CCE
- configuring Display Emulators

Note: These procedures assume that any new hardware is completely installed according to 450-1011-201.

Adding an Applications Processor for 3274 Operation

You must configure at least one dedicated Applications Processor SRU for 3274 operation, and you can configure multiple dedicated SRUs if required. On the dedicated SRUs, there must be no PRUs other than those referred to ‘Adding the Necessary PRUs’, below.

To configure an Applications Processor SRU for 3274 operations, proceed as follows:

- (1) Sign on as the system administrator.

The main Menu appears.

- (2) Configure the Applications Processor for 3274 operation in its correct cabinet and slot in the software map. (See Part 6, ‘Configuring Shared Resource Units’, for detailed instructions.) There can be several Applications Processors dedicated to IBM 3274 operation, but each Applications Processor must be dedicated to 3274 operation - no unrelated PRUs can exist on it.

Adding the Necessary PRUs

The 3274 emulation requires a Host Agent (HAG) PRU, and Cluster Controller Emulator and Display Emulator PRUs.

- (1) Add the Host Agent (HAG) PRU to the Applications Processor. (See Part 7, ‘Configuring Program Resource Units’, for detailed instructions.) One instance of the HAG is required for each Applications Processor dedicated to IBM 3274 operation. If you configure multiple instances of HAG, assign to each one an object index unique among the HAG PRUs. Activate each HAG PRU.
- (2) Add one or more CCE PRUs to the Applications Processor. There are two types of CCE PRUs:
 - ‘IBM 3274 CCE - SNA’ (for a host of the SNA/SDLC type)
 - ‘IBM 3274 CCE - BSC’ (for a host of the bisynchronous type). See Part 7, ‘Configuring Program Resource Units’, for detailed instructions. At least one instance of the CCE PRU is required on each Applications Processor dedicated to 3274. If you configure multiple instances of CCE, assign to each one an object index unique among the CCE PRUs. The object indexes must be in the range 0 to 31.

Note: When you subsequently configure the CCE parameters, you enter the CCE PRU’s object index value in the Emulator Number field on the 3274 Emulation Menu.

- (3) Activate each CCE PRU.
- (4) Add one or more DE PRUs (‘IBM 3274 DE’) to the 3274 Applications Processor. See Part 7, ‘Configuring Program Resource Units’, for detailed instructions. At least one instance of the DE PRU is required on each Applications Processor dedicated to 3274. If you configure multiple instances of the DE PRU, assign to each one an object index unique among the DE PRUs. The object indexes must be in the range 0 to 31.

Note: When you subsequently configure the DE parameters, you enter the DE PRU's object index value in the Emulator Number field on the 3274 Emulation Menu.

- (5) Activate each DE PRU.

Configuring the Hardware for 3274

This procedure describes how to configure the system map for 3274 emulation. It assumes you understand how the system map works. (See Part 5, Overview of the System Map Utility, for further information.) This procedure also assumes that you have determined the ports to be used by the CCEs.

To configure the system map, you must add a LAN Interface Unit (LIU) and then configure the ports to be used by the CCEs. Proceed as follows:

- (1) Sign on as the system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select System Map and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) Press <Next Cabinet> repeatedly until you arrive at the Hardware Map screen for the cabinet containing the LANlink SRU to which the LAN Interface Unit (LIU) for 3274 is to be connected.
- (7) Use the arrow keys to select the LANlink SRU, and then press <Next Level>.

On the Hardware Map screen, the system displays a line list showing the devices connected to the lines of the LANlink SRU.

Steps 8 to 11 configure a LAN Interface UNIT (LIU) on a LANlink line.

- (8) Press <Insert Item>.

The system displays the Selection List screen.

- (9) Use the arrow keys to select 'LAN Interface Unit (LIU)', and then press <Select Item>.

The Hardware Map screen with the line list reappears. The newly selected LIU is listed in the lower portion of the screen, in the defined state. The cursor is prompting for a name.

- (10) Enter a name that helps define the LIU, such as '3274 LIU 1', and press RETURN.

The cursor moves to the right to prompt for a line number.

- (11) Enter the number of the LANlink line to which this LIU is to be connected and press ENTER.

The system refreshes the line list, placing the LIU in its assigned position. The LIU is still in the defined state.

Steps 12 to 19 designate the LIU port to be used by the CCE PRU.

- (12) Use the arrow keys to select the LIU and press <Next Level>.

The system displays the Port Map for the ports on the LIU.

- (13) Press <Insert Item>.

The system displays the Selection List screen, listing port personalities.

- (14) Use the arrow keys to select either 'LIU Port - Bisync' (if the line from the host is bisynchronous) or 'LIU Port - SDLC' and press <Edit Item>.

The system displays the Item Definition screen, where you can edit the object index of the selected port personality.

- (15) Press RETURN repeatedly until the cursor arrives in the Object Index field. Then enter in this field an object index value in the range 0 to 31. The object index value must be unique among port personalities of this type.

Note 1: For simplicity, make the port personality's object index the same as the CCE PRU's object index. (If another LIU port already has an object index value identical to that of the CCE PRU, then disregard this recommendation.)

Note 2: When you subsequently configure the CCE parameters, you enter the value of the LIU port's object index in the LIU Number field on the CCE Definition screen.

- (16) Press <Exit & Save Item>.

The system redisplay the Selection List screen, with the same port personality still selected.

- (17) Press <Select Item>.

The system redisplay the Port Map, with the selected port personality in the

lower portion on the screen, in the defined state. The cursor is prompting for a name.

- (18) Enter a suitable name (the default is '---') and press RETURN.

The cursor moves to the right, prompting for a port number.

- (19) Enter the port number and press ENTER.

The system redisplay the list of ports on the Port Map, with the new personality on its assigned port. The port is in the defined state.

Note: On an LIU used for 3274 connections, do not assign ports to any other equipment.

Steps 20 to 22 activate the LIU.

- (20) Press <Exit Level>.

The LANlink line list reappears on the Hardware Map screen.

- (21) Press <Change Softkeys>.

New softkeys appear.

- (22) Use the arrow keys to select the newly defined LIU, and then press <Change Status>.

The status of the LIU changes to active.

Steps 23 to 25 activate the port for the CCE PRU.

- (23) Use the arrows keys to select the LIU, and then press <Next Level>.

The system displays the Port Map for the LIU.

- (24) Press <Change Softkeys>.

New softkeys appear.

- (25) Use the arrow keys to select the CCE's port, and then press <Change Status>.

The status of the port changes to active.

- (26) To exit, press the <Exit> softkeys until you arrive at the main menu.

Configuring the CCE Parameters

After adding the PRUs and configuring the LIU and ports, you use the 3274 Configuration Utility to define the parameters of the CCEs and DEs. To define the parameters of a CCE, take the following steps:

The menu structure is shown in Figure 18-1. Proceed as follows:

- (1) Sign on as a system administrator.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

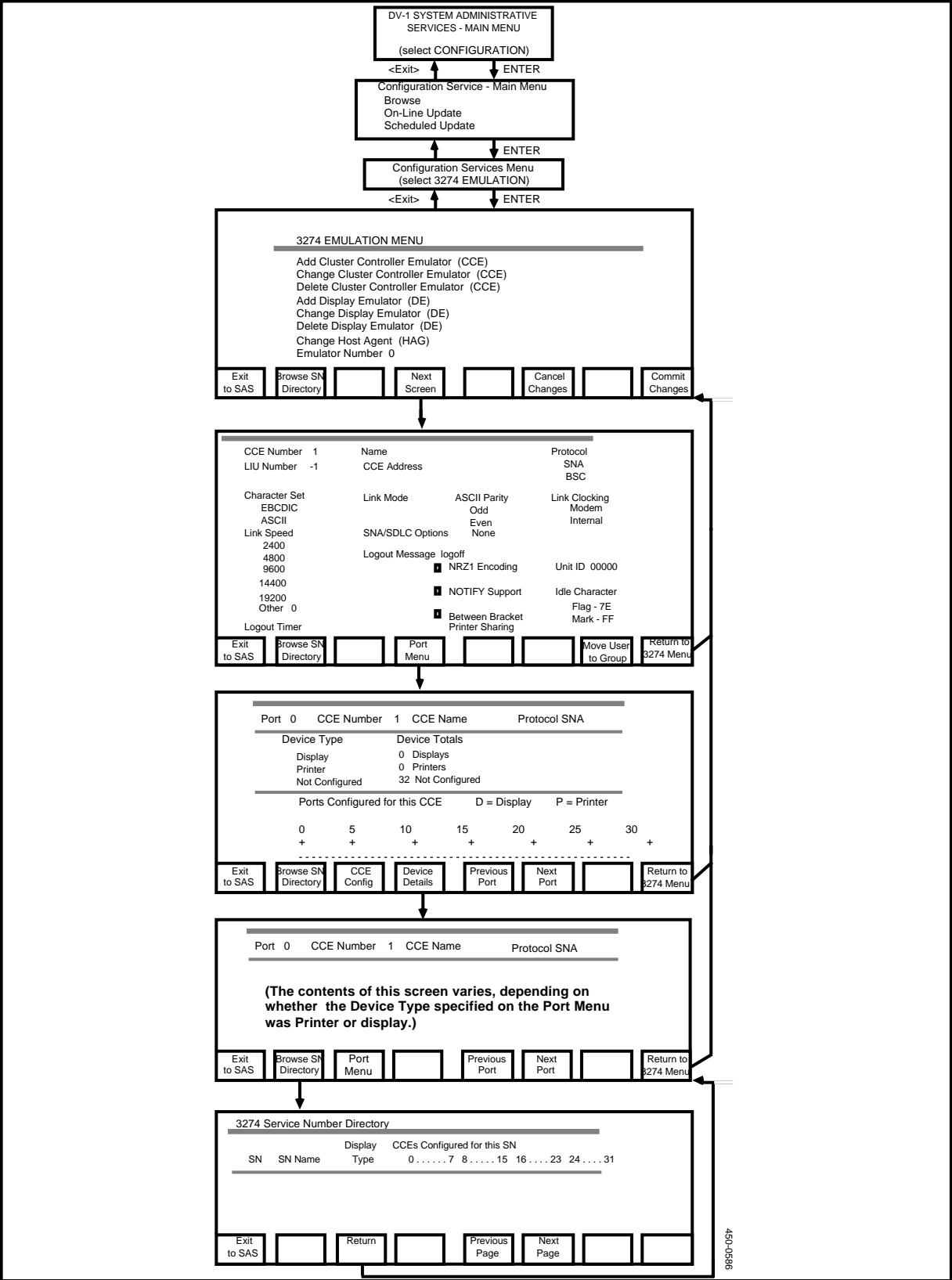
- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select 3274 Emulation, and press ENTER.

The system displays the 3274 Emulation Menu.

Figure 18-1
Menu Structure for CCE Configuration



9850-059

- (6) Use the arrow keys to select Add Cluster Controller Emulator (CCE), and then press RETURN.

The cursor moves to the Emulator Number field.

- (7) Enter the number of the CCE that is to be configured. (The emulator number must be identical to the object index of the CCE PRU being configured.) Then press <Next Screen>.

The system displays the CCE Definition screen (This can be recognized by the CCE Number field in its upper left corner.)

- (8) On the CCE Definition screen, type in the parameter values that apply to the host. (For information about the parameters, see Table 18-A.)

To advance from one field to the next, press RETURN.

To go back to the previous field, hold down the SHIFT key and press TAB.

To advance to the port menu, press <Port Menu>.

To quickly display a Service Number directory at any time, press <Browse SN Directory>.

To return to 3274 Emulation Menu, press <3274 Menu>. The system then redisplay the 3274 Emulation Menu, where you must press <Commit Changes> or <Cancel Changes>.

You can also exit by pressing <Exit to SAS>. This returns you to the 3274 Emulation Menu where you must commit or cancel the changes. After you commit or cancel, the system redisplay the Configuration Services Menu.

Table 18-A
CCE Definition Screen Parameters

This table describes the various parameters that define the operation of a CCE with a host. The CCE definition screen has fields in- which you can specify the values of these parameters. Before configuring a CCE, you should obtain the parameter values from the host and record them in the site records (450-1011-152).

FIELD	ENTRY
CCE Number	This is the value specified in the Emulator Number field on the previous screen, the CCE Definition screen. It must correspond to the value of the object index of the CCE PRU.
Name	An optional 20-character name. It is used only for ease of identification.
Protocol	Protocol used by the host. Use arrow keys to choose one of SNA (SDLC protocol, default) or BSC (bi-sync).
LIU Number	Enter the object index number (0 to 31) of the LIU port that is connected to the host. This value must be identical to the object index of the port personality of the LIU port that is used by the CCE PRU. The LIU number is used by the CCE PRU to find the LIU port going to the host.

Table 18-A Continued
CCE Definition Screen Parameters

FIELD	ENTRY
CCE Address	Two hexadecimal digits in upper case. Enter the address assigned to this link by the host. The range of addresses is 00 to FF if the protocol is SNA, 00 to 1F if the protocol is BSC.
Character Set	Use the arrow keys to select the character set (ASCII or EBCDIC) used by the host.
Link Mode	Use the arrow keys to choose Full Duplex or Half Duplex.
ASCII Parity	Use the arrow keys to choose odd, even, or no parity. This field is required only if the character set is ASCII.
Link Clocking	Use the arrow keys to select Modem (if clocking is to come from a modem) or Internal (if the DNC clock is to be used).
Link Speed	If Link Clocking is set to Internal, use the arrow keys to select the data rate on the link. If Link Speed is set to Other, enter the speed here. The range is 1 to 99999.
Logout Timer	No entry is required. Press RETURN to skip this field.
Logout Message	Enter up to two segments of up to 40 characters of text each, pressing RETURN to advance to the lower segment. This text will be displayed every time a user logs out of a 3274 3mulation session.
NRZI Encoding	If encoding is used, press the space bar to put an X in the field. To cancel encoding (and remove the X), press the space bar again.
NOTIFY Support	If the protocol is SNA and if the notify command is to be supported, press the space bar to put X in the field. To cancel this feature (and remove the X), press the space bar again.
Between Bracket and Printer Sharing	If the protocol is SNA and if local displays are to be able to access printers between jobs, press the space bar to put an X in the field. To cancel this feature (and remove the X), press the space bar again.
Unit ID	If the protocol is SNA, enter the five-character hexadecimal number (00000 to FFFFF, in upper case) to be used in SNA XID commands for this CCE. (XIDs are used only during connection to a dial-up host.) The Unit ID must match the BLK= operand of the Switched PU definition. The default Unit ID is 00000.
Idle Character	If the protocol is SNA, use the arrow keys to indicate the idle character used for this CCE. Verify that it is the same as the idle character that the host transmits. You can choose 'Flag-7E' or 'Mark-FF'.

Configuring Display Ports and Printer Ports on a CCE

To configure the ports on the CCE, you use the Port Menu and the Device Details screen. You access the Port Menu from the CCE Definition screen by pressing

<Port Menu>. On the Port Menu you specify which type of device, if any, is supported by each port on a CCE. There are 32 ports on a CCE, numbered 0 to 31. A CCE port can support a terminal or a printer.

Note 1: The ports on a CCE are virtual ports, and should not be confused with the LIU port that the CCE PRU uses for communication with the host.

Note 2: If you configure more than four CCE ports in a single session, then after committing every four ports, you should dump the temporary file used by the 3274 Configuration Utility. For detailed instructions, see 'Dumping the Temporary File', later in this part.

When the Port Menu first appears, it shows the CCE's number, name, and protocol. This information comes from the CCE Definition screen. The total number of displays and printers currently configured for the CCE and the number of available ports on the CCE (not configured) are shown under the Device Totals heading. You can see which type of device is currently supported by each port on the CCE by looking at the Ports Configured for this CCE display on the screen.

If you are adding this CCE, the information displayed under the Device Totals heading indicates that there are 32 ports not configured, and the Ports Configured for this CCE display will be blank. As you configure the ports, these fields change dynamically. The Ports Configured for this CCE field includes 32 spaces, numbered from 0 to 32, corresponding to the port numbers. As you configure the ports, the system displays D or P in the appropriate space to indicate whether the port's device type is Display or Printer.

To configure the CCE's ports, proceed as follows:

- (1) Starting on the CCE Menu, press <Port Menu>.

The system displays the Port Menu. (This can be recognized by the Port field in the upper left corner.)

On the Port Menu, press RETURN to advance from one field to the next, and hold down the SHIFT key and press the TAB key to move back to the previous field.

- (2) When the Port Menu appears, the cursor is prompting in the Port field. In this field, indicate the CCE port number by typing it in, or by using the <Previous Port> and <Next Port> softkeys to change the displayed port number. Then press ENTER.

The cursor moves to the Device Type field.

- (3) Move the cursor to the device type to be supported by this CCE port:
 - 'Display' for a terminal
 - 'Printer' for a printing device
 - 'Not Configured' (the default) if there is no device currently attached.

Then press ENTER.

If you choose Display or Printer as the device type, the system displays Device Details screen when you press ENTER.

- (4) In the fields on the Device Details screen, you enter the port-specific parameters. The information required on the Device Detail screen depends on whether you specify Printer or Display as the device type.

Device Details for the Display Device Type

For CCE ports whose device type is Display, the parameters on the Device Details screen are:

- (a) **Service Number (SN).** This is a number in the range 1 to 9999. A service number defines a hunt group. By assigning the same service number to several ports, you put all those ports in a single hunt group. When a user needs a port, he or she indicates a hunt group number, and the system assigns any available port from the hunt group. (Press <Browse SN Directory> at any time to see a list of existing service numbers.) After entering the service number, press ENTER. If it is a new service number, then you are defining it, and the system prompts you in the next field. If you enter a service number that is already defined, the system fills in the rest of the fields on the screen, and you cannot alter them.
- (b) **SN Name.** This is the name associated with the service number. Up to 20 characters are allowed. After typing in the name, press RETURN to move the cursor to the next field.
- (c) **Display Type.** This is the type of display emulation that is to be provided with this port. Move the cursor to the desired display type:
3277-2
3278-2
3278-2H
3278-3
3278-3H
3278-4
3278-4H
3278-5
3278-5H
3179-2B.

Note 1: If you use an ASCII terminal, you are allowed to use only the 3278-2 and 3278-2H display types. The other display types do not work with ASCII terminals, which display only 22 lines.

Note 2: If you need to access host applications that use color, define one or more CCE ports with a service number that has the 3179-2B display type, and then define a Display Emulator with that display type. (Display Emulators are discussed later in this part.) Both color and monochrome M4020 terminals can then use that service number to access the color applications.

Device Details for the Printer Device Type

For CCE ports whose device type is Printer, the parameters on the Device Details screen are:

- (a) **Printer Type.** Move the cursor to the type of printer emulation provided by this port. Valid options are 3287 (the default) and 3289. Press ENTER to advance to the next field.
- (b) **Print Mode.** This field indicates how this printer port is to be used. A printer port can support local copy from a terminal only (Local), host output only (System), or both (Shared). Move the cursor to the entry that indicates how the printer is to be used. The default is System. Press ENTER to advance to the next field.
- (c) **Printer Timeout.** Type in the number of minutes of inactivity that will cause the end of a direct-connect print job for the printer. The range is 0 to 1440, and the default is 1. If you specify 0, printing is spooled.
- (d) **Printer Name.** Type in the name of the printer. This establishes the specific printer to which 3274 output is to be sent.
- (e) **Job Name.** You may specify a name to be printed on the banner page of each print job sent to this printer. Up to six characters are allowed.
- (f) **Device Ports Authorized.** Toggle the space bar to indicate which display ports on the CCE are authorized to use this printer for output from the terminal (local copy). A checkmark in the box means yes. (An ASCII terminal displays an x in square brackets rather than a checkmark.) A blank means no. This field is valid only if the value of the Print Mode field is 'Local' or 'Shared'.
- (g) **Printer Classes.** Toggle the space bar to indicate which of the IBM 3274-defined classes this printer belongs to. A checkmark means the printer belongs to the class. (An ASCII terminal displays an x in square brackets rather than a checkmark)

After specifying values on the Device Details screen, you can exit from the screen as follows:

- (1) Press <Port Menu>.The system redisplay the Port Menu.
- (2) On the Port Menu, you can configure other ports.
- (3) When there are no more ports to be configured, you can exit by pressing <Return to 3274 Menu> on the Port Menu, and then pressing <Commit Changes> on the 3274 Emulation Menu.

Note 1: If more than four ports are to be configured in a session, the temporary file should be dumped after every three or four ports are committed. (See 'Dumping the Temporary File', in this part.)

Note 2: After configuring display ports on a CCE, you must also configure at least one Display Emulator (DE) to provide the interface between the CCE and the terminals in your system.

Configuring Additional CCEs

Other CCEs can be configured in the system, either for another host, or as a standby for an existing host, as follows:

- (a) If another host is to be added, configure a new LIU port. This step is not required for a standby CCE to be used for an existing host.
- (b) Configure a new CCE by repeating the steps in 'Configuring the CCE Parameters'.
 - For a standby CCE to be used on the same host, another instance of 'IBM 3274 CCE - SNA' or 'IBM 3274 CCE - BSC' should be added to the Applications Processor running the CCE PRU. In this case, only one of the CCE PRUs can be active at any time.
 - For a different CCE PRU to be used on a different host, a separate Applications Processor SRU should be added, and separate instances of the CCE and DE PRUs should be configured on this new Applications Processor. The new PRUs should have different object indexes from those on the first Applications Processor.

For each new CCE PRU, configure a separate port on a separate LIU.

Note: On an LIU used for 3274 connections, do not assign ports to any other equipment.

On an Applications Processor, only one CCE PRU can be active at any time, but CCE PRUs on different Applications Processors can be active at the same time.

Changing or Deleting a CCE

To change or delete a CCE, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select 3274 Emulation, and press ENTER.

The system displays the 3274 Emulation Menu.

- (6) Use the arrow keys to select Change Cluster Controller Emulator (CCE), or Delete Cluster Controller Emulator (CCE), and then press RETURN.

The cursor moves to the Emulator Number field.

- (7) Enter the number of the CCE. (The emulator number must be identical to the object index of the CCE PRU.)
- (8) If you are changing the CCE parameters, press <Next Screen>.

The system displays the CCE Definition screen, on which you can modify the parameters.

- (9) If you are changing the CCE parameters, then when you finish entering the changes, press <Return to 3274 Menu>.

The system redisplay the 3274 Emulation Menu.

- (10) On the 3274 Emulation Menu, press <Commit Changes>.

Configuring Display Emulators

A Display Emulator (DE) is a program that provides the interface between the CCE and the terminals in your system. When you configure the display emulator, you designate display types for terminal handlers. Each display emulator contains 32 terminal handlers, and there can be up to 32 Display Emulator PRUs in the system.

Each individual terminal handler provides the interface between a port on the CCE and a terminal. The terminal handlers are dynamically assigned when users request 3274 host sessions. You must define enough Display Emulator terminal handlers to support the maximum number of concurrent 3274 sessions.

The menu structure for configuring display emulators is shown in Figure 18-2.

To configure a display emulator (DE), take the following steps:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select 3274 Emulation, and press ENTER.

The system displays the 3274 Emulation Menu.

- (6) Use the arrow keys to select Add Display Emulator (DE), and then press ENTER.

The cursor moves to the Emulator Number field.

- (7) Enter the number of the DE that is to be configured. (The emulator number must be identical to the object index of the DE PRU being configured.) Then

press <Next Screen>.

The system displays the Display Emulator (DE) Configuration screen. (For information on the fields on this screen, see Table 18-B.)

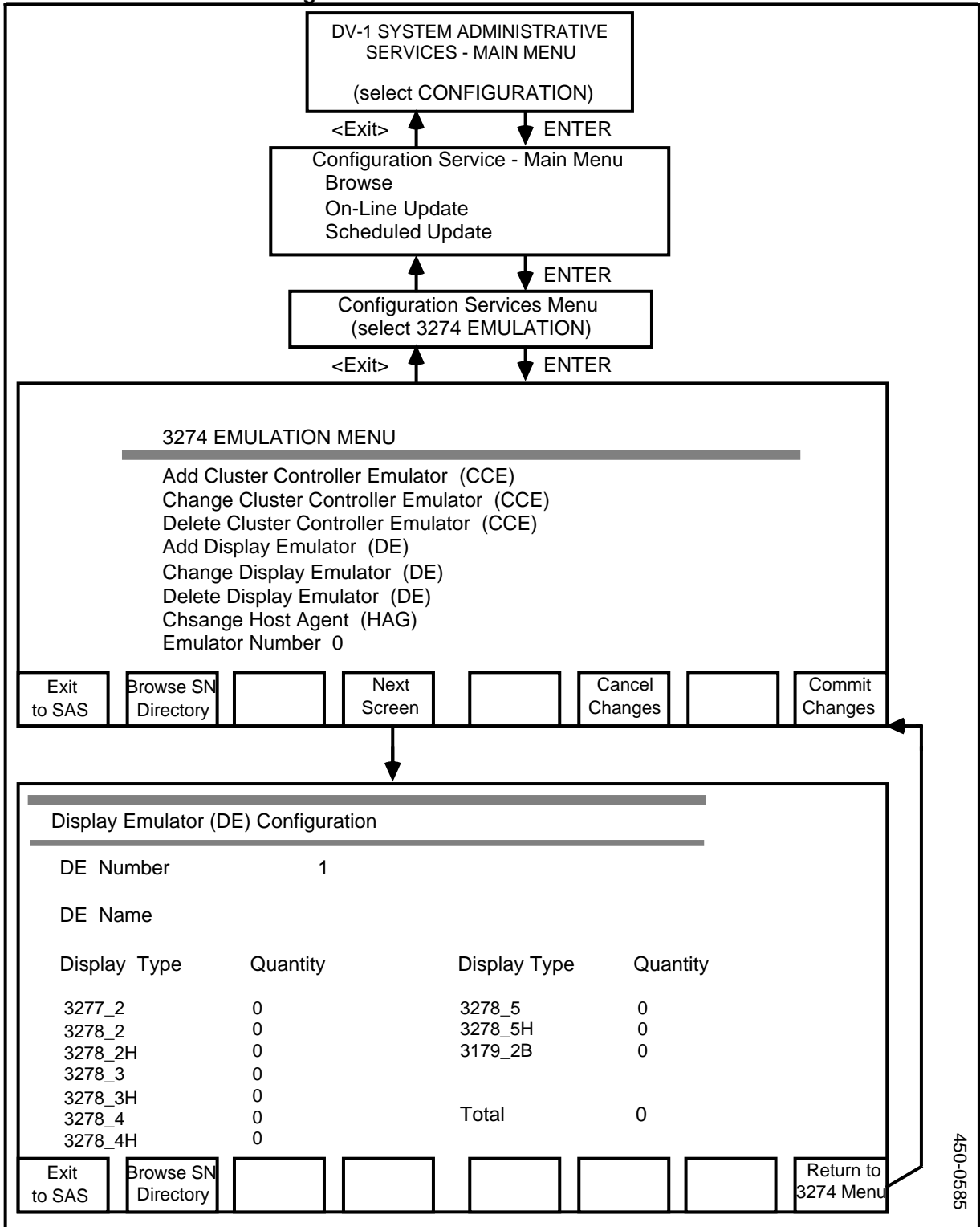
- (8) In the Quantity fields on this screen, specify how many of each type of terminal handler you need. For each display type there must be enough terminal handlers to accommodate the maximum number of concurrent 3274 sessions that will use the display type. Press RETURN to advance from one field to the next.
- (9) After specifying the necessary information, press <Exit to SAS>.

The system redisplay the 3274 Emulation Menu.

- (10) On the 3274 Emulation Menu, commit the changes by pressing <Commit Changes>, or cancel the changes by pressing <Cancel Changes>.

The system redisplay the Configuration Services Menu.

Figure 18-2
Menu Structure for DE Configuration



450-0585

Table 18-B
Display Emulator Parameters

A display emulator associates a display type with service numbers and ports. The Display Emulator Configuration screen has fields in which you can specify the values of these parameters.

FIELD	INFORMATION
DE Number	Shows the display-emulator number already associated with the port.
DE Name	Shows the display-emulator name already associated with the DE number.
Display Type	Use the arrow keys to select the type of display that is to be called up by this DE number: 3277-2 3278-2 3278-2H 3278-3 3278-3H 3278-4 3278-4H 3278-5 3278-5H 3179-2B

Changing or Deleting a Display Emulator (DE)

To change or delete a display emulator definition, take the following steps:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select 3274 Emulation, and press ENTER.

The system displays the 3274 Emulation Menu.

- (6) Use the arrow keys to select either Change Display Emulator (DE) or Delete Display Emulator (DE), and then press ENTER.

The cursor moves to the Emulator Number field.

- (7) Enter the number of the DE. (The emulator number must be identical to the object index of the DE PRU.)

- (8) If you are changing the definition, press <Next Screen>.

The system displays the Display Emulator (DE) Configuration screen, where you can change the contents of the Quantity fields.

- (9) After changing the definition, press <Return to 3274 Menu>.

The system redisplay the 3274 Emulation Menu.

- (10) Whether changing or deleting, press <Commit Changes>.

Service Numbers for 3274 Emulation

When you configure the virtual ports on a CCE, you give each port a service number, and you designate a display type for each service number. The user specifies a service number when he or she initiates a 3274 session, and the system allocates to the user a CCE port with the specified service number.

You can choose to assign the same service number to multiple CCE ports. By doing so, you group those ports into a 'hunt group'. Then, if the user specifies the hunt group's service number when initiating a 3274 session, the system scans ports in the hunt group, and allocates any available port from the group.

Deleting a Service Number

To delete a service number, access each port that has that service number, and deconfigure the port by selecting the Not Configured device type on the CCE Definition screen. Proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Select 3274 Emulation, and press ENTER.

The system displays the 3274 Emulation Menu.

- (6) Select Change Cluster Controller Emulator (CCE), and then press RETURN.

The cursor moves to the Emulator Number field.

- (7) Enter the number of the CCE whose ports have the service number. (The emulator number must be identical to the object index of the CCE PRU.) Then press RETURN.

- (8) On the 3274 Emulation Menu, press <Next Screen>.

The system displays the CCE Definition screen. (This can be recognized by the CCE Number field in the upper left corner.)

- (9) On the CCE Definition screen, press <Port Menu>.

The system displays the Port Menu. (This can be recognized by the Port field in the upper left corner.)

- (10) On the Port Menu, enter the number of the CCE port. Then press RETURN.

The cursor moves to the Device Type field.

- (11) To cancel the CCE port configuration, move the cursor to 'Not Configured' and then press <Return to 3274 Menu>.

The system redisplay the 3274 Emulation Menu.

- (12) Press <Commit Changes>.

Assigning a New Service Number

To assign a new service number to a CCE port that does not already have a service number, follow the instructions under 'Configuring Display Ports and Printer Ports on a CCE' and 'Device Details for the Display Device Type', earlier in this part.

To assign a new service number to a CCE port that already has a service number, proceed as follows:

- (1) Cancel the CCE port configuration as explained under 'Deleting a Service Number'.
- (2) On the 3274 Emulation Menu, select Change Cluster Controller Emulator (CCE) and press ENTER.

The cursor moves to the Emulator Number field.

- (3) Type in the emulator number. (The emulator number is identical to the object index of the CCE PRU.) Then press <Next Screen>.

The system displays the CCE Definition screen.

- (4) Reconfigure the port as explained under 'Configuring Display Ports and Printer Ports on a CCE' and 'Device Details for the Display Device Type', earlier in this part.

Inspecting the Service Number Directory

To view the directory of current service numbers, press <Browse SN Directory> on either the Port Menu or the Device Details screen.

The system displays the 3274 Service Number Directory screen. This is a display-only screen. For each service number, this screen displays:

- the service number
- the service number name
- the display type

- the CCE port (or ports) with this service number.

For information on the fields on this screen, see Table 18-C.

Table 18-C
Service Number Directory Information

Fields corresponding to these parameters can be found on the 3274 Service Number Directory screen. This screen is a quick reference for service number information. You cannot enter data on the screen. The field values are updated automatically, based on the information you enter on other screens.

FIELD	INFORMATION
SN	Shows all the service numbers currently defined for the system.
SN Name number.	Shows the name that has been entered in association with each service number.
Display Type	Shows the display type used by each service number.
CCEs Configured	Shows which of up to 32 ports in the system are associated with the service number. (There may be more than one.)

Dumping the Temporary File

When you use the 3274 Configuration Utility, the data that you enter remains in a temporary file until you exit as far as the System Administrative Services Main Menu. If the temporary file fills up while you are still entering data, the data will be lost. Therefore, it is a good idea to dump the temporary file periodically, such as when three or four ports have been configured in the same session. The procedure involves leaving the 3274 Configuration Utility, and exiting as far as the System Administrative Services Main Menu. (Subsequently, you can reenter the 3274 Configuration Utility.)

To dump the temporary file, proceed as follows:

- (1) If you are on a screen other than the 3274 Emulation Menu, press <Exit to SAS>.

The system redisplay the 3274 Emulation Menu.

- (2) On the 3274 Emulation Menu, commit the changes by pressing <Commit Changes>, or cancel the changes by pressing <Cancel Changes>.

The system redisplay the Configuration Services Menu.

- (3) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.
- (4) Select CONFIGURATION, and then press ENTER.

The system displays the System Administrative Service - Main Menu.

- (5) Use the arrow keys to select Online Update, and press ENTER.
The Configuration Services Menu appears.
- (6) Use the arrow keys to select 3274 Emulation, and then press ENTER.
The system displays the 3274 Emulation Menu.
- (7) Reaccess the screen that was on display when you started the procedure.

Deactivating and Activating CCE PRUs

This procedure describes how to deactivate one CCE PRU, and activate another one in its place.

Note: Ensure that no one is using the CCE PRU that is to be deactivated.

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.
The System Administrative Services Main Menu appears.
- (3) Select CONFIGURATION, and then press ENTER.
The Configuration Service - Main Menu appears.
- (4) Select Online Update or Scheduled Update, and then press ENTER.
The Configuration Services Menu appears.
- (5) On the Configuration Services Menu, select System Map, and press ENTER.
The system displays the Hardware Map screen for the SRUs in the first cabinet.
- (6) Display the Hardware Map screen for the cabinet containing the SRU that is the 3274 Applications Processor. You can use the following softkeys:
 - <Next Cabinet> displays the Hardware Map screen for the next higher-numbered cabinet. It wraps to the lowest-numbered cabinet after the highest-numbered cabinet.
 - <Previous Cabinet> displays the Hardware Map screen for the previous lower-numbered cabinet. It wraps to the highest-numbered cabinet after the lowest-numbered cabinet.
- (7) Select the SRU that is the 3274 Applications Processor, and press <Next Level>.
The system displays the Software Map screen, listing the PRUs that currently reside on the 3274 Applications Processor.
- (8) On the Software Map screen, use the arrow keys to select the CCE PRU whose state is to be changed, and press <Change Softkeys>.

New softkeys appear.

- (9) Press <Change Status>.

The status of the CCE PRU changes from defined to active, or from active to defined.

Supported and Unsupported Features for 3270 Emulation

Table 18-D sets out the 3270 features that are supported by the 3270 Emulation service, and those that are not supported.

Table 18-D
Supported and Unsupported Features for 3270 Emulation

FEATURE	DESCRIPTION
Features Supported by DNC:	
BSC Operation	-Speeds up to 14.4 K b/s
SDLC Operation	-Speeds up to 19.2 K b/s using RS-232-C anticipated up to 56 K b/s using V.35 -NRZ and NRZ1 encoding
SNA Operation	-Physical Unit type 2 -Logical Unit types 1, 2, and 3 -Configuration support levels A, B, or C -NOTIFY option -Inbound and Outbound Pacing -Maintenance Statistics -Automatic Session Recovery via ERP -Function Management Data for LU1
3270 Commands	-Read Modified -Read Modified All Read Buffer -Write -Erase Write -Erase Write Alternate -Write Structured Field -Erase All Unprotected -Copy (BSC only)

Table 18-D Continued
Supported and Unsupported Features for 3270 Emulation

FEATURE	DESCRIPTION
3270DS Orders	<ul style="list-style-type: none"> -Erase Unprotected to Address -Graphic Escape (does not cause alternate character selection) -Insert Cursor -Program Tab -Repeat to Address -Start Field -Start Field Extended -Set Attribute -Modify Field
SCS Orders	<ul style="list-style-type: none"> -BS, BEL, CR, ENP, FF, GE, HT, INP, IRS, LF, NL, SHF, SLD, SVF, TRN, VCS, VT
LU1 Characteristics	<ul style="list-style-type: none"> -Between-bracket printer sharing -SCS Data Stream
LU2 Characteristics	<ul style="list-style-type: none"> -24 PF keys -Typewriter keyboard -Display model 2 -Extended highlighting -SNA session switching between SSCP and PLU -Local Copy
LU3 Characteristics	<ul style="list-style-type: none"> -3270 data stream Formatted and Unformatted printouts Extended highlighting Buffer size of 4K bytes Between-bracket printer sharing
Features NOT Supported by DNC:	<ul style="list-style-type: none"> -Transparent mode (BSC Operation) -BSC text blocks over 4096 data bytes -Configuration support Level D -Color -APL/Text -Encrypt/Decrypt -Decompression -Programmed Symbols -SCS printer-to-host control communications -If an ASCII terminal is used, display types other than 3278-2 and 3278-2H -Special Application requests such as logical format storage, local data editing, screen partitioning.

3270 Key Emulations from ASCII Terminals

When you initiate a 3274 session from an ASCII terminal connected to a DNC, the system redefines the meaning of certain key sequences to allow you to access the full function set of the IBM host. Consequently, the key sequences normally used to emulate the keys of the M4000-series terminals do not operate as they do in other services.

Key Emulations for DNC Hardkeys

To emulate the hardkeys of an M4000-series terminal from an ASCII terminal in 3274 mode, use the key sequences shown in Table 18-E.

Key Emulations for IBM Terminal Features

If you initiate a 3274 session from an ASCII terminal connected to a DNC, the key sequences shown in Table 18-F allow you to access IBM terminal features.

Table 18-E
M4000 HARDKEY EMULATIONS IN 3274 MODE

M4000 HARDKEY	EQUIVALENT ASCII KEY SEQUENCE IN 3274 MODE
Hardkeys	
ACCEPT	BREAK a
ADJUST	BREAK d
CANCEL	BREAK x
CLOSE	BREAK l
COMMAND	BREAK c
HELP	BREAK h
ALT+HELP (service description help)	BREAK v
MAIN MENU	BREAK m
MEETING	BREAK t
PHONE	BREAK p
SHARE	BREAK s
WINDOW	BREAK n
SHIFT+WINDOW (window menu)	BREAK
Note: To enter a DNC command, press and release the BREAK key, then press the key that represents the command.	

Table 18-F
IBM TERMINAL KEY EMULATIONS IN 3274 MODE

IBM TERMINAL KEY	EQUIVALENT ASCII KEY SEQUENCE IN 3274 MODE
PF1	ESC 1
PF2	ESC 2
PF3	ESC 3
PF4	ESC 4
PF5	ESC 5
PF6	ESC 6
PF7	ESC 7
PF8	ESC 8
PF9	ESC 9
PF10	ESC 0
PF11	ESC minus
PF12	ESC equal
PF13	ESC shifted 1
PF14	ESC shifted 2
PF15	ESC shifted 3
PF16	ESC shifted 4
PF17	ESC shifted 5
PF18	ESC shifted 6
PF19	ESC shifted 7
PF20	ESC shifted 8

Table 18-F Continued
IBM TERMINAL KEY EMULATIONS IN 3274 MODE

IBM TERMINAL KEY	EQUIVALENT ASCII KEY SEQUENCE IN 3274 MODE
PF21	ESC shifted 9
PF22	ESC shifted 0
PF23	ESC underscore
PF24	ESC plus
PA1	ESC z or PF1
PA2	ESC x or PF2
Attention	ESC t
Clear	ESC Backspace or PF4
Device Cancel	ESC e
Dup	ESC u
Enter	Enter, Pad Enter
Erase EOF	ESC Delete
Erase Input	ESC Linefeed
ESC	ESC ESC
Field Mark	ESC f
Home	ESC h
Ident	ESC q
Insert	ESC Y
Newline	ESC Linefeed or ESC Return
Print	ESC w
Reset	ESC r
Sys Req	ESC s
Tab backward	ESC ,
Tab forward ESC	

Note: The shifted numeric keys must be selected from the main keyboard and not from the numeric keypad. The keys on the numeric keypad return special values on some terminals.

19. 3780 Remote File Transfer

The 3780 Remote File Transfer (RFT) feature provides batch file transfer capability between a local DNC system functioning as a 3780 terminal and a remote system. The remote system can be either a remote 3780 terminal, that is, another DNC, or a remote host.

The DNC and the remote system communicate using point-to-point Binary Synchronous Communications (BSC) protocol. The codeset, the transmission mode, record size, and other factors related to transmission are primarily controlled by configuration parameters entered on the RFT configuration screens

Working at a DNC, you can configure as many as 16 remote systems, and you can designate two of them as the active systems, that is systems with which the DNC can communicate. (At any one time, there can be no more than two active remote systems.)

How 3780 RFT Works

Once you have configured RFT on the local DNC, that DNC can function as a 3780 terminal, and can receive files from the active remote systems and send files to those remote systems.

When the DNC or a remote system has files to transmit, it requests control of a communication line. When it gains control of the line, it transmits the files. Transmission is half duplex, meaning that only the remote system or the DNC can send files at any one time.

Receiving Files from a Remote System

Once a remote system has gained control of the line, the DNC awaits the transmission. When the DNC receives files, it stores them in a receive file directory. There is a separate receive file directory for each remote system.

The remote system may send a device selection sequence at the beginning of the transmission to indicate whether the incoming data is in print or punch format. If the remote system does not specify print or punch format, the DNC uses the default parameter from the RFT configuration.

Received Files: Formats and Names

When a received file arrives in the receive file directory, the RFT feature assigns it a name derived from four pieces of information:

- the destination device (print or punch)

- the data type of the transmission (binary or text) specified by the remote system
- the job number
- the host number of the remote system.

The following table shows the names that would be assigned to job 5555 arriving from the remote system with host number 09.

Transmission Type	Host-specified Device Code	Receive Device	Print Spool	File Name
Nontransparent	DC1	Printer	No	TXT15555.09
Nontransparent	DC1	Printer	Yes	SPL15555.09
Nontransparent	DC2	Punch		TXT25555.09
Nontransparent	DC3	Punch		TXT35555.09
Nontransparent	Not specified	Punch		TXT05555.09
Nontransparent	Not specified	Printer	No	TXT05555.09
Nontransparent	Not specified	Printer	Yes	SPL05555.09
Transparent		Punch		TRN05555.09

The RFT feature creates names for incoming files according to the following rules.

Characters 1 to 3. If the data is transparent (that is, binary), the first three characters are TRN. If the data type is nontransparent (that is, text), the first three characters of the file name are:

- SPL if direct print spooling has been enabled
- TXT if direct print spooling has not been enabled.

Character 4. The fourth character is a digit referring to the destination device. For transparent (binary) files, the digit is always 0 because the remote system cannot specify the receiving device of a transparent transmission. For nontransparent (text) files, the fourth digit can be:

- 0, indicating that the remote system did not specify a receiving device type
- 1, indicating that the remote system specified device 1, the printer
- 2 or 3, indicating that the remote system specified device 2 or 3, the punch.

When the remote system does not specify the receiving device type, the device is the default device specified in the RFT configuration.

Characters 5 to 8. The fifth to eighth characters of the file name represent the job number.

Character 9. The ninth character of the file name is a period (.).

Characters 10 to 11. The last two characters of the file name represent the host number assigned to the remote system in the RFT configuration.

If you have enabled print spooling of received files (by setting a parameter in the RFT configuration), then an incoming nontransparent file will be given a name beginning with SPL if its receive device is the printer. The SPL file is placed in the

RFT receive directory for the remote system, and is enqueued for printing on a print queue. After the file has been printed, it is deleted.

Note: For more information on transparent and nontransparent transmission, see ‘Transparent and Nontransparent Transmission’, later in this part.

Sending Files to a Remote System

When the DNC sends files to a remote system, it sends them as jobs. A single job can be composed of one to six files. When you want to send files to a remote system, you must initiate the RFT Command Interpreter and enter a command statement. This statement contains the name of the host and the names of the files. (Note that the RFT Command Interpreter and its commands are discussed in detail later in this part.)

The RFT software then reads the files into one job file and places the job file in the transmit queue for the remote system. The DNC then requests control of the line to the remote system. When it gains control of the line, it transmits the the job to the remote system according to the configuration parameters for that system.

Jobs are transmitted on a first-in/first-out basis. Each time the DNC finishes transmitting a job, the line is released. If there is another job in the transmit queue, the DNC must request control of the line again.

Transparent and Nontransparent Transmission

Files can be transferred between the DNC and the remote system in two modes:

- transparently, that is, as unaltered binary data
- nontransparently, that is, as text data containing control codes.

Transparent Transmission is for binary data. The following conditions must exist:

- The sending system specifies that the file is binary.
- The character set specified in the RFT configuration must be EBCDIC.
- The sending system must select binary synchronous communication (BSC) transparency. The remote host does so by sending a code that precedes the transmission. For the DNC, you specify BSC transparency in the RFT configuration.

In transparent transmission, the data is transmitted exactly as it is found in the file. No ASCII or EBCDIC translation is done, and data characters are not converted in any way.

Nontransparent transmission is for text data. Data is treated as text if the sending system does not specify that the file is binary. The system translates between ASCII and EBCDIC if the two systems are using different character sets. The system also does code substitution so that the data contains the suitable end-of-record codes.

Configuring 3780 RFT

To set up the 3780 Remote File Transfer feature, you must use two of the services listed on the Configuration Services Menu: the System Map service and the Remote File Transfer service. In the system map, you configure the program resource units (PRUs) that do the work of transferring files, and a dedicated port for each remote system. In the Remote File Transfer service, you declare a name for each remote system, and link each name to a specific 3780 driver PRU and to a specific port. Thereafter, when you enter a SEND command to send files to a remote system, the DNC knows which driver PRU and which port to use.

The PRUs for Remote File Transfer are:

- (a) **Remote File Transfer.** This is the master program that keeps track of the configured remote systems and manages a transmit queue for each one.
- (b) **RFT Command Interpreter.** This is the program that accepts the RFT commands that you enter and forwards them to the RFT 3780 Service Driver.
- (c) **RFT 3780 Service Driver.** This is the program that does the sending and receiving of files. You must configure a separate instance of this PRU for each remote system.

All the RFT PRUs must reside on a single Applications Processor (AP) SRU.

When you configure RFT to permit file transfers between a DNC and one or more remote systems, your activities can be separated into certain major steps. Those steps are listed below, in the recommended sequence of execution. (Note that detailed instructions for carrying out each major step are found in later sections of this discussion.)

- For each remote IBM host, contact the computer operations staff who are responsible for the remote host. Arrange to have a port on each remote host allocated for remote file transfer. Determine the name of each port, and arrange to have the proper software downloaded to each port.
- Verify that the Host Agent (HAG) PRU is configured on your system, and add it if it is lacking.
- Verify that the Remote File Transfer service is listed on the Configuration Services Menu. If it is not on the menu, you can activate the service so that it will appear there.
- For each remote system, you must configure an instance of the 3780 Service Driver PRU. The object index of each instance of the driver PRU must match the host number of the remote system that the PRU will access. Host numbers are integers in the range 0 to 15, and are shown on the Host Name Menu. If you have previously configured remote systems, you should start the Remote File Transfer service, access the Host Name Menu, and determine which host numbers are still available.
- To communicate with a remote system, you must configure a dedicated LIU port. Each dedicated port must have a bisynchronous-communications port personality with an object index that is different from the indexes assigned to any other such port personalities. To ensure that you choose a unique value

for the object index, you can sign on to the DNC as a system administrator and scan the object indexes of any previously configured bisynchronous-communications port personalities.

- Enter the system map information to configure the RFT program resource units (PRUs). Edit the object index of each instance of the 3780 Service Driver PRU to match the host number that will be assigned to the associated remote system. Then activate the PRUs.
- Enter the system map information to configure the port personality of the LIU ports that the DNC will use for remote file transfers. Assign a unique object index to the port personality of each dedicated port. Then activate each port.
- Enter the RFT configuration information to define each remote system, and then designate which remote systems will be active. (At any one time, no more than two remote systems can be active.)

Ensuring that the Host Agent PRU is Active

The Host Agent PRU must be configured and active before you can use RFT.

If another data communications service (such as 3274 Emulation) is configured on the system, then the Host Agent is already active. If you know that the Host Agent is already configured and active, skip these instructions and proceed to 'Ensuring that the Remote File Transfer Option Is Available'. Otherwise, take the following steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, press <Next Cabinet> repeatedly until the system displays the Hardware Map screen for the cabinet containing the Applications Processor for the Host Agent PRU.
- (7) Use the arrow keys to select the Applications Processor, and press <Next Level>.

The system displays the Software Map screen, listing the PRUs that are

configured for the Applications Processor.

If the Host Agent PRU is not yet configured, proceed to Step 8. If the PRU is already configured but is not in the active state, proceed to Step 11. If the PRU is configured and active, proceed to Step 13.

- (8) Press <Insert Item>.

The system displays the Selection List screen.

- (9) Use the arrow keys to select Host Agent, and press <Select Item>.

The system redisplay the Software Map screen, with the newly selected PRU at the bottom of the screen, in the defined state. The system is prompting for a name.

- (10) Type in a name, press RETURN twice, and then press ENTER.

The system redisplay the list of PRUs, with the Host Agent PRU in the defined state.

- (11) Use the arrow keys to select the Host Agent PRU, and press <Change Softkeys>.

New softkeys appear.

- (12) Press <Change Status>.

The previous softkeys reappear. The status of the Host Agent PRU changes to active.

- (13) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Ensuring that the Remote File Transfer Option Is Available

To check that the Remote File Transfer option is listed on the Configuration Services Menu, proceed as follows:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Check that Remote File Transfer is listed on the menu. If so, you can proceed to Step 5 under the heading 'Checking the Available Host Numbers'.

If the option is not on the menu, then press <Define Services>.

The system displays the Configuration Services Definition screen.

- (6) On the Configuration Services Definition screen, press <Next Service> repeatedly until you arrive at a screen on which the value of the Display Name field is Remote File Transfer.

When you arrive at this screen, the cursor is prompting in the box in the Display? field.

- (7) Specify that the option should appear on the menu, by pressing the space bar.

A checkmark appears in the box in the Display? field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

- (8) Press <Save Changes>.

The system displays a message stating that the changes have been saved.

- (9) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the changes on disk, and ensures that the Remote File Transfer option will appear on the Configuration Services Menu when you next initiate the configuration services screens.
- (10) On the System Administrative Services - Main Menu, select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (11) Select Online Update and press ENTER.

The system displays the Configuration Services Menu, which now includes the Remote File Transfer option.

Checking the Available Host Numbers

The object index of each instance of the 3780 Service Driver must match the value assigned as the host number of the remote system. The possible host numbers are 0 to 15. If no remote systems have previously been configured for the DNC, then all the host numbers are available. In this case, you can skip these instructions and assign host numbers arbitrarily. If some have already been configured for the DNC, you can take the following steps to determine which host numbers are still available:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Browse and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select Remote File Transfer and then press ENTER.

The system displays the RFT Master screen.

- (6) Press <Configure Host Menu>.

The system displays the Host Name Menu. On this screen, the available host numbers are those that do not have host names beside them.

Checking Object Indexes of Existing Port Personalities

Remote file transfer between the DNC and the remote system requires a dedicated port on a LAN Interface Unit (LIU). The object index of the port personality of each dedicated port must be unique, that is, the number assigned must be different from any other used with a port running a bisynchronous communications personality. To check the object indexes of previously configured port personalities, take the following steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Browse and press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, press <Next Cabinet> repeatedly until the system displays the Hardware Map screen for the cabinet containing the LANlink SRU to which an LIU is attached.
- (7) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

On the Hardware Map screen, the system displays a line list, listing the devices that are attached to the lines of the LANlink.

- (8) Port personalities for RFT are found in LIUs of type 'LAN Interface Unit (LIU)'. If such an LIU is connected to one of the lines of the LANlink, use the arrow keys to select the LIU, and press <Next Level>.

The system displays the Port Map for the LIU.

- (9) Port personalities for RFT are of type 'LIU Port - Bisync'. Look for such port personalities in the Program Type column. If any such port has previously been configured for remote file transfer, then in accordance with the naming convention recommended in this manual, the name of its port personality (listed in the Program Name column) should include the object index, as in RFT-PORT-83. Take note of all such names.

Note: The DNC can have up to 12 LANlink SRUs, each with one or more LIUs. You should check the ports on every LIU of type 'LAN Interface Unit (LIU).'

Configuring the RFT PRUs

Three program resource units (PRUs) are required for the RFT feature:

- **Remote File Transfer** (one instance)
- **RFT Command Interpreter** (one instance)
- **RFT 3780 Service Driver** (one instance for each configured remote system).

All these PRUs must reside on a single Applications Processor (AP) SRU.

To configure the RFT PRUs, take the following steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update, and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, press <Next Cabinet> repeatedly until the system displays the Hardware Map screen for the cabinet containing the Applications Processor SRU on which the RFT PRUs are to reside.

- (7) Use the arrow keys to select the Applications Processor SRU and then press <Next Level>.

The system displays the Software Map screen, listing any PRUs that already reside on the Applications Processor.

- (8) On the Software Map screen, press <Insert Item>.

The system displays the Selection List screen.

- (9) On the Selection List screen, use the arrow keys to select Remote File Transfer, and then press <Select Item>.

The system redisplay the Software Map screen. The newly selected PRU appears in the lower portion of the screen, and is in the defined state. The system is prompting for a name.

- (10) Type in the name, press RETURN twice, and then press ENTER.

The newly defined PRU appears in the list in the upper portion of the screen, in the defined state.

- (11) On the Software Map screen, press <Insert Item>.

The system displays the Selection List screen.

- (12) On the Selection List screen, use the arrow keys to select RFT Command Interpreter, and then press <Select Item>.

The system redisplay the Software Map screen. The newly selected PRU appears in the lower portion of the screen, and is in the defined state. The system is prompting for a name.

- (13) Type in the name, press RETURN twice, and then press ENTER.

The newly defined PRU appears in the list in the upper portion of the screen, in the defined state.

- (14) On the Software Map screen, press <Insert Item>.

The system displays the Selection List screen.

- (15) On the Selection List screen, use the arrow keys to select RFT 3780 Service Driver, and then press <Edit Item>.

The system displays the Item Definition screen.

- (16) On this screen, you must change the value of the object index to make it match the value of the host number that will be assigned to the remote system. (Host numbers are shown on the Host Name Menu.) Press TAB repeatedly, to advance to the Object Index field, and enter the required value. Then press <Exit and Save Item>.

The system redisplay the Selection List screen, with 3780 Service Driver selected.

- (17) Press <Select Item>.

The system redisplay the Software Map screen. The newly selected PRU appears in the lower portion of the screen, and is in the defined state. The system is prompting for a name.

- (18) Type in the name. The name should include the object index, for example, RFT-DRIVER-0. After typing in the name, press RETURN twice, and then press ENTER.

The newly defined PRU appears in the list in the upper portion of the screen, in the defined state.

While on the Software Map screen, you can put the RFT PRUs into the active state. Repeat Steps 19 to 21 for each of the PRUs:

- (19) Use the arrow keys to select the PRU.

- (20) Press <Change Softkeys>.

New softkeys appear.

- (21) Press <Change State>.

The state changes to active.

- (22) After configuring and activating the RFT PRUs, exit by pressing the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the new information on disk.

Configuring the LIU for RFT

Remote file transfer between the DNC and the remote system requires a dedicated port on a LAN Interface Unit (LIU). You must configure the LIU to have the proper

software downloaded into it, and you must specify the proper port personality for the dedicated port.

Note: If a suitable LIU has already been configured, skip these instructions and go to 'Configuring the DNC Port for RFT'.

To configure the LIU for RFT, take the following steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update, and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, press <Next Cabinet> repeatedly until the system displays the Hardware Map screen for the cabinet containing the LANlink SRU to which the LIU is to be attached.

- (7) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

On the Hardware Map screen, the system displays a line list, listing the devices that are attached to the lines of the LANlink.

- (8) Press <Insert Item>.

The system displays the Selection List screen.

- (9) On the Selection List screen, use the arrow keys to select LAN Interface Unit (LIU), and then press <Select Item>.

The system redisplay the line list on the Hardware Map screen. The newly selected LIU is in the lower portion of the screen, and is in the defined state. The cursor is to the right, prompting for a name.

- (10) Enter the name and press RETURN.

The cursor moves to the right, to prompt for a line number.

- (11) Enter the line number and press ENTER.

The newly selected LIU appears in the line list in the upper portion of the screen, in the defined state.

Activating the LIU

To activate the LIU, take the following steps:

- (1) Starting on the line list on the Hardware Map screen, press <Change Softkeys>.

New softkeys appear.

- (2) Use the arrow keys to select the LIU, and then press <Change Status>.

The LIU changes to the active state. The previous softkeys reappear.

Note: If you intend to proceed directly to define a port for RFT, skip to Step 8 under 'Configuring the DNC Port for RFT'.

Configuring the DNC Port for RFT

To configure a port on that LIU for remote file transfer, follow these steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update, and then press ENTER.

The system displays the Configuration Services Menu.

- (5) Select System Map, and press ENTER.

The system displays the Hardware Map screen, listing the SRUs in the first cabinet.

- (6) If necessary, press <Next Cabinet> repeatedly until the system displays the Hardware Map screen for the cabinet containing the LANlink SRU to which the LIU is attached.

- (7) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

On the Hardware Map screen, the system displays a line list, listing the devices that are attached to the lines of the LANlink.

- (8) On the line list, use the arrow keys to select the line for the LIU, and then press <Next Level>.

The system displays the Port Map for the LIU.

Note: If you have just configured the LIU, there will be no ports listed as yet.

- (9) Press <Insert Item>.

The system displays the Selection List screen, listing the types of port personalities that can be specified for ports on the LIU.

- (10) Use the arrow keys to select LIU Port - Bisync, and then press <Edit Item>.

The system displays the Item Definition screen, where you can edit the object index of the selected port personality.

- (11) Press RETURN repeatedly until the cursor arrives in the Object Index field. Then enter in this field a value that is unique among port personalities used for remote file transfer. (You will have to enter the same value in the LIU Number field on RFT Host Screen #1. See Step 5 under 'Entering the RFT Parameters'.)

Note: For the object index, you can enter a value up to 98. When configuring ports for RFT, it is a good idea to start with 98 and work backwards. This minimizes the possibility that another bisynchronous port will have an object index identical to that of an RFT port.

- (12) Press <Exit & Save Item>.

The system redisplay the Selection List screen, with the same port personality still selected.

- (13) Press <Select Item>.

The system redisplay the Port Map. The newly selected port personality is in the lower portion of the screen, and the cursor is prompting for a name.

- (14) Type in the port name. The name should include the object index, as in RFT-PORT-83. After typing in the name, press RETURN.

The cursor moves to the right, prompting for a port number.

- (15) Type in the port number, and press ENTER.

The newly defined port personality appears in the upper portion of the screen, in the defined state.

Steps 16 and 17 activate the port.

- (16) Starting on the Port Map, use the arrow keys to select the RFT port, and press <Change Softkeys>.

New softkeys appear.

- (17) Press <Change Status>.

The status of the port changes to active. The previous softkeys reappear.

- (18) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the new information on disk.

Entering the RFT Configuration Information

The RFT configuration information includes specifications of the number of users who can use the RFT feature simultaneously, and specifications describing the data link and the transmit and receive parameters.

To enter RFT configuration information, you must use the Remote File Transfer option on the Configuration Services Menu in the System Administration screens.

The menu structure is shown in Figures 19-1 and 19-2.

Menu Level Access

To access the screens where you enter the RFT configuration information, take these steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update, and then press ENTER.

The system displays the Configuration Services Menu.

Note: If the Remote File Transfer option is lacking from the Configuration Services Menu, add it by following the steps under 'Ensuring that the Remote File Transfer Option Is Available', earlier in this part.

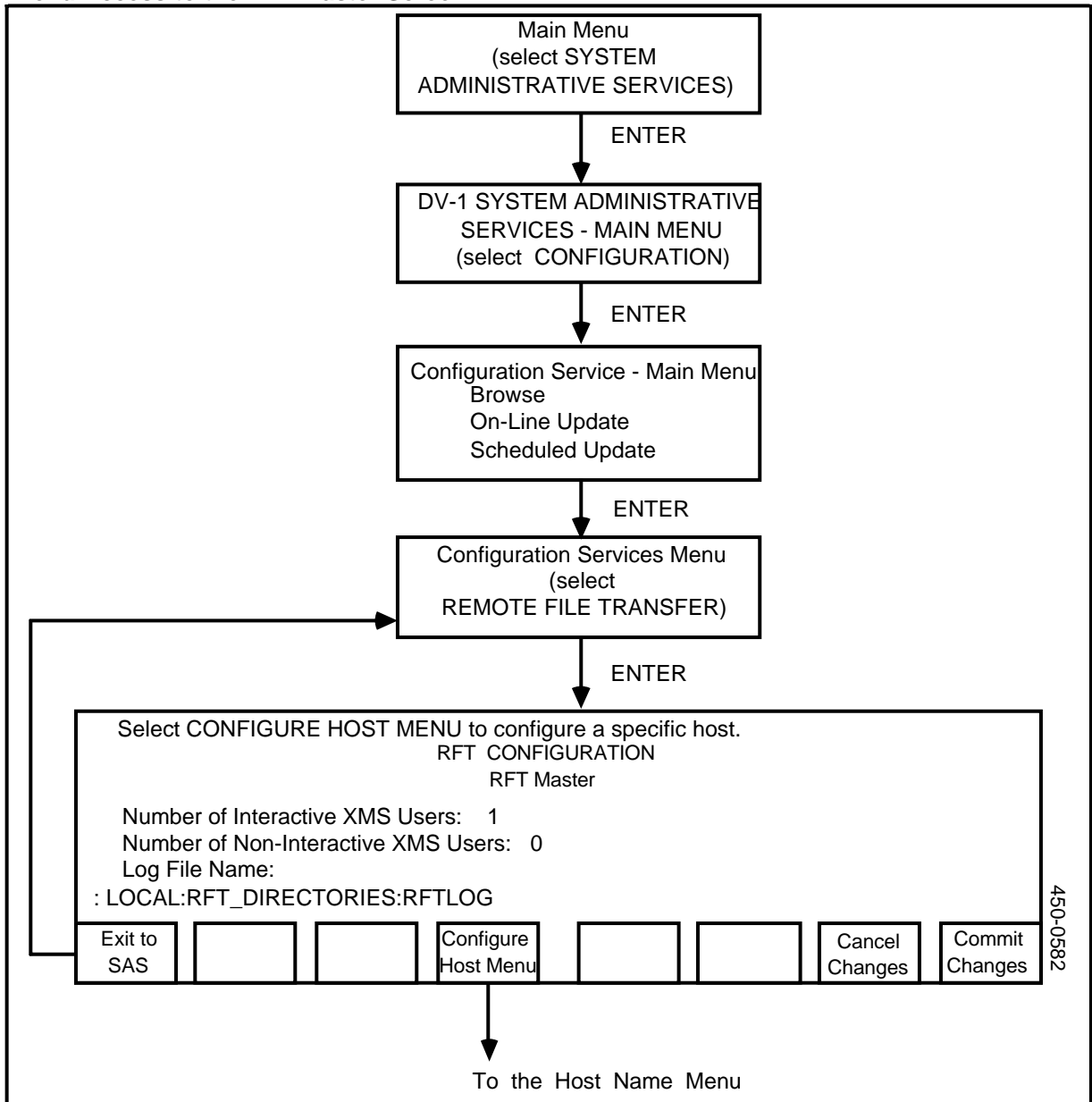
Entering the RFT Parameters

You enter the RFT parameters on the RFT Configuration screens. To enter the parameters, take the following steps:

- (1) Starting on the Configuration Services Menu, use the arrow keys to select Remote File Transfer and then press ENTER.

The system displays the RFT Master screen (see Figure 19-1).

Figure 19-1
Menu Access to the RFT Master Screen

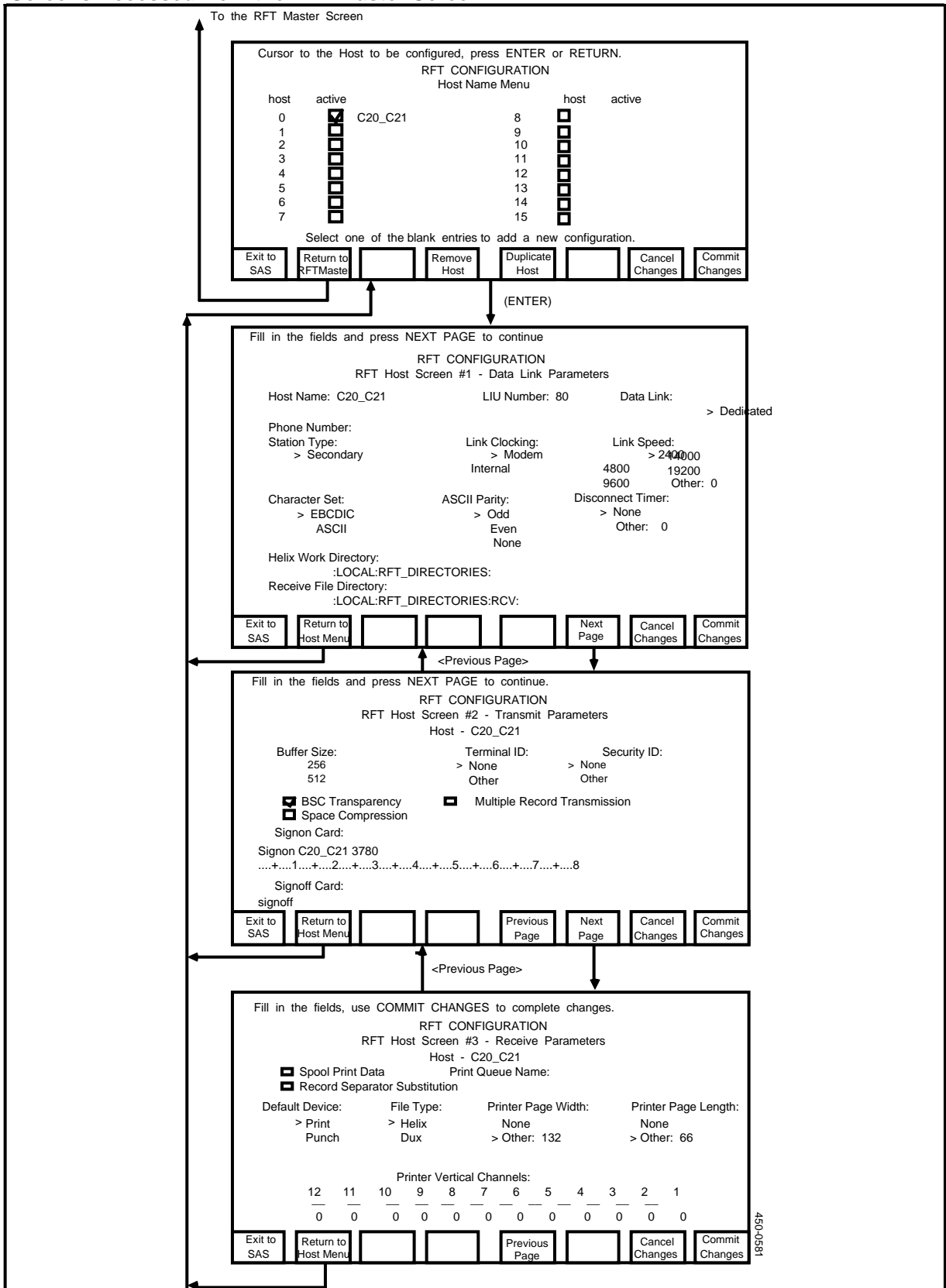


- (2) On the RFT Master screen, enter the parameters for the Remote File Transfer PRU. For each of the displayed fields, a default value is displayed. If the default value is acceptable, leave it unchanged. To change a default value, just type in the new value over the default. To advance from field to field, press TAB. To move to the previous field, hold down the SHIFT key and press TAB. The fields on the screen are:
- **Number of Interactive XMS Users.** This is the maximum number of users that can use the RFT CLI at one time. The range of acceptable values is 1 to 32, and the default is 32.

- **Number of Non-Interactive XMS Users.** The value of this parameter should be zero. (The field is for a future enhancement to the RFT feature.)
 - **Log File Name.** This is the file to which RFT log messages will be written. The default is :LOCAL:RFT:RFTLOG. You can enter a file name ranging in size from 4 to 80 characters. If the file does not exist, the Remote File Transfer PRU creates it.
- (3) After entering the values on the RFT Master screen, press <Configure Host Menu>.

The system displays the Host Name Menu (see Figure 19-2). This screen displays the host names and the numbers of remote systems, and shows which remote systems are currently active (that is, in communication with the DNC). You can configure as many as 16 remote systems, but there can be no more than two active remote systems at any one time.

Figure 19-2
Screens Accessed from the RFT Master Screen



- (4) On the Host Name Menu, there are fields numbered from 0 to 15. The names of configured remote systems appear in these fields. Press TAB to select an unused field, and then press ENTER or RETURN.

The system displays RFT Host Screen #1, listing data link parameters.

- (5) Enter values for the parameters on RFT Host Screen #1.

To advance from field to field on this screen, press TAB. To move to the previous field, hold down the SHIFT key and press TAB. Some of the fields require you to type in parameter values. Other fields enable you to choose values by using the arrow keys.

The fields on the screen are:

- **Host Name.** The name can be 1 to 16 characters. Each host name must be unique. The host name is converted to uppercase during configuration. No space characters are allowed in a host name. There is no default.

Note: For a single remote system, you can configure two or more host names, and assign different parameters to each logical system. Then the differing logical host names make it possible for different users to access the same remote system in different ways.

- **LIU Number.** The value in this field is the means by which the DNC associates the host name with a specific LIU port. The LIU number must be identical to the value of the object index of the port personality of the LIU port that is dedicated to the remote system. In this field the DNC accepts values in the range 0 to 98. The default value is 99.
- **Data Link.** Use the arrow keys to choose either Dedicated (the default) or Dial Up.
- **Phone Number.** If the data link is a dial-up link, then you must specify a phone number to be used to dial the host. The number can be 1 to 32 characters. There is no default.
- **Station Type.** You can choose either Primary or Secondary (the default). The DNC and the remote system must have differing station types. For example, if the remote system is configured as the primary station, the DNC must be the secondary station. If a primary and secondary station are both requesting the use of a communication line, the primary station has priority. In a contention situation, the primary station reissues its request for the line every second, but the secondary station reissues its request every three seconds.

If the remote system is an IBM mainframe, it is usually configured as the primary station, and the DNC is usually configured as a secondary station.

- **Link Clocking.** You can choose either Modem (the default) or Internal. Modem specifies that the LIU is to emulate Data Termination Equipment (DTE) and that the modem will provide the link clocking. Internal specifies that the LIU is to emulate Data Communication Equipment (DCE) and is to supply the clock pulse.

Note: Specially wired RS-232-C cable connectors are required for the internal clocking feature.

- **Link Speed.** If the value of the Link Clocking parameter is Internal, then you must specify the link speed, which is the bit rate of the internal clock. You can choose 2400, 4800, or 9600. Alternatively, you can choose Other, and specify either 0 or a speed in the range 110 to 9600. (The rates above 9600 that are displayed are for future enhancements.) The default is 0.
- **Character Set.** You can choose either EBCDIC (the default) or ASCII. If EBCDIC is selected, nontransparent data transmitted by the DNC is translated from ASCII to EBCDIC, and received data is translated from EBCDIC to ASCII. If you intend to transmit data transparently, you must choose ASCII. (For more information, see 'Transparent and Nontransparent Transmission', earlier in this part.)
- **ASCII Parity.** If the value of the Character Set parameter is ASCII, then you can specify the parity. You can choose Odd (the default), Even, or None.
- **Disconnect Timer.** On a dial-up link, the disconnect timer disconnects the user from the remote system after the data link has been idle for a certain length of time. The value in this field specifies the length of time in minutes. You can enter 0, which disables the disconnect timer, or a value in the range 1 to 255. The default is 3.
- **Helix Work Directory.** The Helix work directory is the receive backup directory. Received files are placed in this directory if the receive directory file server is unavailable. (This is useful if the receive directory is on a file server other than :LOCAL.)

The Helix work directory is also the directory from which files are normally sent to remote systems. You can send a file from any directory by specifying the path name in the SEND command. (See 'The SEND Command', later in this part.) However, if you specify only the file name in the SEND command, the RFT feature expects to find the file in the Helix work directory. The default is:

:LOCAL:RFT_DIRECTORIES:

- **Receive File Directory.** Files received from the remote system are placed in the receive file directory. In this field you must specify a Helix path name. You can enter 2 to 80 alphanumeric characters to specify the directory. The specified path must include the file server name on which the directory exists, such as :LOCAL:. The default is:

:LOCAL:RFT_DIRECTORIES:RCVnn: where nn is the host number.

- (6) After specifying values for the data link parameters listed on RFT Host Screen #1, press <Next Page>.

The system displays RFT Host Screen #2, listing transmit parameters.

- (7) Enter values for the parameters on RFT Host Screen #2.

To advance from field to field on this screen, press TAB. To move to the previous field, hold down the SHIFT key and press TAB. Some of the fields

require you to type in parameter values. Other fields enable you to choose values by using the arrow keys. The fields on the screen are:

- **Buffer Size.** This is the size of the buffers that are used to transmit data to the remote system. You can choose either 256 (the default) or 512.

Note: This parameter is provided to allow compatibility with IBM hosts only. A remote 3780 terminal, that is, a DNC, will support 512-byte buffers. If the remote system can support 512-byte buffers, that is the more efficient size.

- **Terminal ID.** In this field you can choose either None (the default) or Other. If you choose Other, you then specify a single uppercase, lowercase, or numeric character. The character is repeated to form a two-character terminal ID. The terminal ID combines with the security ID (specified in the next field) to form the five-character terminal identification sequence that is used for initial line requests. The terminal ID is used only if the security ID is also specified.
- **Security ID.** In this field you can choose either None (the default) or Other. If you choose Other, you then specify a three-character alphanumeric character sequence. The security ID combines with the terminal ID (specified in the previous field) to form the five-character terminal identification sequence that is used for initial line requests.

Note: If specified, the security ID must be coordinated with the security configuration in force at the remote host.

- **BSC Transparency.** You can choose that BSC transparency should be enabled, which is indicated by a checkmark in the box, or disabled, which is indicated by the absence of a checkmark. The default setting is enabled. To toggle the setting, press the space bar on the keyboard when the field is highlighted.

If you enable BSC transparency, and if you specified the EBCDIC character set on RFT Host Screen #1, then you can send files transparently. (For more information, see 'Transparent and Nontransparent Transmission', earlier in this part.)

- **Multiple Record Transmission.** You can choose that multiple record transmission should be enabled, which is indicated by a checkmark in the box, or disabled, which is indicated by the absence of a checkmark. The default setting is disabled. To toggle the setting, press the space bar on the keyboard when the field is highlighted. If you enable multiple record transmission, the number of records that will be placed in the transmit buffer depends on the record size, the buffer size, and whether you specify transmission of fixed-length or variable-length records. (See 'The SEND Command', later in this part, for more information on transmission of fixed- and variable-length records.)
- **Space Compression.** This parameter specifies how blank spaces are transmitted to a remote system. If you enable space compression, then wherever there are two or more contiguous spaces in the data stream, they are replaced by a bisynchronous control character signifying compression, followed by a second character indicating the number of spaces.

By default, space compression is disabled. To toggle the setting of this

parameter, press the space bar on the keyboard when the field is highlighted. To indicate that space compression is enabled, the system displays a checkmark in the box beside the field label. (An ASCII terminal displays an x inside square brackets instead of a checkmark.)

Note 1: If you are transmitting a Helix file from a DNC to a DUX directory in a remote DNC, you should not send the file in space-compressed form. If the file is stored in space-compressed form, you should expand it before transmitting it.

Note 2: The setting of this parameter has no effect on received data. If the remote system sends compressed data to the DNC, the RFT feature always decompresses it.

- **Sign-on Card.** In this field you specify the contents of the record that is sent to the remote system when the data communications link is initially established. You can specify up to 80 characters. You should specify:

name 3780

where **name** is the host name. The default contents of the sign-on card is null.

- **Sign-off Card.** Normally, the sign-off card is used only for a dial-up data link. If the disconnect timer automatically disconnects a line, it automatically transmits a log-off sequence to the host. The sequence is composed of the contents of the sign-off card, followed by an end-of-transmission signal. The default contents of the sign-off card is null.
- (8) After specifying values for the transmit parameters listed on RFT Host Screen #2, press <Next Page>.

The system displays RFT Host Screen #3, listing receive parameters.

- (9) Enter values for the parameters on RFT Host Screen #3.

To advance from field to field on this screen, press TAB. To move to the previous field, hold down the SHIFT key and press TAB. Some of the fields require you to type in parameter values. Other fields enable you to choose values by using the arrow keys. The fields on the screen are:

- **Spool Print Data.** You can choose that print spooling of received files should be enabled or disabled (the default). If spooling is enabled, then incoming transmissions on the print device are spooled to the print spooler, and they are deleted from the receive file directory after printing. When spooling is enabled, a checkmark appears in the box in the field. To toggle the setting, press the space bar on the keyboard when the field is highlighted.
- **Print Queue Name.** When print spooling is enabled, you use this field to specify the name of the printer queue to which the incoming data is to be spooled. The name can be 1 to 20 characters in length. The default value of the name is null.
- **Record Separator Substitution.** This parameter applies only to data received for the printer. If substitution is disabled, then incoming internal

record separator (IRS) characters are discarded. If substitution is enabled, and if print spooling is also enabled, each incoming IRS character is replaced by a two-character CR LF sequence (carriage return and line feed). If substitution is enabled but print spooling is disabled, each incoming IRS character is replaced by CR if the receive file type is Helix or by LF if the receive file type is DUX. (You specify the receive file type in the File Type field, which is discussed shortly.)

- **Default Device.** In this field you specify the default receive device type. You can choose Print (the default) or Punch. The default device type is assigned to incoming nontransparent (text) transmissions if the remote system does not transmit a code specifying the device type.

If the receive device type is printer and if receive file print spooling is enabled, then the incoming transparent files are spooled to the printer, and are deleted from the directory after printing. (For more information, see ‘Transparent and Nontransparent Transmission’, earlier in this part.)

- **File Type.** The value of this parameter controls whether received files are to be treated as Helix files (the default) or DUX files. When receiving any nontransparent file that is not destined for the print spooler, the DNC replaces the IRS character. If the file type is Helix, the DNC substitutes CR for the IRS character. If the file type is DUX, the DNC substitutes LF for the IRS character, and it changes the file type of the incoming file to DUX, so that a DUX application doing block reads will see the LF characters.

Note: If the receive file type is DUX, only legal Helix file name characters may be used.

- **Printer Page Width.** This parameter controls the maximum number of characters per line of print data. You can choose None or Other. If you choose None, there is no maximum. If you choose Other, you can specify a value in the range 1 to 255. The default is a width of 132. When the maximum page width is reached, the end-of-line control code is inserted into the data stream, the column pointer is reset, and processing continues from print column position 1.

Note: The end-of-line control code may be CR, LF, or CR and LF, depending on the receive file type (Helix or DUX), and depending on whether print spooling is enabled.

- **Printer Page Length.** This parameter controls the maximum presentation length of a page of print data. If you choose Other, you can specify a value in the range 1 to 255. The default is a length of 66. The value of this parameter determines the number of line feed characters that are substituted for an incoming form feed character.

If the value of the parameter is None, and if channel stops 1 and 12 are not configured, then the printer is considered to have a continuous format. In this case, form feed characters are ignored, and no extra line feeds are inserted. (For information on channel stops, see the discussion of the next field.)

- **Printer Vertical Channels.** Across the bottom of RFT Host Screen #3 there are 12 fields for the printer vertical channels. In each field you enter

the default stop value for the printer channel. These channel stop values are a means of controlling the print forms.

The 12-channel convention comes from printers in which forms control is based on a loop of paper tape that has holes punched in it. The length of the tape loop is identical to the length of the print form and the same mechanism advances the print forms and turns the tape in the tape track.

The tape has 12 columns, or channels, printed on it. At one point in the tape track, sensors scan the columns to detect holes punched in the tape. The holes indicate the channels' stop values. For example, the hole in the fourth column may coincide with the tenth line of the print form. To advance the forms to the tenth line, you include a 'skip to channel 4' command in the data stream. When the printer receives the command, it advances the forms until it detects the hole punched in column 4 of the paper tape.

For each of the twelve channels, you specify a stop value, which is a line number. in the range 0 to the printer page length. A value of 0 indicates that there is no default channel stop for the channel. Any other valid value indicates the line number that the printer will advance to when it receives a skip-to-channel code for that channel.

Certain channels have special purposes. The line number for channel 1 determines where the first line of print will be on the page. The line number for channel 12 determines where the last line of print will be. When the printer goes beyond the line number specified for channel 12, it advances to the next page, and spaces down to the line specified for channel 1.

Note: The channel stop values specified on this screen are defaults. The remote host can provide the channel stop values by sending a defining sequence of control codes codes at the beginning of a transmission. The transmitted values override the defaults, and remain in effect until the remote host transmits another set of values, or until the Remote File Transfer PRU goes out of the Working state.

- (10) After specifying values for the receive parameters listed on RFT Host Screen #3, check the information you have entered on the three RFT Host screens. You can move back and forth among these screens by pressing <Previous Page> and <Next Page>.
- (11) Once you have confirmed the accuracy of the information, save the newly entered RFT configuration by pressing <Commit Changes>, and then <Return to Host Menu>.

The system redisplay the Host Name Menu, with the newly configured remote system selected.

Now that you are back at the Host Name Menu, you can designate the newly configured system as an active system. (An active system is one that the DNC is in communication with. At any one time, there can be a maximum of two

active systems.) Steps 12 and 13 designate a remote system as an active system.

- (12) Press TAB if necessary to select the host name, and then press the space bar.

A checkmark appears in the box beside the host name, indicating that it is active.

Note: To deactivate a remote system, use the same procedure: select the host name and press the space bar to make the checkmark disappear.

- (13) Press <Commit Changes>.

The system displays a message stating that the changes have been committed.

- (14) To exit, press <Exit to SAS>.

The system redisplay the Configuration Services Menu.

Transmitting Files to Remote Systems

After you have configured and activated the RFT PRUs and ports, and entered the RFT configuration parameters, you can send files to the active remote systems. You start out by initiating the Helix Command Interpreter. Then, from the Helix Command Interpreter, you initiate the RFT Command Interpreter. You can then enter RFT commands to effect file transfers. This section discusses the RFT commands in detail.

Initiating the RFT Command Interpreter

If you are the superuser, you can initiate the RFT Command Interpreter. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.)

To initiate the RFT Command Interpreter, take the following steps:

- (1) Sign on as the superuser.

The main menu appears.

- (2) Select System Administrative Services and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Use the arrow keys to select Utilities and press ENTER.

The Utilities Services - Main Menu appears.

- (4) Use the arrow keys to select Helix Command Interpreter and press ENTER.

The system prompt appears. (It is usually '>'.)

- (5) In response to the system prompt, type in RFT and then press ENTER.

The system displays the RFT CI prompt message:

```
*** Welcome to Remote File Transfer ***
*** Type "Help" for assistance ***
RFT: Type in command:
```

The RFT Command Interpreter is now running. You can now enter RFT commands.

RFT Commands

The RFT commands are:

CANCEL	Cancels a previously submitted SEND command.
CASE	Controls whether the RFT Command Interpreter converts the file and path names entered in SEND commands to uppercase.
CLEANLOG	Purges the RFT log file, and can also copy the contents of the log file to a data file.
HELP	Displays a screen stating the syntax of the RFT commands.
QUERY	Displays a list of previously submitted jobs that are awaiting transmission to the remote system, and also displays information on the status of the remote system and the status of the data link.
QUIT	Terminates an RFT session and returns you to the Helix Command Interpreter.
RELEASE	Removes the "hold" status that has been placed on a job. The system puts the job on hold if certain kinds of error conditions arise when it tries to transmit the file to the remote system. The released job is requeued in the transmit queue and is retransmitted when its turn comes.
RETRY	Used after an attempted transmission to a remote system has failed, this command reestablishes communication with the remote system and retransmits the file.
SEND	Sends as many as six files to the remote system.

To enter an RFT command, type the command word in its full or abbreviated form at the RFT prompt. You can use either uppercase letters or lowercase letters. Type in any parameters that should accompany the command, as explained in the following sections, and press ENTER.

The CANCEL Command

The CANCEL command removes a previously submitted job from the RFT transmit queue. If the job is being transmitted, the CANCEL command aborts the transmission.

The syntax of the CANCEL command is:

CANCEL job-number

where **job-number** is the number that was assigned to the job when it was submitted via a SEND command. To display job numbers, use the QUERY command.

Note that a job can be canceled only by the user who originally issued the SEND command, or by the system administrator.

The CANCEL command must be spelled out in full.

The CASE Command

The CASE command can be used to instruct the RFT Command Interpreter to convert to uppercase the pathnames included in SEND statements.

The syntax of the CASE command is:

CASE case-mode

where **case-mode** is either LOWER or UPPER. CASE LOWER is the default setting. When CASE LOWER is in effect, the RFT Command Interpreter does not do any case conversion. CASE UPPER instructs the Command Interpreter to convert all letters in pathnames to uppercase. To find out which case-mode is currently in effect, you can enter the CASE command without a case-mode parameter. In this case, the Command Interpreter issues a message stating whether the case mode is set to UPPER or LOWER. When you start the RFT Command Interpreter, the default case mode is in effect. The current case mode remains in effect for the duration of the RFT session, or until you change it by entering a CASE command.

The CASE command can be abbreviated to CAS.

The CLEANLOG Command

The RFT log file receives all log messages referring to all the remote systems configured on the Host Name Menu. The file has a finite capacity, and when it fills up, you must use the CLEANLOG command to clean it out. This command purges the RFT log file. It can also copy the contents of the log file to another Helix file before carrying out the purge operation.

The syntax of the CLEANLOG command is:

CLEANLOG PURGE

where **PURGE** indicates that no copy is to be made before purging, or:

CLEANLOG savename

where **savename** is the name of the Helix file to which the log file is to be copied. The savename can be either an Helix pathname or a file name. If it is a file name (not beginning with a colon), the system derives a Helix pathname by appending the file name to the Helix work directory (specified on RFT Host Screen #1).

The system issues messages indicating the results of the CLEANLOG operation, naming the log file, and naming the savefile if applicable.

The CLEANLOG command can be abbreviated to CL.

The HELP Command

The HELP command displays a screen that lists the syntax of the RFT commands.

The syntax of the HELP command is:

HELP

There are no parameters.

The HELP command can be abbreviated to H.

The QUERY Command

The QUERY command displays a list of jobs that are in the transmit queue awaiting transmission to the remote system. It also displays information on the status of the remote system and the status of the data link.

The syntax of the QUERY command is:

QUERY host-name

where **host-name** is the name of the remote system whose transmit queue is to be interrogated.

The information returned by the QUERY command includes

- **Host Name.** This is the name assigned to the remote system on RFT Host Screen #1.
- **Host Number.** This is the number from 0 to 15 with which the host name is associated on the Host Name Menu.
- **Link Status.** This indicates the status of the physical data link. It includes a list of all the jobs in the queue. It also tells whether the 3780 Service Driver PRU for the remote system is active or inactive. If an LIU port is not associated with the 3780 Service Driver PRU, it displays the message: 'NO LIU PORT'.
- **Communication Status.** This indicates the status of the 3780 Service Driver PRU for the remote system. Possible values are: transmitting, receiving, idle, not in service, and soft disconnected. (The driver is soft disconnected after it suspends transmission operations because of an error condition or because the host has responded to the transmission with a negative acknowledgement, or NAK.)
- **Job Number.** This number is assigned to the job when the user issues the SEND command.
- **Job in Transmit Flag.** If displayed, this indicates that the job is currently being transmitted.
- **Submitting User Name.** This is the user name of the user who entered the command to send the file or files.
- **Job On Hold Indicator.** If the job has been placed on hold, the letter H is displayed. The system places a job on hold if certain kinds of error conditions arise when it tries to transmit the file to the remote system. Such a transmission failure occurs if the remote system responds to the transmission with a negative acknowledgement, or if the file server containing a spool file is unavailable.

The QUERY command can be abbreviated to Q.

The QUIT Command

The QUIT command terminates an RFT session and returns you to the Helix Command Interpreter.

The syntax of the QUIT command is:

QUIT

There are no parameters.

The QUIT command can be abbreviated to QUI.

The RELEASE Command

The RELEASE command removes the hold status that has been placed on a job. The system places a job on hold if certain kinds of error conditions arise when it tries to transmit the file to the remote system. Such a transmission failure occurs if the remote system responds to the transmission with a negative acknowledgement

(NAK), or if the file server containing a spool file is unavailable. When the error condition has been corrected, use the **RELEASE** command to requeue and retransmit the job. The released job is requeued at the end of the transmit queue, and is retransmitted when its turn comes.

The syntax of the **RELEASE** command is:

RELEASE job-number

where **job-number** is the number that was assigned to the job when it was submitted via a **SEND** command. To find out which jobs are on hold, and their job numbers, use the **QUERY** command.

Note that a job can be released only by the user who originally issued the **SEND** command, or by the system administrator.

The **RELEASE** command can be abbreviated to **REL**.

The **RETRY** Command

After an attempted transmission to a remote system has failed, you can use the **RETRY** command to reestablish communication with the remote system and to retransmit the job. Use the **RETRY** command if the transmission has failed and the job is not on hold. (Use the **QUERY** command to determine whether the job is on hold. If the job is on hold, use the **RELEASE** command to requeue the job.)

The syntax of the **RETRY** command is:

RETRY host-name

where **host-name** is the name assigned to the remote system on RFT Host Screen #1.

If a sign-on card has been configured for the remote system, the **RETRY** command sends the sign-on card, as if the link were being established for the first time.

The **RETRY** command can be abbreviated to **RET**.

The **SEND** Command

The **SEND** command submits a job to be transmitted to a remote system. A job can include one or more files, to a maximum of six. When you enter the **SEND** command, the system assigns a job number to the job, and places the job in the transmit queue for the remote system. When its turn comes, the job is transmitted.

The syntax of the **SEND** command is:

SEND file-list TO host-name parameter-list

SEND The **SEND** command can be abbreviated to **S**.

file-list This is a list of one or more file names, to a maximum of six. If a file name does not include a path name, the RFT feature looks for

the file in the Helix Work Directory (specified on RFT Host Screen #1). If there are multiple file names in the list, they are separated from each other by blanks.

(JCL) Any file name in the file list may be preceded by the (JCL) parameter. The file following the (JCL) parameter is treated as standard IBM job control language, that is, formatted in 80-character CARD format, and transmitted in nontransparent TEXT mode. The (JCL) parameter can be abbreviated to (J). (See the discussion of parameter-list for further information on CARD format and TEXT mode.) The (JCL) parameter is separated from the file name by a space.

TO host-name This specifies the name of the remote system to which the file or files will be sent. If only one remote system has been configured on the Host Name Menu, the 'TO host-name' section of the SEND command can be omitted.

parameter-list There are two format parameters, CARD and EXCHANGE, and two mode parameters, TEXT and BINARY. The parameter list can be composed of a single one of these parameters, or it can be composed of one format parameter and one mode parameter.

The parameter-list is an optional part of the SEND command. If a parameter-list is not specified, the default parameters are EXCHANGE and TEXT. If a parameter-list is specified, it must be preceded by a per cent sign (%). When specifying parameters, you can abbreviate the parameters to their initial letters: C, E, B, and T.

CARD Specifies that data is to be transmitted in 80-character records. (Generally, data sent to an IBM host must be in 80-character CARD format.)

EXCHANGE Specifies that the data is to be transmitted in variable-length records.

BINARY Specifies that the data is to be transmitted transparently, that is, exactly as it is found in the file, without recognizing record separators and without ASCII or EBCDIC translation.

TEXT Specifies that the data is to be transmitted nontransparently. In nontransparent transmission, code translation occurs if the sending and receiving systems are using differing character sets (ASCII and EBCDIC).

Note: BINARY transmissions are always sent as 80-byte records. If BINARY and CARD are specified, the CARD parameter guarantees that if the last record has fewer than 80 characters, it will be padded with zeros to exactly 80 characters. This is required by some IBM hosts.

Examples of the SEND Command

The following examples show how to use the SEND command. Note that when entering a SEND command, you must enter the entire command on a single line.

SEND MYFILE-1

This command sends MYFILE-1. Because no pathname is specified for MYFILE-1, the RFT feature looks for the file in the Helix work directory (specified on RFT Host Screen #1). You do not need to specify a destination if only one remote system was configured on the Host Name Menu. The default format parameter, EXCHANGE, and the default mode parameter, TEXT, are in effect.

SEND MYFILE-1 :LOCAL:SPECIAL-DIRECTORY:MYFILE-2 TO HOST-2

This command sends MYFILE-1 and MYFILE-2 to HOST-2. Because no pathname is specified for MYFILE-1, the RFT feature looks for the file in the Helix work directory (specified on RFT Host Screen #1). The default format parameter, EXCHANGE, and the default mode parameter, TEXT, are in effect.

SEND MYFILE-1 (JCL) :LOCAL:JCL-DIRECTORY:FILE-B TO HOST-2 % TEXT EXCHANGE

The (JCL) parameter refers to FILE-B, which is to be treated as a file of job control language statements. That means that FILE-B will be transmitted in CARD format (80-character records, with the last record padded with zeros to exactly 80 characters) and in BINARY mode (transparent transmission with no ASCII or EBCDIC translation). The default mode and format parameters (TEXT and EXCHANGE) apply to MYFILE-1. These parameters are shown in an explicit parameter list, which is introduced by the per cent sign (%).

send myfile-1 (jcl) :local:jcl-directory:file-b TO host-2 % text exchange

This command does the same thing as the command in the previous example, but shows that you can enter the command in lowercase. Only the word TO must be capitalized.

s myfile-1 (j) :local:jcl-directory:file-b TO host-2 % t e

This command does the same thing as the command in the previous example, but shows how you can use abbreviations. It includes the abbreviated forms of 'send', '(jcl)', 'text', and 'exchange'.

S MYFILE-1 (J) :LOCAL:JCL-DIRECTORY:FILE-B TO HOST-2 % T E

This command is the same as the previous example, but is in uppercase.

A Sample Session in the RFT Command Interpreter

Here is a sample session in the RFT Command Interpreter, illustrating the use of the commands:

HELP

System response: the help screen.

SEND :APRIL:REPORT TO NYHOST

System response: "Job 1234 enqueued on NYHOST"

QUERY NYHOST

System response: "Query for NYHOST 1 jobs. Link=READY" System response: "Job 1234 enqueued on NYHOST"

QUIT

System response: "RFT terminated normally"

When RFT terminates, you are returned to the Helix Command Interpreter. To exit from the Helix Command Interpreter and return to the main menu, type in 'Exit' and press ENTER.

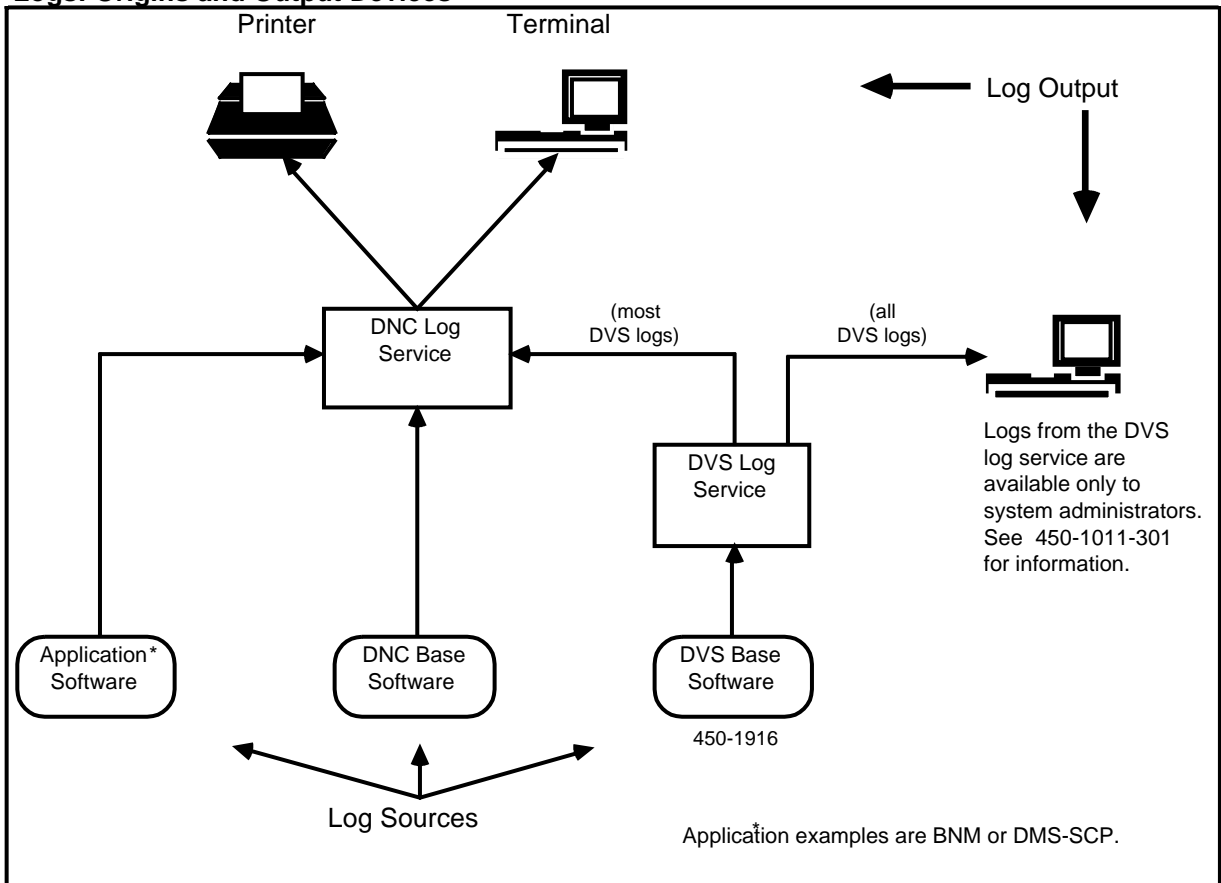
20. Logs in the DNC

A log is a message issued as a record of an event occurring in the DNC. Log messages record both normal occurrences, such as user sign-ons, and abnormal occurrences, such as error conditions and equipment failures.

There are two separate log services operating on the DNC: the DNC Log service and the DVS Log service. Each is controlled by its own man-machine interface. You access the screens controlling the DNC log service from the main menu; you access the screens controlling the DVS Log service from the System Administrative Services Main Menu.

The DVS Log service handles log messages generated by DVS, which is the underlying software for the DNC system. The DVS Log service records all DVS-generated log messages. In addition, most of the DVS-generated messages are intercepted by monitor routines (software that runs on every SRU) and are sent to the DNC Log service. The DVS Log service is discussed in detail later in this part.

Figure 20-1
Logs: Origins and Output Devices



The DNC Log Service

The DNC log service records log messages generated by the applications that run on the DNC, and also records the DVS-generated logs that are sent to it. (See Figure 20-1.)

Features of the DNC Log Service

By default, whenever a DNC log message is generated, the system sends it to a circular log history file. However, the system administrator can 'suppress' a log, in which case the system does not send it to the log history file.

The system administrator can set time and count thresholds for logs. If a threshold is specified, the system suppresses log messages that fall short of the threshold, that is, it generates the message, but does not send it to the log history file.

Every log has a severity. There are 15 severity levels, from critical (the most severe) to 15 (the least severe). Logs of the three highest severity levels--critical, major, and minor-- cause alarms. When a high-severity log message is generated, the Log service sends the message to the Alarm service, which generates an alarm of corresponding severity. For information on the Alarm service, see Part 21, 'Alarms in the DNC'.

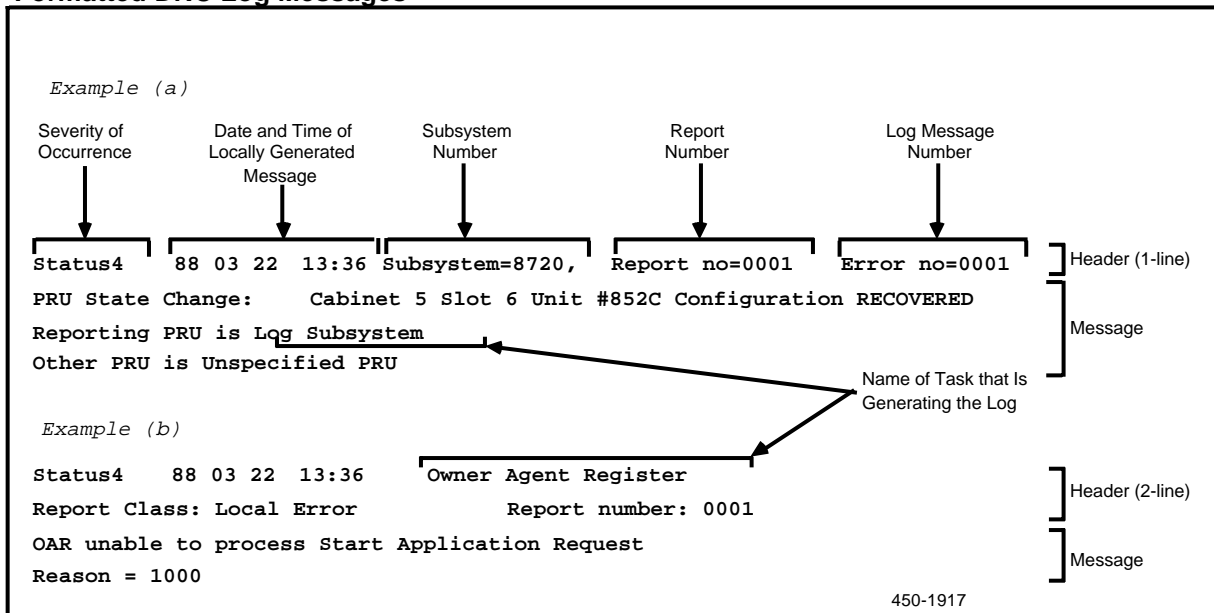
The log history file resides on the disk storage SRU associated with the Primary Processor. The log history file is circular; it holds a configurable number of log messages, and beyond that, each new log message overwrites the oldest existing log message.

The log service can be multilingual. This is possible because the text of the master copy of each log message can be defined in up to three languages. (English, French, and Spanish are typical choices.) For each log output device, the system administrator can specify the language that the system is to use when it issues log messages. If the system administrator selects a language that is unavailable, or makes no selection, the system sends the copy of the message that was defined first.

Output from the DNC Log Service

The DNC Log service sends log messages to the log history file. At the same time, it can output the log messages on printers and terminals that the system administrator has configured as log output devices. Up to 16 log output devices can be active at one time. (For details on configuring log output devices, see ‘Printing Logs Continuously’, later in this part.) Figure 20-2 illustrates formatted DNC log messages.

Figure 20-2
Formatted DNC Log Messages



Any user can obtain a display of DNC log messages on his or her terminal. To produce the log display, the DNC Log service scans the contents of the log history file and selects the messages that the user is entitled to access. (The user’s access rights are determined by the user group to which he or she belongs.) The log messages appear in shortened form, but the user can obtain the display of the full log message by selecting the shortened message on the screen and pressing the <More Details> softkey.

Log Format

Every log message printed by a log printer is composed of two parts, a header and the message itself. Figure 2-2 illustrates formatted log messages.

A log's header is one or two lines in length, depending on the header format. As of the issue date of this document, there are six header formats. Figure 2-2 illustrates two of the formats. The formats not shown differ only slightly from those in the figure.

The log header contains information that uniquely identifies the log message. In some cases, some of the information items in the log header are labeled (for example, 'Subsystem='). The precise composition of the log header depends on the format. Every header is composed of items drawn from the following list:

- (a) **Severity.** There are 15 severity levels, from 'Status15' (the lowest) to 'Critical' (the highest). The severity is included in every log header format.
- (b) **Date and Time.** The date is output at the upper left of the message, in the format YY MM DD, in digits, and the time in HH:MM format. The date and time are included in every log header format.
- (c) **Reporting Resource Unit (RU).** Every log header format includes an item that identifies the reporting resource unit. Depending on the header format, the reporting resource unit is identified either by its RU name or by its subsystem number.

When the RU name appears in the header, the item is not labeled. In a two-line header, the reporting RU name is the last item on line one. In a one-line header, it precedes the report number.

When the subsystem number appears in the header, the item is labeled. The four-digit hexadecimal number is the name of a message-subsystem file that is associated with a certain PRU. The message-subsystem file contains the log messages that the PRU can generate. Each message-subsystem file is named XXXX.LOG, where XXXX is the four-digit hexadecimal number. All the message-subsystem files are stored in the Helix directory named :LOCAL:PRU:LOGS:LOGDESC.

- (d) **Report Number.** Report numbers are hexadecimal numbers that establish categories of log messages related to particular types of event. The report number is included in every log header format. In some formats it is labeled. In formats where it is not labeled, it is the second last item in a one-line header.
- (e) **Error Number.** The error number is a hexadecimal number that is specific to a type of error condition. The error number is included in five of the six log header formats. In some formats it is labeled. In formats where it is not labeled, it is the last item in a one-line header.
- (f) **Report Class.** The report class is an information item in DVS log messages. See 'Mapping of DVS Log Messages', later in this part, for more information on report classes. In two-line log header formats, this item is

labeled. When it is included in a one-line header, it is the first item following the date and time.

Mapping of DVS Log Messages

The log messages issued by the DVS Log service have been mapped to DNC format. That is, the DNC Log service has message-subsystem files containing DNC versions of the DVS log messages. When the DNC Log service receives a DVS log message, it looks up the appropriate message-subsystem file and issues the DNC version of the log.

The information items in DVS and DNC log messages do not correspond on a one-for-one basis. Therefore, when the DNC versions were generated, it was necessary

- to add group and user attributes
- to assign subsystem, report, and error numbers
- to transfer into the DNC format certain items found only in DVS logs, items such as report class.

The **group and user attributes** assigned to the DNC versions of DVS logs restrict access to the logs. Only members of the system administrators' user group (group 0) can access them.

The **subsystem, report, and error numbers** depend on the DVS log's report number and report class. The subsystem number, report number, and error number are set as follows:

If the DVS report class is 0003 (global event), then the subsystem number is set to 0003, the report number is set to the DVS report number, and the error number is set to -1.

If the DVS report class is 0004 (global error), then the subsystem number is set to 0004, the report number is set to the DVS report number, and the error number is set to the DVS error code.

If the DVS report class is neither 0003 nor 0004, and if the DVS report number is in the range 0 to 0FFF or in the range 2000 to 3FFF, then the subsystem number is set to the PRU unit number (the first four digits of the eight-digit device number), the report number is set to the DVS report class, and the error number is set to the DVS report number.

If the DVS report class is neither 0003 nor 0004, and if the DVS report number is in the range 1000 to 1FFF, then the report number is set to the DVS report class, the error number is set to the DVS report number. The subsystem number is set to the ordinal value of the first four characters of the filename. (The full file name is displayed in the Fixed String 2 field. See below.)

The DVS report class name appears in the Fixed String 1 field of the DNC version of the log. The DVS report class names are: debug log (hexadecimal code 0000),

local event (hexadecimal code 0001), local error (hexadecimal code 0002), global event (hexadecimal code 0003), or global error (hexadecimal code 0004).

The **name of the file that generated the message** appears in the Fixed String 2 field of the DNC version of the log.

Configuring the DNC Log Service

The DNC log service requires the following PRUs:

- Log Subsystem
- Notification Server
- Log/Alarm Query.

The PRUs do not need to reside on the same Applications Processor.

If you want to print out logs continuously as they are generated, you must configure the Log Printer PRU. (For information on configuring PRUs, see Part 7, 'Configuring Program Resource Units'.) You must also use the 'Logger Device Editor' option on the Configuration Services Menu. If the option is not on the menu, take the following steps to make it available:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select On Line Update and then press ENTER.

The system displays the Configuration Services Menu.

- (5) If the Logger Device Editor option is not on the menu, then press <Define Services>.

The system displays the Configuration Services Definition screen.

- (6) On the Configuration Services Definition screen, press <Next Service> repeatedly until you arrive at a screen on which the value of the Display Name field is Logger Device Editor.

When you arrive at this screen, the cursor is prompting in the box in the Display? field.

- (7) Specify that the option should appear on the menu by pressing the space bar.

A checkmark appears in the box in the Display? field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

- (8) Press <Save Changes>.

The system displays a message stating that the changes have been saved.

- (9) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu. This saves the changes on disk, and ensures that the Logger Device Editor option will appear on the Configuration Services Menu when you next initiate the Configuration Services screens.

Configuring Centralized Log Collection for a Local Data Net Network

When multiple DNCs are linked in a Local Data Net network, you may want to designate one of the systems as the central collector for log messages. In this case, there is only one log history file in the network, and it is in the collector system. The Log Subsystem PRUs in the peripheral DNCs send their logs to the Log Subsystem PRU in the collector system. Log output devices can be configured on any system in the network. (See Part 15 for information on Local Data Net.)

You differentiate the collector DNC from the peripheral DNCs by means of the object indexes assigned to the Log Subsystem PRUs. The range of valid object index values for the Log Subsystem PRU is 0 to 5. Assign 0 as the object index of the Log Subsystem PRU in the collector DNC. For the Log Subsystem PRU in each of the other DNCs in the network, assign a unique value in the range 1 to 5. (See Part 7 for information on assigning object index values to PRUs.)

Centralized log collection will function properly only if all the DNCs in the Local Data Net network have identical sets of PRUs listed on their Selection List screens for PRUs, and identical sets of SRUs listed on their Selection List screens for SRUs. The names and device numbers of the listed PRUs and SRUs must be the same in all the DNCs.

If you configure centralized log collection, then you need to configure only one instance of the Alarm Subsystem PRU in the Local Data Net network. You can configure the PRU on any DNC in the network.

Centralized log collection is optional. If you want each DNC in a Local Data Net network to report its logs locally, assign 0 as the object index of the Log Subsystem PRU in each DNC in the network.

Specifying the Size of the Log History File

An initialization file specifies the number of messages that the circular log history file can hold. If you are the superuser, you can change the size of the history file by using the editor to change the parameter in the initialization file. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.)

To specify the size of the file, proceed as follows:

- (1) Sign on as the superuser.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

- (4) Select Helix Command Interpreter, and then press ENTER.

The system prompt appears. (It is usually '>'.)

- (5) To start the editor, type in the command

ED :LOCAL:PRU:LOGS:LG:DKINIT.TEXT

and then press ENTER.

The initialization file appears on the screen.

- (6) Use the arrow keys to move the cursor to the FILESIZE field, and type in the number specifying how many log messages the file should hold.
- (7) Save the initialization file. To do so, press the RESET key, then press Q, and then press S.
- (8) After saving the file, exit from the editor by pressing E.

You exit to the Helix Command Interpreter. The system prompt reappears.

- (9) To exit from the Helix Command Interpreter, type in EXIT and then press ENTER.

The Utilities Service - Main Menu reappears.

- (10) Press the <Exit> softkeys until you arrive at the main menu.

Working with DNC Logs

To control the logs handled by the DNC Log Subsystem (that is, those generated by the applications and those received from the DVS Logger), use the screens of the Log Man-machine Interface (Log MMI), which you can reach by selecting the Log MMI option on the main menu. Using the Log MMI, you can:

- display logs and log details
- print the logs recorded in the log history file
- filter the logs that are displayed or printed, by specifying criteria to select the logs by group, class, or severity
- specify that certain log messages should be suppressed
- change a log's severity level
- assign a log to a different class
- specify thresholds for issuing certain logs.

Displaying Logs

The menu structure for this section is shown in Figure 20-3.

To display logs, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select Log MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Log MMI. It may instead be 'System Log', 'DNC Logger', or some other designation.)

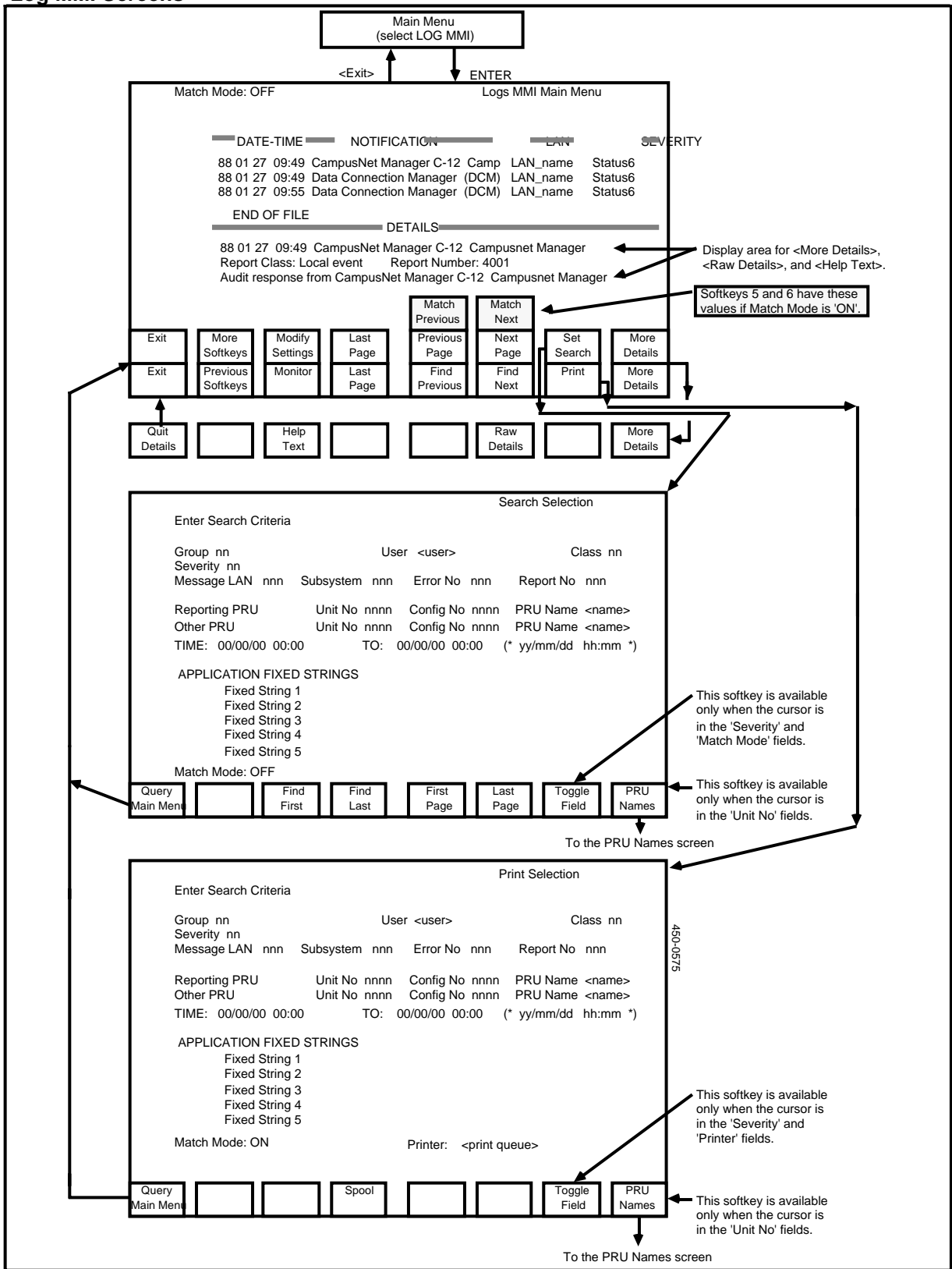
The Logs MMI Main Menu appears, displaying a list of logs (see Figure 20-3). In this list, each log is reported in an abbreviated form, including the following information:

- the date and time
- the program that generated the log
- the LAN number of the DNC where the program resides, shown in parentheses (displayed only if the DNC is part of a Local Data Net network)
- the log's severity level.

The field in the top left corner of the screen tells you that match mode is 'OFF'. This means that the screen will display all the logs that you are entitled to see. The system displays the most recent logs first, to save you from having to page all through the list to get to the most recent ones.

If you signed on as a system administrator, you are entitled to see all logs generated for all groups; if you did not sign on as a system administrator, you are entitled to see logs generated for your own group. In addition, every user is entitled to see broadcast logs.

Figure 20-3
Log MMI Screens



- (3) To page through the list of logs, use the <Next Page> and <Previous Page> softkeys. Following the first display, the system displays matching logs in chronological order, starting with the earliest ones.
- (4) If you want the system to scan the log history file and select log messages that satisfy certain search criteria, then you must go to the Search Selection screen, specify the search criteria, and change the setting of the Match Mode field to 'ON'. Proceed as follows:
 - Press <Set Search>.

The system displays the Search Selection screen.

- Enter the search criteria in the fields on the screen. Press RETURN to move from field to field. (The search criteria are explained in 'Setting the Search Criteria', later in this part.)
- When the cursor reaches the Match Mode field, press <Toggle Field>.

The value of the field changes to 'ON'.

- Press <Query Main Menu>.

The system redisplay the Logs MMI Main Menu. Match mode is now enabled, and the fifth and sixth softkeys are now <Match Previous> and <Match Next>. You can use these softkeys to display the log messages that satisfy the search criteria.

- (5) To display log messages that have been issued since you entered the Log MMI, press <Last Page>.

The system scans the log history file once again, and selects the logs that you are entitled to access. If match mode is enabled, it selects from that group the logs that satisfy the search criteria, and it redisplay the last page of the list.

- (6) To return to the main menu, press <Exit>.

Displaying Detailed Information About a Log

To display a log message in its full, formatted form, use the arrow keys to select the log on the Logs MMI Main Menu, and then press <More Details>.

New softkeys appear, and the system displays the full log message in formatted form in the lower portion of the Logs MMI Main Menu. (See Figure 20-2 for examples of formatted log messages.)

To restore the original softkeys, press <Quit Details>.

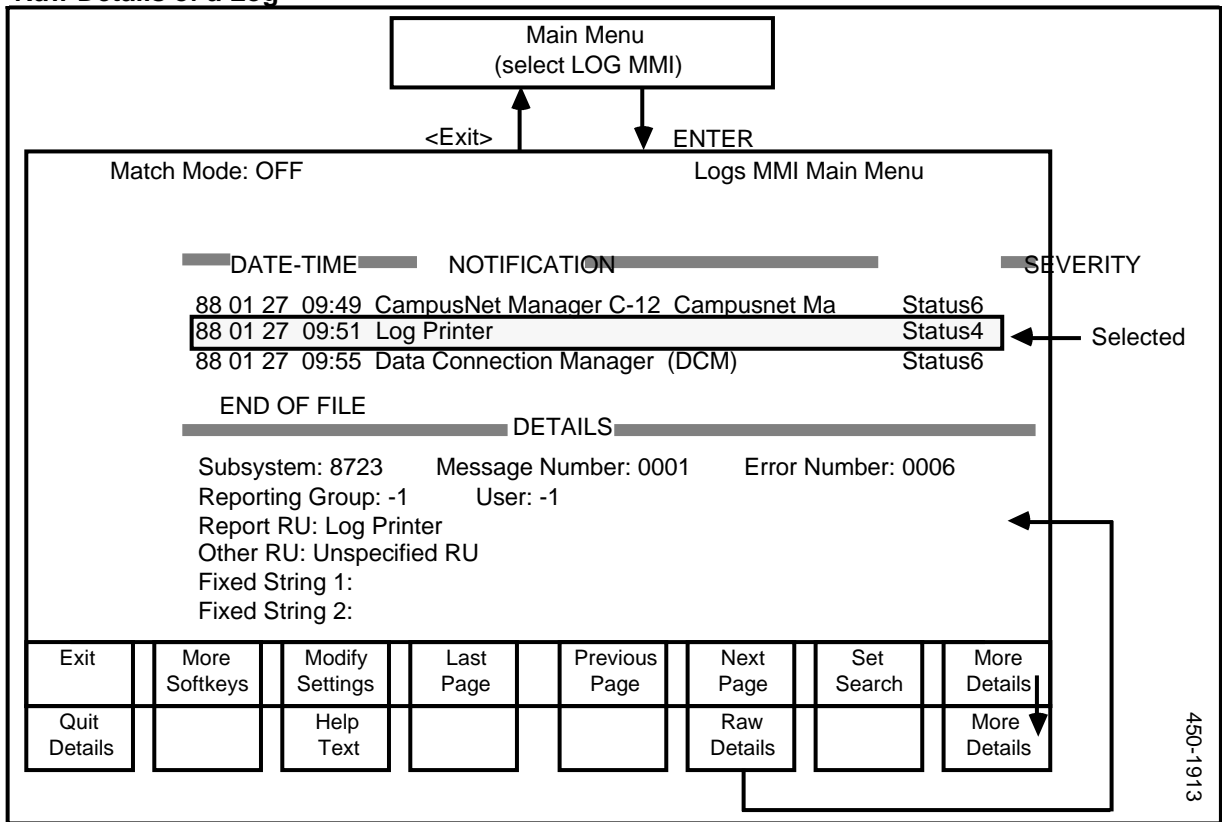
Displaying Help Text for a Log

To display help text concerning a log, select the log on the Logs MMI Main Menu, press <More Details>, and then press <Help Text>.

Help text appears in the lower portion of the Logs MMI Main Menu.

To restore the original softkeys, press <Quit Help Text>.

Figure 20-4
Raw Details of a Log



Displaying Raw Details

To display a log message in unformatted form, select the log on the Logs MMI Main Menu, press <More Details>, and then press <Raw Details>.

The unformatted log appears in the lower portion of the Logs MMI Main Menu, as shown in Figure 20-4. If the amount of information exceeds the available space, the softkey becomes <More Raw Details> to enable you to display the rest of the information.

To restore the original softkeys, press <Quit Details>.

Using Monitor Mode

In monitor mode, the system displays logs on the screen as they occur. To initiate monitor mode, take the following steps:

- (1) Sign on.

The main menu appears.

- (2) Select Log MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Log MMI. It may instead be 'System Log', 'DNC Logger', or some other designation.)

The Logs MMI Main Menu appears.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Monitor>.

The Monitor Mode screen appears. As logs are generated, the system displays on this screen all the logs that you are entitled to access. (If you are a system administrator, you can access logs generated for all groups. If you are not a system administrator, you can access logs generated for your own user group, and the broadcast logs, which are available to all users.)

- (5) To terminate monitor mode and return to the Logs MMI Main Menu, press <Exit>. (On an ASCII terminal, the softkey display does not appear at the bottom of the Monitor Mode Screen. To exit, press the keys that emulate softkey 1.)

Setting the Search Criteria

The search criteria specified on the Search Selection screen determine which logs are displayed on the Logs MMI Main Menu when match mode is enabled.

The menu structure for this section is shown in Figure 20-3.

To set the search criteria that apply to you, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select Log MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Log MMI. It may instead be 'System Log', 'DNC Logger', or some other designation.)

The Logs MMI Main Menu appears, displaying a list of logs.

- (3) Press <Set Search>.

The system displays the Search Selection screen.

- (4) Enter the search criteria in the fields on this screen.

To advance from one field to the next on the screen, press RETURN. To move to the previous field, hold down SHIFT and press TAB.

The Search Selection screen lists the selection criteria. In each field you can specify a parameter value. The system uses the the criteria when displaying logs for you. It scans the log history file, selects the logs that you are entitled to access, and from that group displays only those that satisfy all the parameters that you specify. If a value is not shown for a parameter on this screen, then all logs satisfy that parameter.

The search selection parameters are:

Group. If you are a system administrator, you can specify a group, and then the logs generated for that group are eligible for display. If you are not a system administrator, you cannot configure this parameter, and the only logs eligible for display are those generated for your own group, and the broadcast logs. (Broadcast logs have a group attribute of -1. These logs are available to all users.)

User. If you specify a user, then only logs generated for that user are eligible for display.

Class. There are 16 classes of log messages. If you specify a value in the range 1 to 16, then only logs of the specified class are eligible for display.

Severity. There are 15 severity levels, from 'Status15' (the lowest) to 'Critical' (the highest). If you specify a severity, then only logs of that severity are eligible for display.

To alter the value of this field, press <Toggle Field>.

Message Lan. If multiple DNCs are linked in a Local Data Net network, you can designate the DNC whose logs are to be eligible for display. To designate a particular DNC, type in its lan number, which is the value of the object index of the Log Subsystem PRU in that DNC. (For more information, see 'Configuring Centralized Log Collection for a Local Data Net Network', earlier in this part.)

Subsystem. Message subsystems are files containing log messages. If you specify a message subsystem, then only messages from that file are eligible for display. To specify a message subsystem, enter the subsystem number (four hexadecimal digits) in the Subsystem field. To find out a log's subsystem number, select the log on the Logs MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can display a list of all the message subsystem files, by listing the files in the Helix directory named :LOCAL:PRU:LOGS:LOGDESC.

Error Number. If you specify an error number, then only logs with that error number are eligible for display. To find out a log's error number, select the log on the Logs MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the error numbers of the log messages in a message subsystem by accessing the directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Report Number. If you specify a report number, then only logs with that report number are eligible for display. To find out a log's report number, select the log on the Logs MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the report numbers of the log messages in a message subsystem by accessing the directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Reporting PRU and Other PRU. If you specify a reporting PRU, then only logs generated by that PRU are eligible for display. If you specify a value in the Other PRU field, then only logs referring to that PRU are eligible

for display.

There are two ways to specify a PRU. The simpler way is to press <PRU Names> when the cursor is in the Unit No field. The system then displays the PRU Names screen, listing PRUs. On that screen, use the arrow keys to select the PRU, and then press <Select>. The Search Selection screen then reappears, with the appropriate values for the unit number and PRU name. Alternatively, if you know the PRU's unit number, you can enter it in the Unit No field. For information on how to find a PRU's unit number, see 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Specifying a value in the Config No field is optional. You need to use this field only if there are multiple instances of the PRU, and you want to specify a particular instance. If you need a configuration number, see the procedure 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Time and To. If you specify a time period, then only logs generated within that period are eligible for display.

Application Fixed Strings. A fixed string is a character string that can be used as an element of one or more log messages. You can specify up to five fixed strings. If you specify one or more fixed strings, then a log is eligible for display only if it contains the specified string or strings. Any fixed strings contained in a log message are shown in the raw-details display (see Figure 20-4). To display a log's raw details, select the log on the Logs MMI Main Menu, press <More Details>, and then press <Raw Details>.

Match Mode. When match mode is 'OFF', the <Previous Page> and <Next Page> softkeys are available on the Logs MMI Main Menu. When you press either of these softkeys, the system scans the log history file and displays logs that you are entitled to access, as determined by your user group. (If you are a system administrator, then you are a member of group 0, which means that you are entitled to access all alarms generated for all groups. If you are not a system administrator, then you are entitled to access the alarms generated for your own group, and the broadcast alarms, which are available to all users.) When match mode is 'ON', the <Match Previous> and <Match Next> softkeys are available on the Logs MMI Main Menu. When you press either of these softkeys, the system scans the log history file and displays logs that satisfy all the selection criteria currently shown on the Search Selection screen.

To alter the value of the Match Mode field, press <Toggle Field>.

- (5) After entering the search selection criteria, you can initiate a search by pressing <First Page>, <Last Page>, <Find First>, or <Find Last>.

The system redisplay the Logs MMI Main Menu, scans the log history file, and displays the logs located by the search.

The logs located by the <First Page> and <Last Page> softkeys depend on whether match mode is 'ON' or 'OFF', as explained in the discussion of the

Match Mode parameter.

When you use the <Find First> or <Find Last> softkey, the system finds first or last log message that matches the search criteria currently shown on the Search Selection screen, and displays the logs that immediately follow the matching log. (These two softkeys work this way regardless of the setting of the Match Mode parameter.)

- (6) To return to the Logs MMI Main Menu without initiating a search, press <Query Main Menu>.

Printing Selected Logs

You can have the system print logs that satisfy print criteria that you specify. The system scans the log history file, selects the logs that satisfy the criteria, formats them, and prints them in reverse chronological order (that is, the most recent logs first).

Note: This procedure prints out logs only on request, and can only print logs that have been sent to the log history file. You can also define a printer as a log output device, so that the printer will print logs continuously as they occur. See 'Printing Logs Continuously', later in this part.

The menu structure for this section is shown in Figure 20-3.

To print selected logs, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select Log MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Log MMI. It may instead be 'System Log', 'DNC Logger', or some other designation.)

The Logs MMI Main Menu appears, displaying a list of logs.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Print>.

The system displays the Print Selection screen.

- (5) Enter the print criteria in the fields on this screen.

To advance from one field to the next on the screen, press RETURN. To move to the previous field, hold down SHIFT and press TAB.

The Print Selection screen lists the selection criteria. In each field you can specify a parameter value. The system uses the criteria when printing logs for you. It scans the log history file, selects the logs that you are entitled to

access, and from that group prints only those that satisfy all the criteria currently shown on the Print Selection screen. If a value is not shown for a parameter on this screen, then all logs satisfy that parameter.

The print selection parameters are:

Group. If you are a system administrator, you can specify a group, and then the logs generated for that group are eligible for printing. If you are not a system administrator, you cannot configure this parameter, and the only logs eligible for printing are those generated for your own group, and the broadcast logs. (Broadcast logs have a group attribute of -1. These logs are available to all users.)

User. If you specify a user, then only logs generated for that user are eligible for printing.

Class. There are 16 classes of log messages. If you specify a value in the range 1 to 16, then only logs of the specified class are eligible for printing.

Severity. There are 15 severity levels, from 'Status15' (the lowest) to 'Critical' (the highest). If you specify a severity, then only logs of that severity are eligible for printing.

To alter the value of this field, press <Toggle Field>.

Message Lan. If multiple DNCs are linked in a Local Data Net network, you can designate the DNC whose logs are to be eligible for printing. To designate a particular DNC, type in its lan number, which is the value of the object index of the Log Subsystem PRU in that DNC. (For more information, see 'Configuring Centralized Log Collection for a Local Data Net Network', earlier in this part.)

Subsystem. Message subsystems are files containing log messages. If you specify a message subsystem, then only messages from that file are eligible for printing. To specify a message subsystem, enter the subsystem number (four hexadecimal digits) in the Subsystem field. To find out a log's subsystem number, select the log on the Logs MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can display a list of all the message subsystem files, by listing the files in the Helix directory named :LOCAL:PRU:LOGS:LOGDESC.

Error Number. If you specify an error number, then only logs with that error number are eligible for printing. To find out a log's error number, select the log on the Logs MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the error numbers of the log messages in a message subsystem by accessing the directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Report Number. If you specify a report number, then only logs with that report number are eligible for printing. To find out a log's report number, select the log on the Logs MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the report numbers of the log messages in a message subsystem by accessing the

directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Reporting PRU and Other PRU. If you specify a reporting PRU, then only logs generated by that PRU are eligible for printing. If you specify a value in the Other PRU field, then only logs referring to that PRU are eligible for printing.

There are two ways to specify a PRU. The simpler way is to press <PRU Names> when the cursor is in the Unit No field. The system then displays the PRU Names screen, listing PRUs. On that screen, use the arrow keys to select the PRU, and then press <Select>. The Print Selection screen then reappears, with the appropriate values for the unit number and PRU name. Alternatively, if you know the PRU's unit number, you can enter it in the Unit No field. For information on how to find a PRU's unit number, see 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Specifying a value in the Config No field is optional. You need to use this field only if there are multiple instances of the PRU, and you want to specify a particular instance. If you need a configuration number, see the procedure 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Time and To. If you specify a time period, then only logs generated within that period are eligible for printing.

Application Fixed Strings. A fixed string is a character string that can be used as an element of one or more log messages. You can specify up to five fixed strings. If you specify one or more fixed strings, then a log is eligible for printing only if it contains the specified string or strings. Any fixed strings contained in a log message are shown in the raw-details display (see Figure 20-4). To display a log's raw details, select the log on the Logs MMI Main Menu, press <More Details>, and then press <Raw Details>.

Match Mode. This is a display field. On this screen, match mode is always 'ON'. This means that when selecting logs for printing, the system first scans the log history file and selects the logs that you are entitled to access, as determined by your user group. (If you are a system administrator, then you are a member of group 0, which means that you are entitled to access all alarms generated for all groups. If you are not a system administrator, then you are entitled to access the alarms generated for your own group, and the broadcast alarms, which are available to all users.) From the logs that you are entitled to access, the system then selects and prints only those that satisfy the selection criteria currently shown on the Print Selection screen.

Printer. In this field you specify the name of the print queue that is to be used for the print job.

To alter the value of this field, press <Toggle Field>.

Note: For information on defining print queues, see 'Printer Queue Administration', in Part 14, 'Printer Administration'.

- (6) After entering the print criteria, press <Spool> to send the job to the print queue.
- (7) Return to the Logs MMI Main Menu by pressing <Query Main Menu>.

Note: When the system redisplay the Logs MMI Main Menu, match mode is enabled, even if it was not enabled before you displayed the Print Selection screen.

Modifying Configurable Log Settings

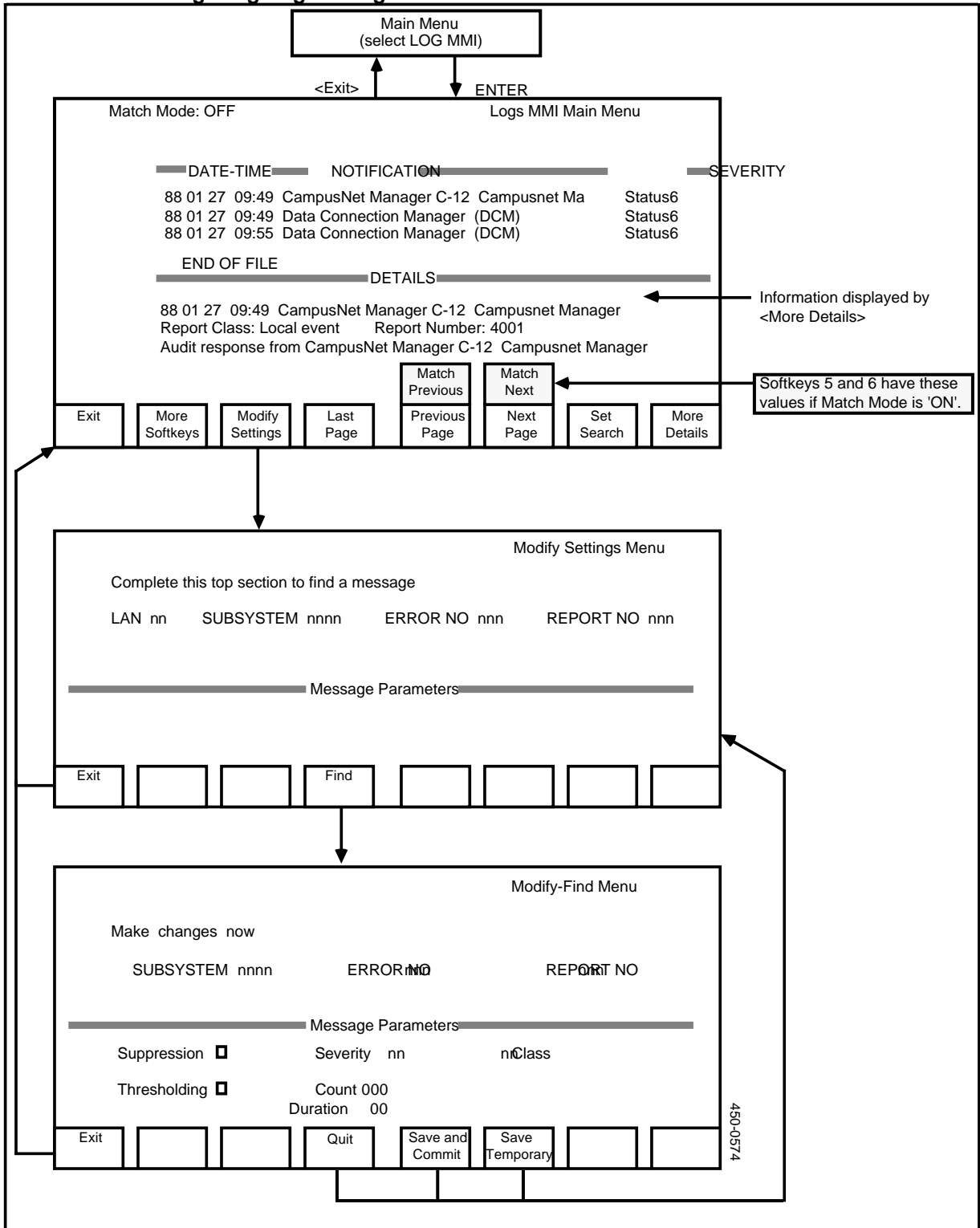
The system administrator can use the Log MMI to configure the following attributes of a log:

- **Suppression.** This controls whether the system issues a log message that is associated with an event. If you specify suppression for a log, then when the event occurs, the system does not issue the associated log message.
- **Severity.** There are 15 severity levels, from 'Status15' (the lowest) to 'Critical' (the highest). You can change the severity level of a log.
- **Class.** Each log has a class parameter which you can change if required. A class is an artificial grouping of logs. There are 16 log classes. When viewing or printing logs, the user can select logs by class.
- **Thresholding.** Thresholding specifies that the log message associated with an event is generated only if the event occurs a certain number of times within a certain time period, or at every so many occurrences of the event, as specified.

If multiple DNCs are linked in a Local Data Net network, each DNC contains its own copy of the Log Subsystem PRU. In such a case, you can modify the settings for a particular log message on a particular DNC. designate the DNC whose logs you wish to search. To designate a particular DNC, type in the value of the object index of the Log Subsystem PRU in that DNC. (For more information, see 'Configuring Centralized Log Collection for a Local Data Net Network', earlier in this part.)

The menu structure for this section is shown in Figure 20-5.

Figure 20-5
Screens for Configuring Log Settings



To configure log settings, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select Log MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Log MMI. It may instead be 'System Log', 'DNC Logger', or some other designation.)

The Logs MMI Main Menu appears, displaying a list of logs.

- (3) Press <Modify Settings>.

The system displays the Modify Settings Menu.

- (4) If multiple DNCs are linked in a Local Data Net network, indicate the DNC system in which you want to modify the log settings. Use the LAN field to designate the DNC system. To advance from field to field, press RETURN. Type in the value of the object index of the Log Subsystem PRU in the chosen DNC. (For more information, see 'Configuring Centralized Log Collection for a Local Data Net Network', earlier in this part.)
- (5) To specify the log message whose settings you want to modify, identify the message subsystem, the error number, and the report number by entering appropriate hexadecimal values in the SUBSYSTEM, ERROR NO, and REPORT NO fields.

To obtain a log's subsystem number, error number, and report number, select the log on the Logs MMI Main Menu, press <More Details>, and then press <Raw Details>. The resulting display contains the subsystem, error, and report numbers.

(The four hexadecimal digits identifying the message subsystem are the first four characters of the subsystem name. Message subsystems are listed in the :LOCAL:PRU:LOGS:LOGDESC directory.)

- (6) Press <Find>.

The system displays the Modify-Find Menu, listing the log settings that can be configured.

To advance from field to field on this screen, press RETURN. To move to the previous field, hold down the SHIFT key and press TAB.

- (7) To suppress the log, move the cursor to the Suppression field and press the space bar.

The system displays a checkmark in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.) To disable suppression and remove the mark, press the space bar again.

- (8) To change the log's severity level, move the cursor to the Severity field and type in the new severity.

- (9) To change the log's class, move the cursor to the Class field and type in the new class.
- (10) To specify thresholding, move the cursor to the Thresholding field and press the space bar.

The system displays a checkmark in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

- (11) If you are specifying thresholding and you want the system to issue a log message after every nth occurrence of the event, then move the cursor to the Count field and type in the number of occurrences.
- (12) If you are specifying thresholding and you want the system to issue a log message only if a certain number of events occur within a certain number of minutes, then move the cursor to the Duration field and type in the number of minutes.
- (13) After modifying the settings, press <Save and Commit> to save the new settings permanently, or <Save Temporary> to save the new settings in random access memory.

The system redisplay the Modify Settings Menu. Near the top of that screen, it displays a message stating that the update was successful.

If you decide not to update the log settings, you can press <Quit> to return to the Modify Settings Menu, or <Exit> to return to the Logs MMI Main Menu.

Note: If you use <Save Temporary>, then the new settings are lost if the system is rebooted, or if the Log Subsystem PRU goes out of service, or if that PRU's Applications Processor goes out of service.

- (14) Press the <Exit> softkeys until you arrive at the main menu.

Printing Logs Continuously

To print out logs continuously as they are generated, you must perform the following operations:

- configure an instance of the Log Printer output task PRU to run on one of the Applications Processors
- designate a printer queue as an administration queue
- assign a printer to the administration queue
- specify that logs should be sent to the administration queue
- specify that members of the user group can use the administration queue.

For information on configuring the Log Printer PRU, see Part 7, 'Configuring Program Resource Units'. For information on defining administration print queues and assigning printers to queues, see 'Defining a Print Queue', and 'Specifying a Printer's In-service Queue', in Part 14, 'Printer Administration'.

Sending Logs to the Administration Print Queue

If the system is to print logs continuously, the logs must be routed to an administration print queue. An administration print queue is one to which all users have administrator access, and to which no user has user access. These access rights are specified when the queue is defined.

To specify that logs should be sent to the administration print queue, proceed as follows:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select System Administrative Services and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and press ENTER.

The Configuration Services Menu appears.

- (5) Use the arrow keys to select Logger Device Editor, and then press ENTER.

The system displays the Logger Device Editor Screen for output device number 1 (see Figure 20-6). The cursor is in the Device Enabled field.

- (6) You can configure as many as 16 log output devices. Press <Next Device> until the screen displays an unused device number.

- (7) Enable the device by pressing the space bar. This causes a checkmark to appear in the box in the field. (An ASCII terminal displays an x in square brackets instead of a checkmark.) Then press RETURN.

The cursor moves to the Device Type field.

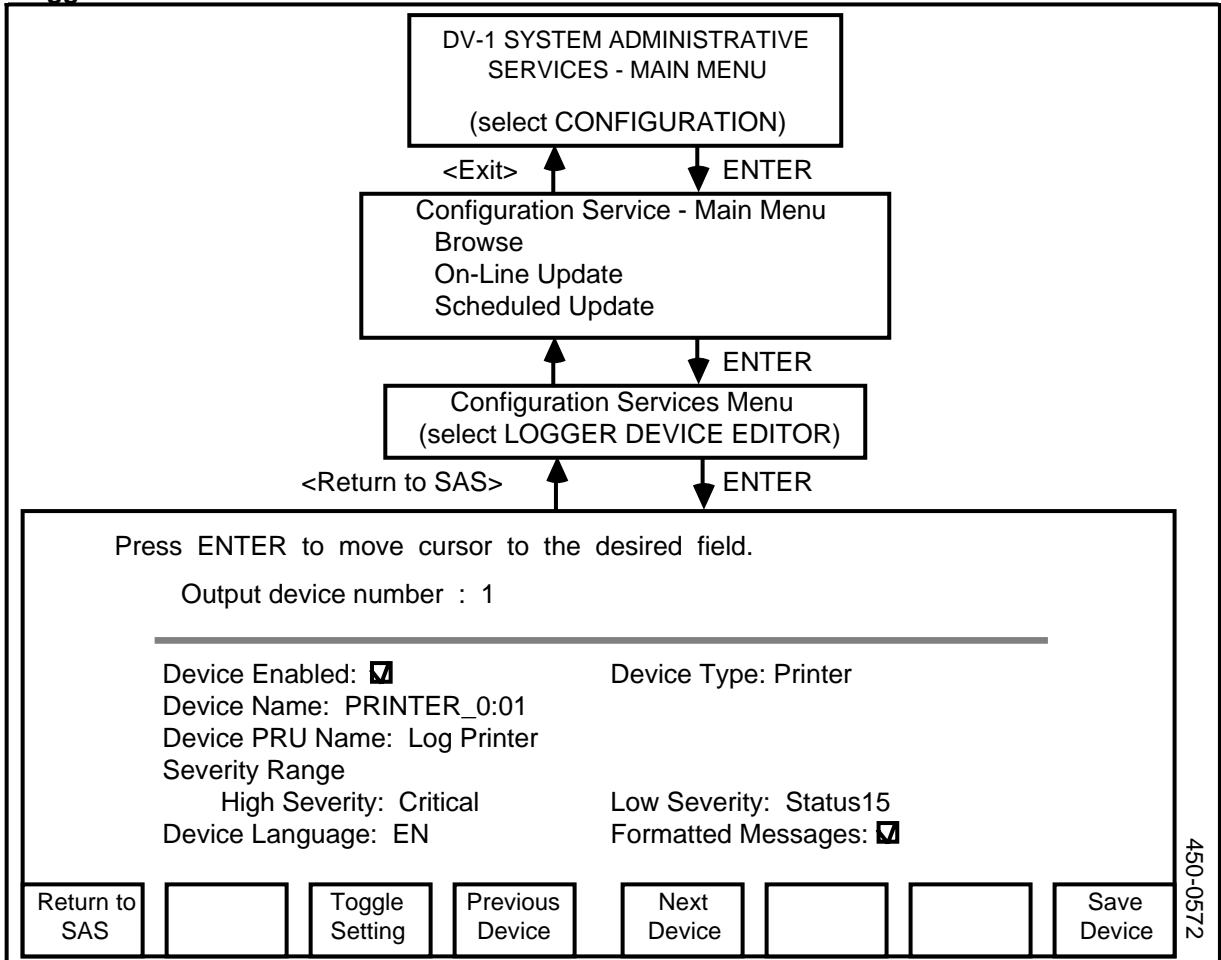
- (8) Press <Toggle Setting> until 'Printer' appears in the field. Then press RETURN.

The cursor moves to the Device Name field.

- (9) Type in the name of the administration print queue on whose printer the log messages are to be printed. Then press RETURN.

The cursor moves to the Device PRU Name field.

Figure 20-6
Logger Device Editor Screen



- (10) Press <Toggle Setting> until the name of the printer-output-task PRU appears in the field. (The default name of the PRU is 'Log Printer'.) Then press RETURN.

The cursor moves to the High Severity field.

- (11) Press <Toggle Setting> until the desired value is displayed in the field. (The highest severity level is 'Critical'.) Then press RETURN.

The cursor moves to the Low Severity field.

- (12) Press <Toggle Setting> until the desired value is displayed in the field. (The lowest severity level is 'Status15'. To specify that logs of all severity levels are eligible for printing, specify a highest severity of 'Critical' and a lowest severity of 'Status15'.) Then press RETURN.

The cursor moves to the Device Language field.

- (13) Press <Toggle Setting> until the desired language is displayed in the field. Then press RETURN.

The cursor moves to the Formatted Messages field.

- (14) To specify that the messages should be formatted for printing, press the space bar to put a checkmark in the box in the field. (An ASCII terminal displays an x in square brackets instead of a checkmark.)
- (15) Press <Save Device>.

At the top of the screen, the system displays a message stating that the device configuration has been saved.

- (16) Press <Return to SAS>.

The system redisplay the Configuration Services Menu.

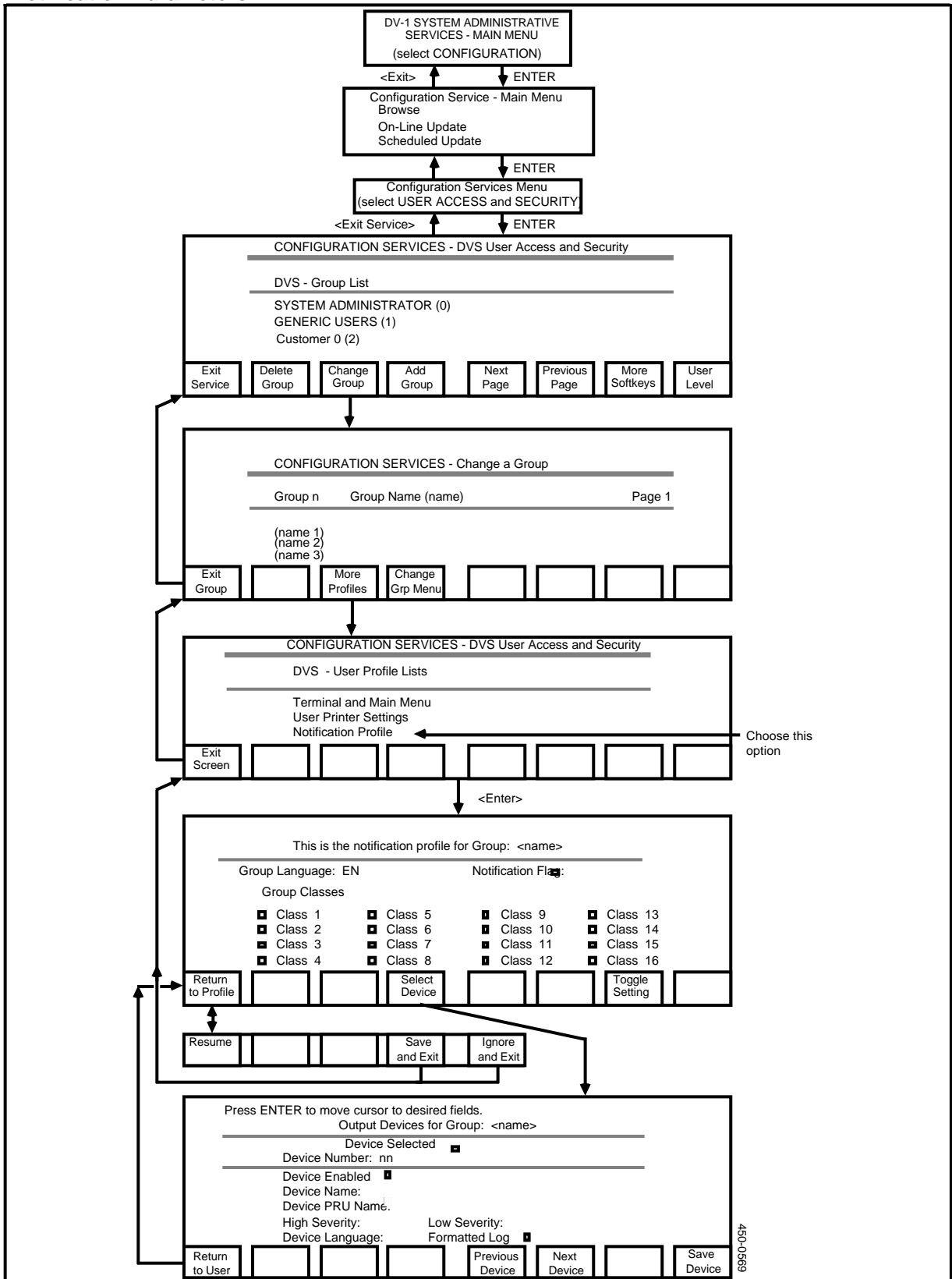
Having configured the printer to print logs continuously, you must now select the output device as one that can be used by members of the user group.

Granting Users Access to the Log Output Device

After using the Logger Device Editor to designate a printer as a device on which logs are to be printed continuously, you must select the printer as a device that the users can use for log output.

The menu structure for this section is shown in Figure 20-7.

Figure 20-7
Screens for Selecting Log Output Devices and for Specifying Group-level Notification Parameters



To select a log output device, proceed as follows:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select System Administrative Services and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The Configuration Services Menu appears.

- (5) Use the arrow keys to select User Access and Security, and then press ENTER.

The system displays the User Access and Security screen, displaying a list of user groups.

- (6) Use the arrow keys to select the user group, and then press <Change Group>.

The system displays the Change a Group screen.

- (7) Press <More Profiles>.

The system displays the User Access and Security Screen, with a list of options.

- (8) Use the arrow keys to select Notification Profile, and then press ENTER.

The system displays the Notification Profile screen for the user group.

Note: The fields on this screen allow you to specify the parameters controlling the display of log messages on lines 1 and 2 of the users' terminal screens. The values specified are defaults that apply to all users in the group. A user can override the defaults. For more information, see 'Log Notification Parameters for a Group', and 'Log Notification Parameters for a User', later in this part.

- (9) Press <Select Device>.

The system displays the Output Devices screen for the user group. When the screen appears, the cursor is prompting in the Device Selected field.

- (10) Press <Next Device> until the Device Number field displays the number of the required device.

- (11) Press the space bar to select the device.

A checkmark appears in the box in the Device Selected field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

- (12) Press <Save Device>.

The system displays a message stating that the device configuration has been saved.

- (13) Press <Return to User>.

The system redisplay the Notification Profile screen.

- (14) Press <Return to Profile>.

New softkeys appear.

- (15) Press <Save and Exit>.

The system redisplay the User Access and Security screen.

- (16) Press the <Exit> softkeys until you arrive at the main menu.

Specifying Log Notification Parameters

If a log message is issued while a user is signed on, the system can display the message on the notification lines (lines 1 and 2) on the user's terminal screen.

Note: On ASCII terminals, messages appear in the notification lines only when the user is on the system main menu.

The log notification parameters control which classes of messages are displayed on the notification lines, and the language of the display. (You can choose from as many as three languages, typically English, French, and Spanish.) You can specify log notification parameters at both the group and user levels. By default the user-level parameters apply to each user in the group. User-level parameters can be specified to override the defaults.

Specifying Log Notification Parameters for a Group

The menu structure for specifying group-level notification parameters is shown in Figure 20-7.

To specify the parameters, take the following steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select System Administrative Services and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The Configuration Services Menu appears.

- (5) Use the arrow keys to select User Access and Security, and then press ENTER.

The system displays the User Access and Security screen, displaying a list of user groups.

- (6) Use the arrow keys to select the user group, and then press <Change Group>.

The system displays the Change a Group screen.

- (7) Press <More Profiles>.

The system displays the User Access and Security Screen, with a list of options.

- (8) Use the arrow keys to select Notification Profile, and then press ENTER.

The system displays the Notification Profile screen for the user group.

On this screen, press RETURN to advance from one field to the next.

- (9) In the Group Language field, specify the language in which the logs are to be displayed. To change the value of this field, press <Toggle Setting>.

- (10) To enable notification, move the cursor to the Notification Flag field, and press the space bar.

A checkmark appears in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

- (11) To specify that a certain class of logs should be displayed on users' terminals, move the cursor to the field for the class, and press the space bar.

A checkmark appears in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

Note: You may specify multiple classes.

- (12) When the settings are correct, press <Return to Profile>.

New softkeys appear.

- (13) Press <Save and Exit>.

The system redisplay the User Access and Security screen.

- (14) Press the <Exit> softkeys until you arrive at the main menu.

Specifying Log Notification Parameters for a User

If specified, notification parameters for an individual user override parameters for the user's user group.

The menu structure for specifying user-level parameters is shown in Figure 20-8.

To specify notification parameters for a user, take the following steps:

- (1) Sign on as the system administrator.

The main menu appears.

- (2) Select System Administrative Services and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select CONFIGURATION and press ENTER.

The Configuration Service - Main Menu appears.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The Configuration Services Menu appears.

- (5) Use the arrow keys to select User Access and Security, and then press ENTER.

The system displays the User Access and Security screen, displaying a list of user groups.

- (6) Use the arrow keys to select the user group, and then press <User Level>.

The system displays the User Group screen, listing the users in the group.

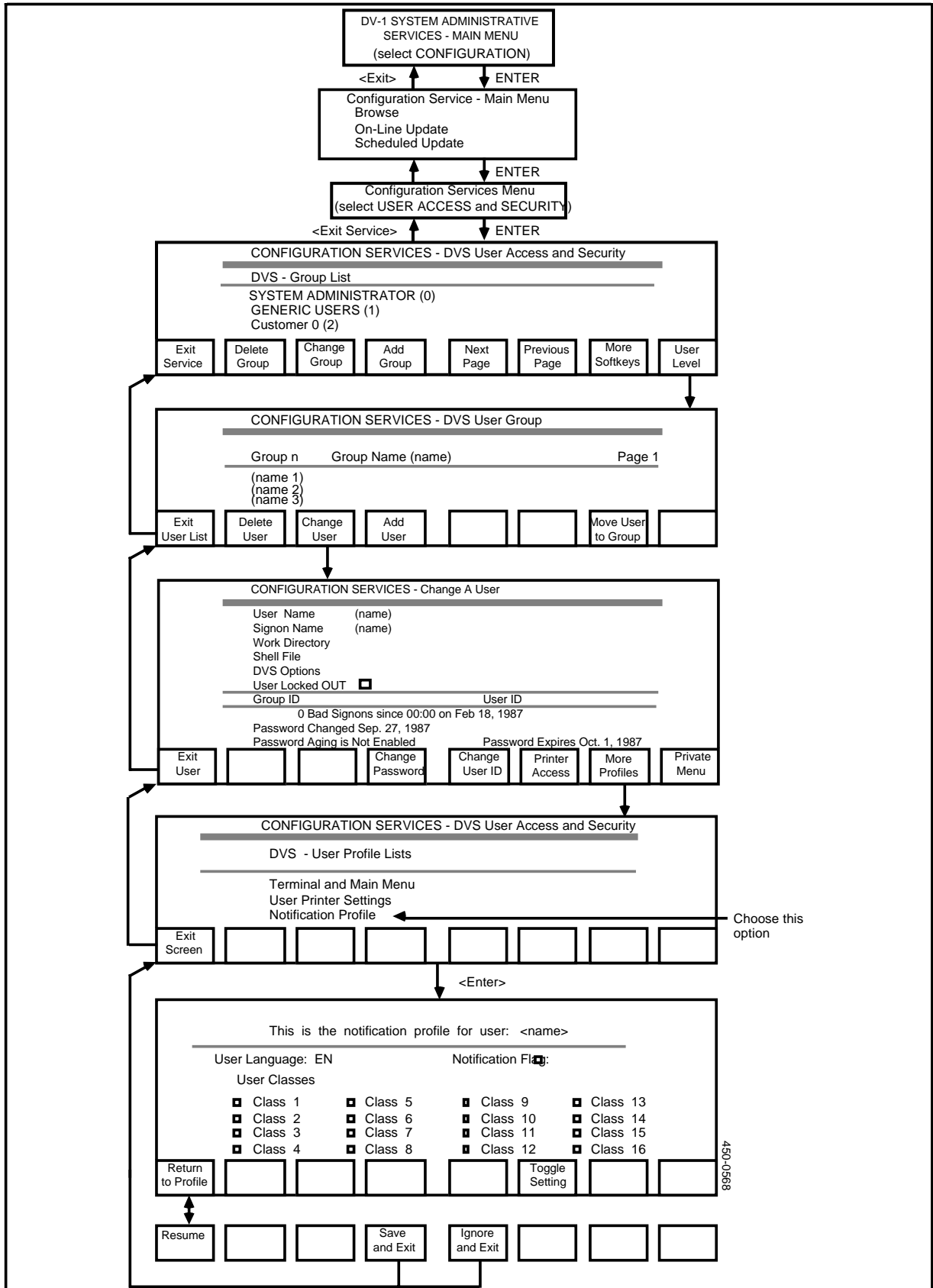
- (7) Use the arrow keys to select the user, and then press <Change User>.

The system displays the Change a User screen for the user.

- (8) Press <More Profiles>.

The system displays the User Access and Security screen, with a list of options.

Figure 20-8
Screens for Specifying User-level Notification Parameters



- (9) Use the arrow keys to select Notification Profile, and then press ENTER.

The system displays the Notification Profile screen for the user.

On this screen, press RETURN to advance from one field to the next.

- (10) In the User Language field, specify the language in which the logs are to be displayed. To change the value of this field, press <Toggle Setting>.
- (11) To enable notification, move the cursor to the Notification Flag field, and press the space bar.

A checkmark appears in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

- (12) To specify that a certain class of logs should be displayed on users' terminals, move the cursor to the field for the class, and press the space bar.

A checkmark appears in the box in the field. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

Note: You can specify multiple classes.

- (13) When the settings are correct, press <Return to Profile>.

New softkeys appear.

- (14) Press <Save and Exit>.

The system redisplay the User Access and Security screen.

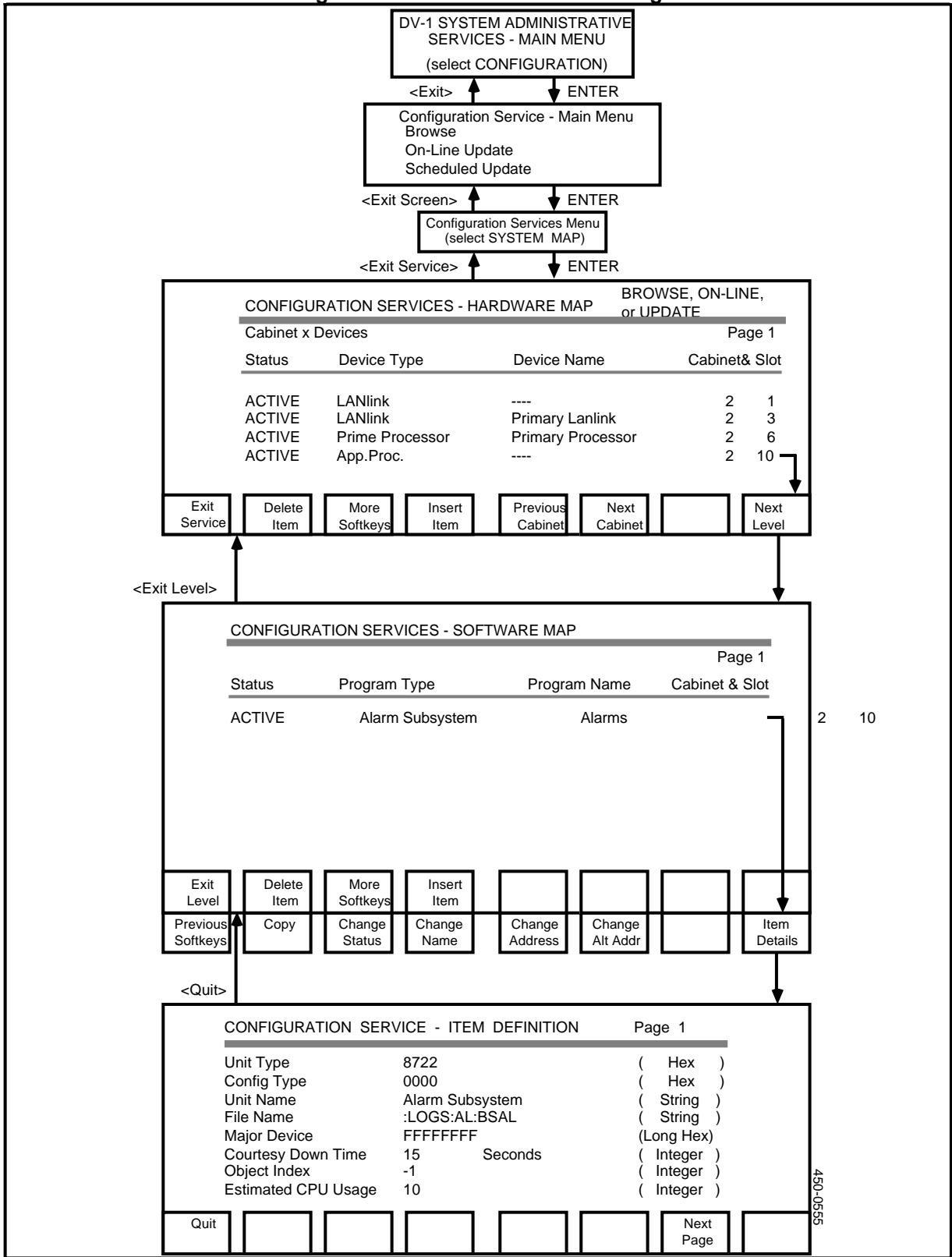
- (15) Press the <Exit> softkeys until you arrive at the main menu.

Finding a PRU's Unit Number and Configuration Number

This procedure accesses the SAS configuration service for the purpose of determining a PRU's unit number and configuration number.

The menu structure is shown in Figure 20-9.

Figure 20-9
Menu Structure for Determining a PRU's Unit Number and Configuration Number



To determine a PRU's unit number and configuration number, take the following steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (5) Select System Map and press ENTER.

The first Hardware Map screen appears, listing the SRUs in the first cabinet.

- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU where the PRU resides.

- (7) Select the SRU, and press <Next Level>.

The system displays the Software Map screen, listing the PRUs that currently reside on the SRU.

- (8) Press <More Softkeys>.

New softkeys appear.

- (9) Select the PRU and press <Item Details>.

The system displays the Item Details screen for the PRU. The values in the Unit Type and Config Type fields are the PRU's unit number and configuration number, respectively.

- (10) To exit, press <Quit>, then press <Previous Softkeys>, and then press the <Exit> softkeys until you arrive at the main menu.

The DVS Log Service

The DVS Log service is separate from the DNC Log service. The DVS Log service handles logs generated by the base DVS software, which is the underlying software for the DNC system.

Most of the log messages generated by the DVS Log service are collected by monitor routines in the SRUs and are automatically forwarded to the DNC Log service. However, a small minority of the DVS Log service's messages are not sent to the DNC Log service. This interface enables you to control all DVS Log messages, including those not sent to the DNC Log service.

Displaying DVS Logs

You can display the DVS logs that have not been sent to the DNC Log service. To display the logs, take the following steps:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the Main Menu.
- (3) From the System Administrative Services Main Menu, select SYSTEM LOG, and press ENTER.

The system displays the System Log - Messages screen, which displays a list of messages and associated devices. The screen displays eight messages at a time.

- (4) Use the arrow keys to select one of the eight messages, then press ENTER to display the detailed message on the screen. (See Figure 20-10.)
- (5) Move through additional screens by pressing the following softkeys:
 - <Next Page> displays the next eight messages (if present), or wraps to the first screen.
 - <Previous Page> returns to the previous message screen, or wraps to the last screen.
 - <Exit Service> returns to the System Administrative Services Main Menu.

Setting up Log Options for DVS Logs

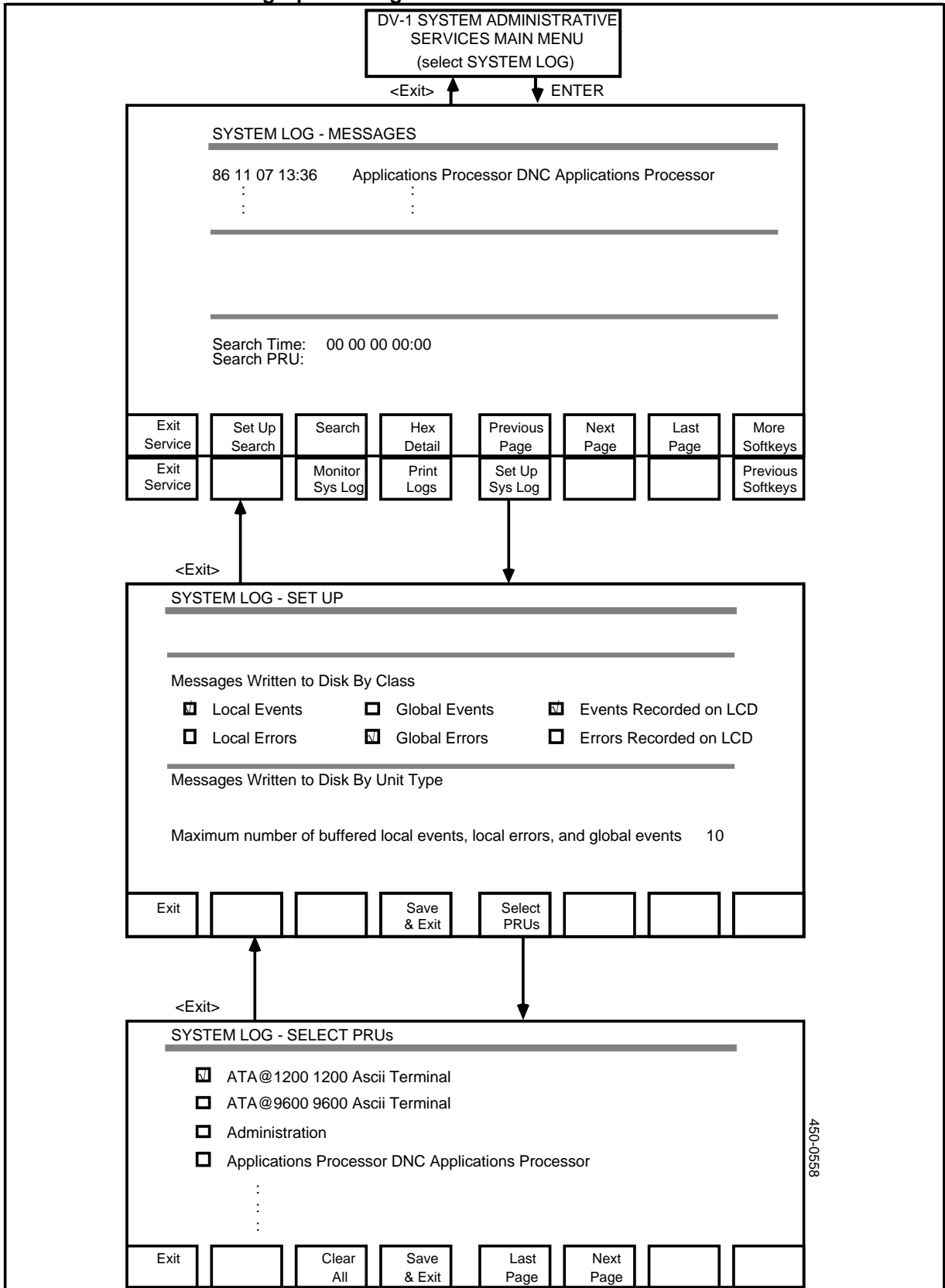
This procedure describes how to define the type and source of DNC Log service messages that are to be retained on a system disk or routed for automatic printing on a peripheral printer device.

The DVS Log service does not automatically send all the messages it issues to a disk file. It does not record the messages that it sends to the DNC Log service, because the DNC Log service records them. Of the remaining messages, the DVS Log service records only those types of messages that you designate. The process of designating the message types is called setting up the logs.

You can specify that all messages not sent to the DNC Log service should be recorded, or you can specify that only those in certain classes should be recorded. You can screen messages by message type and by system component.

The menu structure is shown in Figure 20-10.

Figure 20-10
Menu Structure for Setting Up DVS Logs



To set up the log options, take these steps:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the Main Menu.
- (3) From the System Administrative Services Main Menu, select SYSTEM LOG, and press ENTER.

The system displays the System Log - Messages screen.

- (4) On the System Log - Messages screen, press <More Softkeys>.

New softkeys appear.

- (5) Press <Set Up Sys Log>.

The system displays the System Log - Set up screen, which lists the options to configure the operation of the log service.

- (6) Select the classes of log messages that are to be sent to the system log. If a class is selected, then all messages belonging to that class are written to the system log. To select a class, use the arrow keys to move the cursor to the box beside the class name on the screen, and then press the space bar. This action places a checkmark in the box. (An ASCII terminal displays an x within square brackets instead of a checkmark.) Pressing the space bar again removes the mark. The screen displays the following event classes:

- local events
- local errors
- global events
- global errors
- events recorded on the liquid crystal display (LCD) of the Primary Processor SRU (when so equipped)
- errors recorded on the liquid crystal display (LCD) of the Primary Processor SRU (when so equipped).

Note: If you select all classes of messages, every message generated by any part of the system will be recorded, so it is not necessary to designate individual PRUs as message sources. In this case, you should go directly to Step 10 of this procedure.

- (7) If you want to specify certain PRUs from which all messages should be recorded, press <Select PRUs>.

The system displays the System Log - Select PRUs screen, which lists devices.

- (8) On the System Log - Select PRUs screen, select the PRUs for which log messages are to be recorded. If a PRU is selected, then every message pertaining to that PRU is written to the system log, regardless of message class. To select a PRU, use the arrow keys to move the cursor to the box beside the PRU name on the screen, and then press the space bar. This action places a checkmark in the box. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

You can remove an unwanted checkmark (or x) by selecting the box and pressing the spacebar. To clear all existing marks from the list, press <Clear All>.

The complete list of PRUs may extend over several screens. Use <Next Page> and <Last Page> to move from one page to another.

- (9) When all the required PRUs have been selected,
- press <Save & Exit>, to exit with the designated device selections, or
 - press <Exit>, to exit and cancel the device selections.

The system displays the System Log - Set up screen, which now lists the selected devices under the heading "Messages Written To Disk By Unit Type".

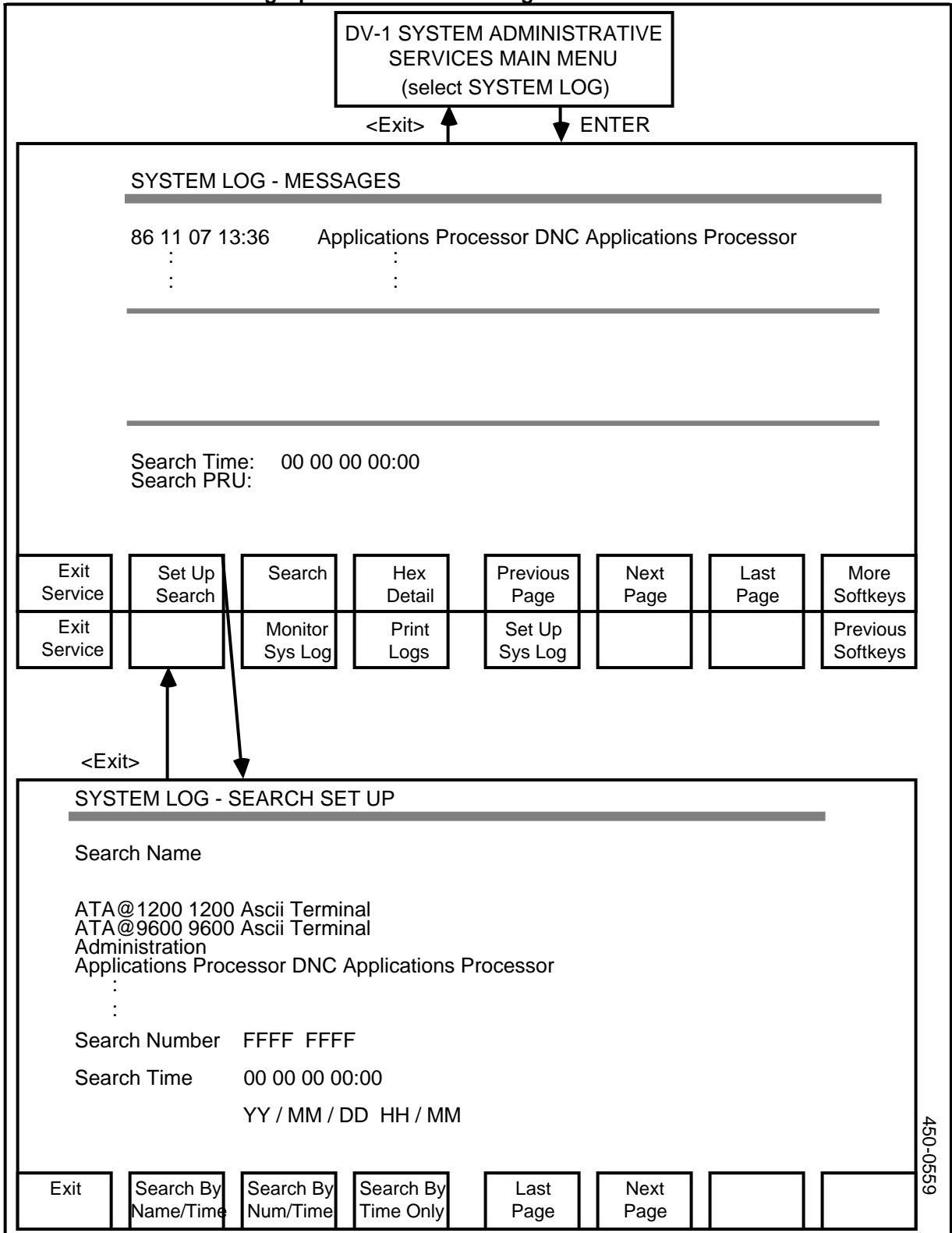
- (10) On the System Log - Set up screen,
- press <Save & Exit> to exit with all designated message-class and device selections, or
 - press <Exit> to exit and cancel the selections.
- (11) Press the <Exit> softkeys until you arrive at the main menu. This saves the new log set-up on the disk.

Setting Up a Search for DVS Logs

You set up a search of the system log if you want to check the log messages that are related to a specific PRU, or if you want to inspect the messages that were recorded during a certain time period. The DNC Log service then searches through its disk file of log messages, and retrieves only those that you require. (Note that the disk file contains only the DVS logs that are not sent to the DNC Log service.)

The menu structure is shown in Figure 20-11.

Figure 20-11
Menu Structure for Setting Up a Search for DVS Logs



To set up a search of the system log, take the following steps:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the Main Menu.

The system displays the System Administrative Services Main Menu.

- (3) On the System Administrative Services Main Menu, select SYSTEM LOG, and press ENTER.

The system displays the System Log - Messages screen, which displays a list of messages and associated devices. The screen displays eight messages at a time.

- (4) On the System Log - Messages screen, press <Set Up Search>.

The System Log - Search Set Up screen appears. The softkeys on this screen enable you to carry out three kinds of searches:

- <Search by Name/Time> searches by PRU name.
- <Search by Num/Time> searches by PRU number.
- <Search by Time Only> searches by time only.

Note that when it first appears, this screen displays only the first page of the units for which message searching can be implemented. To page through the list, use <Next Page> and <Last Page>.

- (5) If you are going to search by PRU name or by PRU number, use the arrow keys to select the unit or units for which the search is to be implemented.
- (6) If you are going to search by time only, then press TAB or RETURN to move the cursor to the First Time field, and specify the start of the time range by typing in the year, month, day, hour, and minute in integer form. Then move the cursor to the Last Time field, and specify the end of the time range by typing in the year, month, day, hour, and minute in integer form.
- (7) Press the softkey that calls for the type of search you want.
- (8) Press <Exit>.

The system redisplay the System Log - Messages screen.

- (9) On the System Log - Messages screen, press <Search>.

Each time you press the softkey, the system retrieves another message that complies with the specified search criteria (units or time).

- (10) From the System Log - Messages screen, you can set up a new search with new criteria by pressing <Set Up Search> again.
- (11) When you are finished searching, exit by pressing <Exit Service> on the System Log - Messages screen.

The system displays the System Administrative Services Main Menu.

Continuously Monitoring DVS Logs

This procedure describes how to access the DVS Log service to observe system output messages as they occur.

The menu structure is shown in Figure 20-12.

To continuously monitor the DVS logs that are not sent to the DNC Log service, proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu.

The system displays the System Administrative Services Main Menu.

- (3) From the System Administrative Services Main Menu, select SYSTEM LOG.

The system displays the System Log - Messages screen, which lists the eight most recent log messages. the last eight messages and the softkeys.

- (4) Press <More Softkeys>.

New softkeys appear.

- (5) Press <Monitor Sys Log>.

The system displays the System Log - Monitor screen, and displays messages on that screen as the log service receives them. The display scrolls as messages are received.

- (6) To halt scrolling of messages, press <Pause Scroll>.

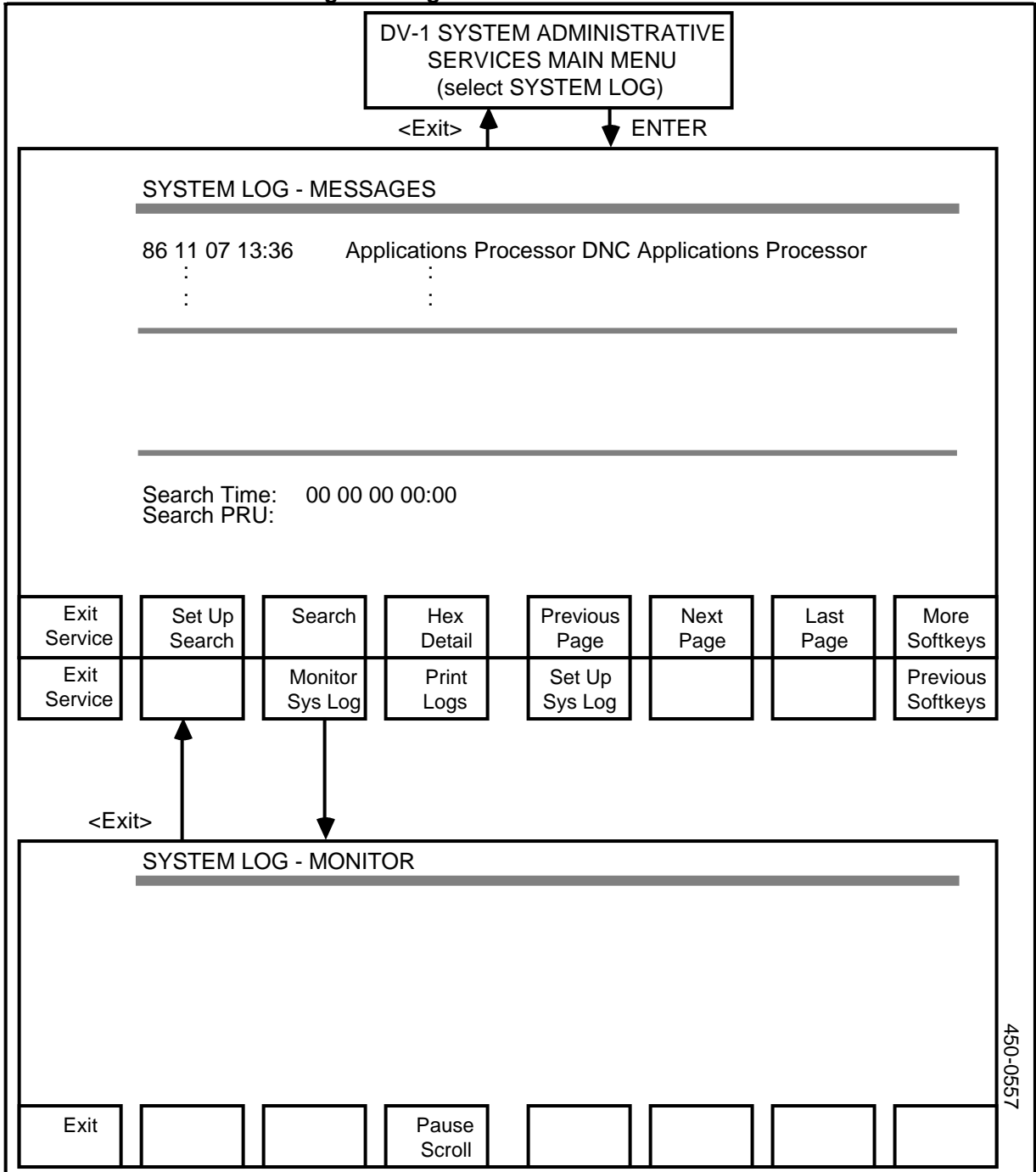
To restore scrolling of messages, press <Resume Scroll>.

- (7) To end the monitoring session, press <Exit>.

The system returns to the System Log - Messages screen.

- (8) Press <Exit Service> to return to the System Administrative Services Main Menu.

Figure 20-12
Menu Structure for Accessing DVS Logs in Continuous Monitor Mode



450-0557

Displaying Detailed Messages from the DVS Log Service's Log File

This procedure describes how to display a detailed explanation of a DVS log message and its corresponding hexadecimal version. Note that these logs are only those that the DVS Log service does not send to the DNC Log service.

The menu structure for this section is shown in Figure 20-13.

To display detailed messages from the DVS Log service's log file, take the following steps:

- (1) Sign on as a system administrator.
- (2) Select System Administrative Services on the main menu.
- (3) On the System Administrative Services Main Menu, select SYSTEM LOG.

The system displays the System Log - Messages screen, which lists the messages that have been stored on disk. The screen lists only eight devices at a time, so the list may extend over several screens.

- (4) To access the detailed log message, move through the System Log - Messages screen as required, using the following softkey functions:
 - <Next Page> displays the next eight messages (if present). At the bottom of the list, it wraps to the first screen.
 - <Previous Page> returns to the previous message screen. At the top of the list, it wraps to the last screen.
 - <Exit Service> returns to the System Administrative Services Main Menu.
- (5) To display the detailed DVS log message, use the arrow keys to select one of the eight displayed messages, and press ENTER.

The system displays the detailed message in the bottom portion of the System Log - Messages screen.

- (6) If the information in the detailed message is insufficient, you can obtain the hexadecimal details of the message. Select the message on the System Log - Messages screen, and press <Hex Detail>.

The system displays the System Log - Hex Detail screen, showing the hex detail of that message (see Figure 20-13).

- (7) To return to the System Log - Messages screen from the System Log - Hex Detail screen, press <Exit>.

Printing Stored DVS Log Messages

You can print some or all of messages that have been written to the DVS Log service's log file. Note that this file contains only those logs that the DVS Log service does not send to the DNC Log service.

Proceed as follows:

- (1) Sign on as a system administrator.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES from the main menu.

The system displays the System Administrative Services Main Menu.

- (3) From the System Administrative Services Main Menu, select SYSTEM LOG.

The system displays the System Log - Messages screen, which lists the eight most recent log messages. the last eight messages and the softkeys.

- (4) On the System Log - Messages screen, press <More Softkeys>.

New softkeys appear.

- (5) Press <Print Logs>.

The system displays the Print Log Reports screen

- (6) Specify the reporting period. The system prints messages received during the reporting period that you specify. To specify the reporting period, press either the TAB key or the RETURN key to move to the First Report Time field, and enter the time indicating the beginning of the period. Then move to the Last Report Time field, and enter the time indicating the end of the period.

Note: If you do not specify a first report time, it defaults to the time at which the oldest message was received; if you do not specify a last report time, it defaults to the time at which the most recent message was received.

- (7) Specify the PRUs. This step further narrows the range of messages that the system prints. Of the messages received during the specified time period, the system prints only those that pertain to the specified PRUs. To specify the PRUs, press <Select PRUs>.

The system displays the System Log - Select PRUs screen.

- (8) On the System Log - Select PRUs screen, use the arrow keys to step through the list of PRUs, and select the required PRUs. To select a PRU, use the arrow keys to move the cursor to the box beside the PRU name on the screen, and then press the space bar. This action places a checkmark in the box. (An ASCII terminal displays an x within square brackets instead of a checkmark.) To select all the PRUs in the list, press <Select All>.

To remove an unwanted mark, select the PRU and press the spacebar. To clear all existing marks from the list, press <Clear All>.

The complete list of PRUs may extend over several screens. Use <Next Page> and <Last Page> to move from one page to another.

- (9) After specifying the desired PRUs, do one of the following:
- Press <Save & Exit> to exit with the specified PRU selections.
 - Press <Exit> to cancel the PRU selections.

The system returns to the Print Log Reports screen. On this screen, under the Received from heading, the system lists the PRUs whose log messages are to be printed.

- (10) Press one of the following:
- <Exit> to exit and return to the System Log - Message screen without printing any system log reports
 - <Print Report> to print the reports selected
 - <Print with Hex> to print the reports with the hexadecimal details included.

Note: If you specify that log messages should be printed, the system uses the print queue that is assigned as your default print queue on the Default Selection screen. For more information on default print queues, see 'Specifying a User's Access Rights to Print Queues', in Part 14, 'Printer Administration'.

- (11) To exit, press the <Exit> softkeys until you arrive at the main menu.

21. Alarms in the DNC

An alarm is caused by a log with a severity level of critical, major, or minor. (These are the three highest of 15 severity levels for logs in the DNC Log service.)

Whenever the DNC Log service issues a log message with one of these severity levels, it passes the message to the alarm service. The alarm service then issues an alarm, which includes the text of the log message and has the same severity level.

When the alarm service issues an alarm message, the message is recorded in the alarm history file. This is a circular file like the log history file. When a user calls for a printout or a display of alarms, the system scans the alarm history file, and selects those alarm messages that qualify for printing or display. (The user can specify the criteria that the system uses to select alarms.)

Configuring the Alarm Service

The alarm service requires the following PRUs:

- Alarm Subsystem
- Log Subsystem
- Notification Server
- Log/Alarm Query.

The PRUs do not need to reside on the same Applications Processor.

For information on configuring PRUs, see Part 7, 'Configuring Program Resource Units'.

Configuring the Alarm Interface Unit (ALIU)

The alarm service communicates with an Alarm Interface Unit (ALIU). The ALIU is installed in the options slot of a LAN Interface Unit (LIU). (For installation instructions, see 450-1011-201, Installation Guide for Cabinet Systems, or 450-1011-202 Installation Guide for Bay Systems.)

For each ALIU, you must configure a port in a LANlink Interface Unit (LIU). The LIU port for an ALIU must have an APIO port personality. (For information on configuring port personalities, see Part 9, 'Configuring Port Personalities for External Devices'.) In addition, you must define the APIO port in the APIDATA paragraph of the batch configuration file. (For information on the batch configuration file, see Part 13, 'Configuring ASCII Device Services'.) The APIO port must have the following parameter values:

Parameter	Value
TRANSMIT	9600
RECEIVE	9600
FLOW	XOFF
PARITY	NONE
DATA	8
STOP	1
LINEMODE	FULL
ECHO	OFF
MODEM	NONE
BUFFER	256
PACKET	128
TIMEOUT	10
DELIM	10:13
MISC	-A

For information on the batch configuration file, see Part 13, 'Configuring ASCII Device Services'.

Configuring the Alarm Initialization File

The alarm initialization file includes various parameters controlling the alarm service. If you are the superuser, you can edit the alarm initialization file to specify the following parameters:

- the number of messages that the circular alarm history file can hold
- the device that sounds the audible alarm signal.

Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.

To configure the alarm initialization file, proceed as follows:

- (1) Sign on as the superuser.

The main menu appears.

- (2) Select **SYSTEM ADMINISTRATIVE SERVICES**, and press **ENTER**.

The System Administrative Services Main Menu appears.

- (3) Select **Utilities** and press **ENTER**.

The Utilities Service - Main Menu appears.

- (4) Select **Helix Command Interpreter**, and then press **ENTER**.

The system prompt appears. (It is usually '>'.)

- (5) To start the editor, type in the command

ED :LOCAL:PRU:LOGS:AL:ALINIT.TEXT

and then press ENTER.

The initialization file appears on the screen.

- (6) To change the size of the alarm history file, use the arrow keys to move the cursor to the FILESIZE field, and type in the number specifying how many alarm messages the file should hold.
- (7) To enable the Alarm Interface Unit, the 'AIUConfigured' field must have the value 'true', and the 'Apt_destination' field must specify the address (cabinet, slot, line, and port) of the Alarm Interface Unit. In a standard installation, the Alarm Interface Unit is connected to port 2 on the base of the LIU. (Installation instructions can be found in NTPs 450-1011-201 and 450-1011-202.)

If you need to modify the value of the 'AIUConfigured' field or the 'Apt_destination' field, use the arrow keys to move the cursor to the field, and type in the proper value.

- (8) If the speaker of an M4020 terminal is to sound audible alarms, then the 'AlphaConfigured' field must have the value 'true', and the 'Vtp_destination' field must specify the address (cabinet, slot, and line) of the terminal. The value of the port must always be set to zero.

If you need to modify the value of either field, use the arrow keys to move the cursor to the field, and type in the proper value.

Note 1: An M4020 that is designated as the alarms terminal does not have functional telephony.

Note 2: You can specify an Alarm Interface Unit and an M4020 terminal as concurrent alarm units if required.

- (9) Save the initialization file. To do so, press the RESET key, then press Q, and then press S.
- (10) After saving the file, exit from the editor by pressing E.

You exit to the Helix Command Interpreter. The system prompt reappears.

- (11) To exit from the Helix Command Interpreter, type in EXIT and then press ENTER.

The Utilities Service - Main Menu reappears.

The Alarm MMI

To access the user interface for controlling alarms, select the Alarms option on the main menu.

This user interface enables you to:

- display alarms and alarm details
- print alarms

- cut off the audible signal that accompanies alarms
- change the state of an alarm.

Displaying Alarms

The menu structure for this section is shown in Figure 21-1.

To display alarms, take the following steps:

- (1) Sign on.

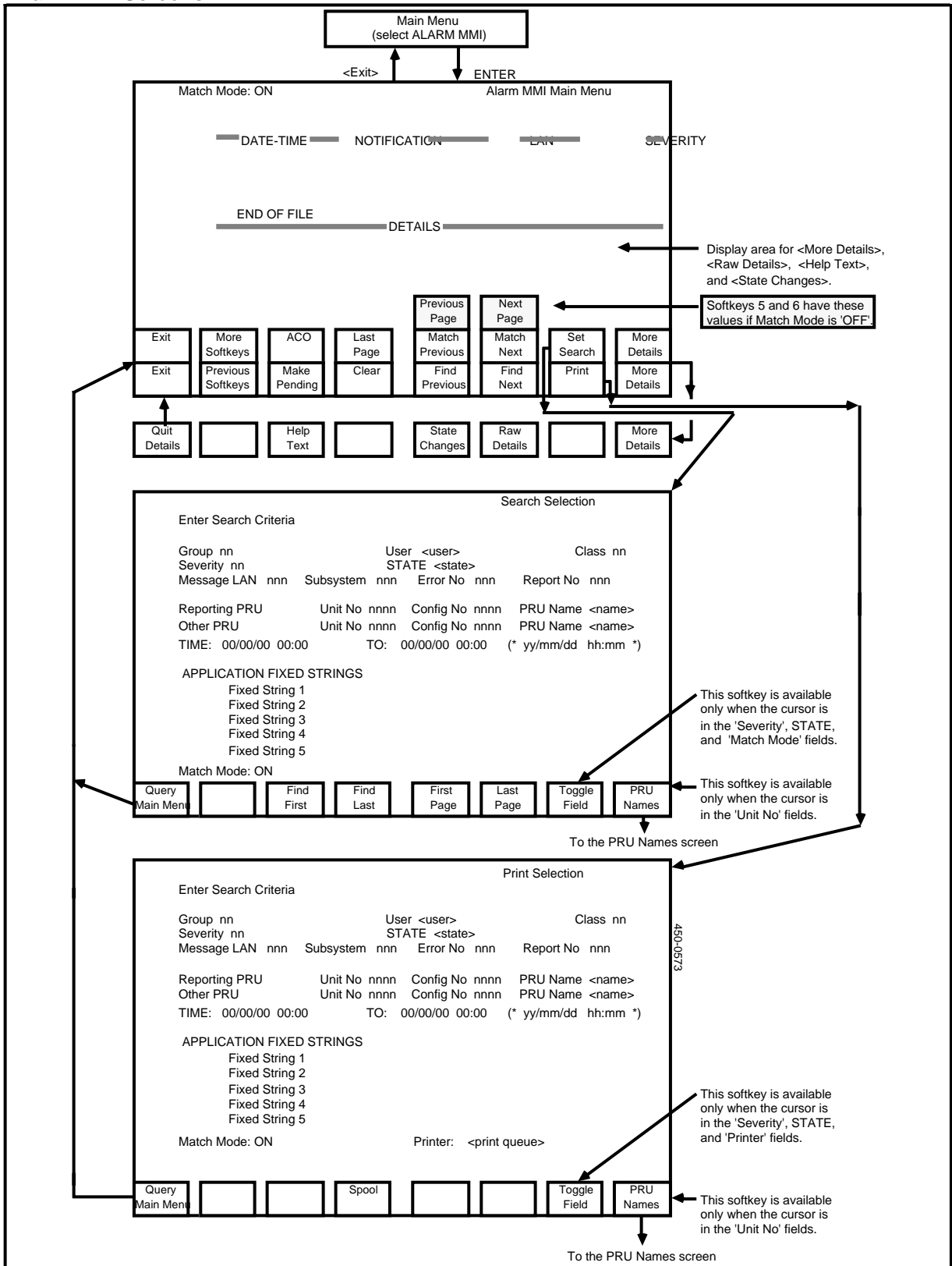
The Main Menu appears.

- (2) Select Alarm MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Alarm MMI. It may instead be 'Alarms', 'DNC alarms', or some other designation.)

The Alarm MMI Main Menu appears, displaying a list of active alarms. The field in the top left corner of the screen tells you that match mode is enabled. This means that the alarms on the screen have been selected from the alarm messages in the alarm history file because they match certain search criteria. (You can modify the search criteria. See 'Setting the Search Criteria', later in this part.) The system displays the most recent alarms first. In this list, each alarm is reported in abbreviated form, including the following information:

- the date and time
 - the program that generated the log that triggered the alarm
 - the LAN number of the DNC where the program resides, shown in parentheses (displayed only if the DNC is part of a Local Data Net network)
 - the alarm's severity level.
- (3) If you want to page through the list of alarms that satisfy the search criteria, press <Match Next>. Following the first display, the system displays matching alarms in chronological order, starting with the earliest ones. <Match Previous> moves backwards through the list.

Figure 21-1
Alarm MMI Screens



- (4) If you want the system to scan the alarm history file and display all the alarms that you are entitled to access, you must go to the Search Selection screen and change the setting of the Match Mode parameter:

- Press <Set Search>.

The system displays the Search Selection screen.

- Press RETURN repeatedly until the cursor arrives in the Match Mode field.
- Press <Toggle Field>.

The value of the field changes to 'OFF'.

- Press <Query Main Menu>.

The system redisplay the Alarm MMI Main Menu. Match mode is now disabled, and the fifth and sixth softkeys are now <Previous Page> and <Next Page>. You can use these softkeys to page through all the alarm messages that you are entitled to access. (If you are a system administrator, you can access alarms generated for all groups; if you are not a system administrator, you can access alarms generated for your own group, and broadcast alarms, which are available to all users.)

- (5) If you want more details about a displayed alarm, use the arrow keys to select the alarm, and then press <More Details>.

The system displays the details in the lower portion of the screen.

- (6) To display alarms that have been issued since you entered the alarm MMI, press <Last Page>.

The system scans the alarm history file once again, and selects the alarms that you are entitled to access. If match mode is enabled, it selects from that group the alarms that satisfy the search criteria, and it displays the last page of the list.

- (7) To return to the main menu, press <Exit>.

Displaying Detailed Information About an Alarm

To display detailed information about an alarm, use the arrow keys to select the alarm on the Alarm MMI Main Menu and then press <More Details>.

New softkeys appear, and detailed information appears in the lower portion of the Alarm MMI Main Menu.

To restore the original softkeys, press <Quit Details>.

Displaying Help Text for an Alarm

To display help text concerning an alarm, select the alarm on the Alarm MMI Main Menu, press <More Details>, and then press <Help Text>.

Help text appears in the lower portion of the Alarm MMI Main Menu.

To restore the original softkeys, press <Quit Help Text>.

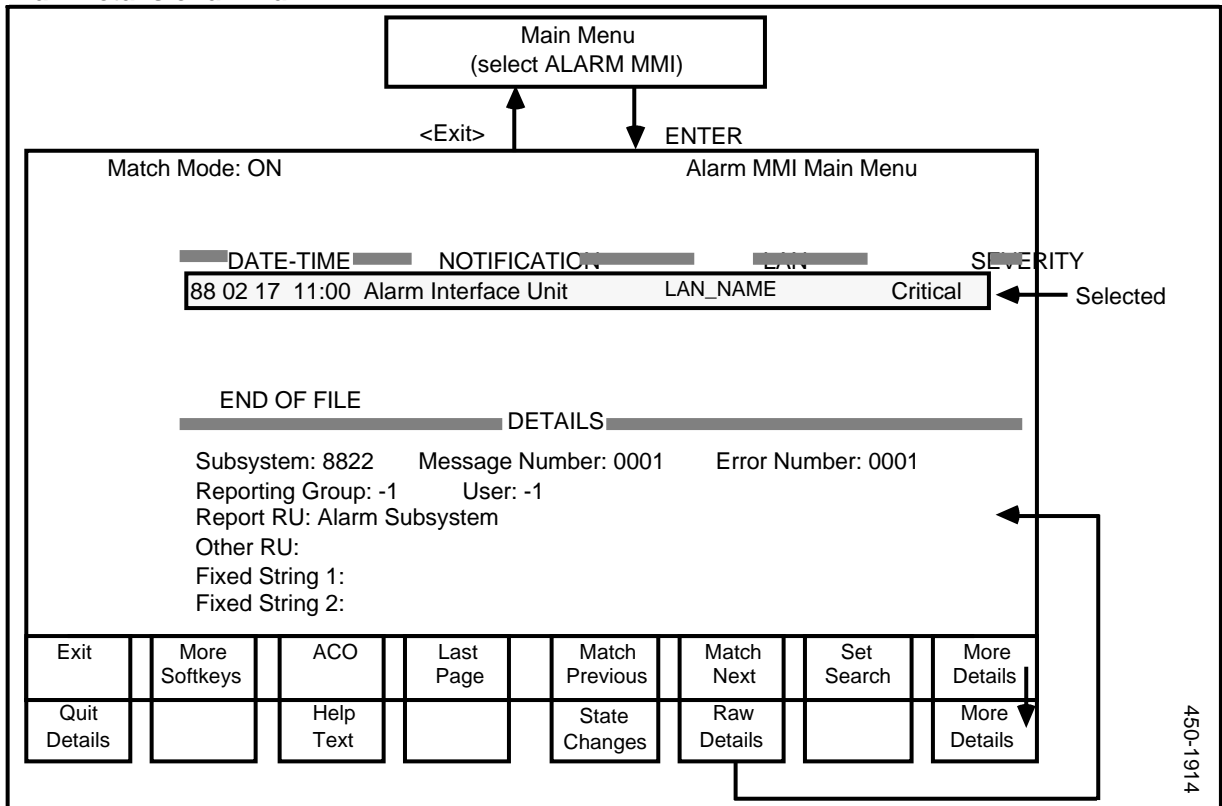
Displaying Raw Details

To display an alarm in unformatted form, select the alarm on the Alarm MMI Main Menu, press <More Details>, and then press <Raw Details>.

The unformatted alarm appears in the lower portion of the Alarm MMI Main Menu, as shown in Figure 21-2. If the amount of information exceeds the available space, the softkey becomes <More Raw Details> to enable you to display the rest of the information.

To restore the original softkeys, press <Quit Details>.

Figure 21-2
Raw Details of an Alarm



Inspecting an Alarm's State Changes

To inspect the state changes that an alarm has gone through, select the alarm on the Alarm MMI Main Menu, press <More Details>, and then press <State Changes>.

In the lower portion of the Alarm MMI Main Menu, the system displays a list of the state changes that the alarm has gone through, showing the time when each state change occurred.

Setting the Search Criteria

The search criteria specified on the Search Selection screen determine which alarms are displayed on the Alarm MMI Main Menu when match mode is enabled.

The menu structure for this section is shown in Figure 21-1.

To set the search criteria that apply to you, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select Alarm MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Alarm MMI. It may instead be 'Alarms', 'DNC Alarms', or some other designation.)

The Alarm MMI Main Menu appears, displaying a list of alarms.

- (3) Press <Set Search>.

The system displays the Search Selection screen.

- (4) Enter the search criteria in the fields on this screen.

To advance from one field to the next on the screen, press RETURN. To move to the previous field, hold down SHIFT and press TAB.

The Search Selection screen lists the selection criteria. In each field you can specify a parameter value. The system uses the criteria when displaying alarms for you. It scans the alarm history file, selects the alarms that you are entitled to access, and from that group displays only those that satisfy all the parameters currently shown on the Search Selection screen. If a value is not shown for a parameter on this screen, then all alarms satisfy that parameter.

The search selection parameters are:

Group. If you are a system administrator, you can specify a group, and then the alarms generated for that group are eligible for display. If you are not a system administrator, you cannot configure this parameter, and the only alarms eligible for display are those generated for your own group, and the broadcast alarms. (Broadcast alarms have a group attribute of -1. These alarms are available to all users.)

User. If you specify a user, then only alarms generated for that user are eligible for display.

Class. There are 16 classes of alarm messages. If you specify a value in the range 1 to 16, then only alarms of the specified class are eligible for display.

Severity. For alarms there are three grades of severity: critical, major, and minor. If you specify a severity, then only alarms of that severity are eligible for display.

To alter the value of this field, press <Toggle Field>.

State. An alarm can have one of three states: active, pending, and cleared. Only alarms with the specified state are eligible for display. The default value of this parameter is 'ACTIVE'.

To alter the value of this field, press <Toggle Field>.

Message Lan. If multiple DNCs are linked in a Local Data Net network, you can designate the DNC whose alarms are to be eligible for display. To designate a particular DNC, type in its lan number, which is the value of the object index of the Log Subsystem PRU in that DNC. (For more information, see 'Configuring Centralized Log Collection for a Local Data Net Network', in Part 20.)

Subsystem. Message subsystems are files containing log messages. If you specify a message subsystem, then only alarms based on log messages from that subsystem are eligible for display. To specify a message subsystem, enter the subsystem number (four hexadecimal digits) in the Subsystem field. To find out an alarm's subsystem number, select the alarm on the Alarm MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can display a list of all the message subsystem files, by listing the files in the Helix directory named :LOCAL:PRU:LOGS:LOGDESC.

Error Number. If you specify an error number, then only alarms based on logs with that error number are eligible for display. To find out an alarm's error number, select the alarm on the Alarm MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the error numbers of the log messages in a message subsystem by accessing the directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Report Number. If you specify a report number, then only alarms based on logs with that report number are eligible for display. To find out an alarm's report number, select the alarm on the Alarm MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the report numbers of the log messages in a message subsystem by accessing the directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Reporting PRU and Other PRU. If you specify a reporting PRU, then only alarms generated by that PRU are eligible for display. If you specify a value in the Other PRU field, then only alarms referring to that PRU are eligible for display.

There are two ways to specify a PRU. The simpler way is to press <PRU Names> when the cursor is in the Unit No field. The system then displays the PRU Names screen, listing PRUs. On that screen, use the arrow keys to select the PRU, and then press <Select>. The Search Selection screen then reappears, with the appropriate values for the unit number and PRU name. Alternatively, if you know the PRU's unit number, you can enter it in the Unit No field. For information on how to find a PRU's unit number, see 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Specifying a value in the Config No field is optional. You need to use this field only if there are multiple instances of the PRU, and you want to specify a particular instance. If you need a configuration number, see the procedure 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Time and To. If you specify a time period, then only alarms generated within that period are eligible for display.

Application Fixed Strings. A fixed string is a character string that can be used as an element of one or more alarm messages. You can specify up to five fixed strings. If you specify one or more fixed strings, then an alarm is eligible for display only if it contains the specified string or strings. Any fixed strings contained in an alarm message are shown in the raw-details display. To display an alarm's raw details, select the alarm on the Alarm MMI Main Menu, press <More Details>, and then press <Raw Details>.

Match Mode. When match mode is 'OFF', the <Previous Page> and <Next Page> softkeys are available on the Alarm MMI Main Menu. When you press either of these softkeys, the system scans the alarm history file and displays alarms that you are entitled to access, as determined by your user group. (If you are a system administrator, then you are a member of group 0, which means that you are entitled to access all alarms generated for all groups. If you are not a system administrator, then you are entitled to access the alarms generated for your own group, and the broadcast alarms, which are available to all users.) When match mode is 'ON', the <Match Previous> and <Match Next> softkeys are available on the Alarm MMI Main Menu. When you press either of these softkeys, the system scans the alarm history file and displays alarms that satisfy all the selection criteria currently shown on the Search Selection screen.

To alter the value of this field, press <Toggle Field>.

- (5) After entering the search selection criteria, you can initiate a search by pressing <First Page>, <Last Page>, <Find First>, or <Find Last>.

The system redisplay the Alarm MMI Main Menu, scans the alarm history file, and displays the alarms located by the search.

The alarms located by the <First Page> and <Last Page> softkeys depend on whether match mode is 'ON' or 'OFF', as explained in the discussion of the Match Mode parameter.

When you use the <Find First> or <Find Last> softkey, the system finds first or last alarm message that matches the search criteria currently shown on the Search Selection screen, and displays the alarms that immediately follow the matching alarm. (These two softkeys work this way regardless of the setting of the Match Mode parameter.)

- (6) To return to the Alarm MMI Main Menu without initiating a search, press <Query Main Menu>.

Printing Selected Alarms

You can have the system print alarms that satisfy print criteria that you specify. The system scans the alarm history file, selects the alarms that satisfy the criteria, formats them, and prints them in reverse chronological order (that is, the most recent alarms first).

The menu structure for this section is shown in Figure 21-1.

To print selected alarms, proceed as follows:

- (1) Sign on.

The main menu appears.

- (2) Select Alarm MMI and press ENTER. (Note that the label on the main menu can be customized by the application, so that it may not say Alarm MMI. It may instead be 'Alarms', 'DNC alarms', or some other designation.)

The Alarm MMI Main Menu appears, displaying a list of alarms.

- (3) Press <More Softkeys>.

New softkeys appear.

- (4) Press <Print>.

The system displays the Print Selection screen.

- (5) Enter the print criteria in the fields on this screen.

To advance from one field to the next on the screen, press RETURN. To move to the previous field, hold down SHIFT and press TAB.

The Print Selection screen lists the print criteria. In each field you can specify a parameter value. The system uses the print criteria when printing alarms for you. It scans the alarm history file, selects the alarms that you are entitled to access, and from that group prints only those that satisfy all the criteria currently shown on the Print Selection Screen. If a value is not shown for a parameter on this screen, then all alarms satisfy that parameter.

The print selection criteria are:

Group. If you are a system administrator, you can specify a group, and then the alarms generated for that group are eligible for printing. If you are not a system administrator, you cannot configure this parameter, and the only alarms eligible for printing are those generated for your own group, and the broadcast alarms. (Broadcast alarms have a group attribute of -1. These alarms are available to all users.)

User. If you specify a user, then only alarms generated for that user are eligible for printing.

Class. There are 16 classes of alarm messages. If you specify a value in the range 1 to 16, then only alarms of the specified class are eligible for printing.

Severity. For alarms there are three grades of severity: critical, major, and minor. If you specify a severity, then only alarms of that severity are eligible for printing.

To alter the value of this field, press <Toggle Field>.

State. An alarm can have one of three states: active, pending, and cleared. Only alarms with the specified state are eligible for printing. The default value of this parameter is 'ACTIVE'.

To alter the value of this field, press <Toggle Field>.

Message Lan. If multiple DNCs are linked in a Local Data Net network, you can designate the DNC whose alarms are to be eligible for printing. To designate a particular DNC, type in its lan number, which is the value of the object index of the Log Subsystem PRU in that DNC. (For more information, see 'Configuring Centralized Log Collection for a Local Data Net Network', in Part 20.)

Subsystem. Message subsystems are files containing log messages. If you specify a message subsystem, then only alarms based on log messages from that subsystem are eligible for printing. To specify a message subsystem, enter the subsystem number (four hexadecimal digits) in the Subsystem field. To find out an alarm's subsystem number, select the alarm on the Alarm MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can display a list of all the message subsystem files, by listing the files in the Helix directory named :LOCAL:PRU:LOGS:LOGDESC.

Error Number. If you specify an error number, then only alarms based on logs with that error number are eligible for printing. To find out an alarm's error number, select the alarm on the Alarm MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the error numbers of the log messages in a message subsystem by accessing the directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Report Number. If you specify a report number, then only alarms based on logs with that report number are eligible for printing. To find out an alarm's report number, select the alarm on the Alarm MMI Main Menu and press <More Details>. If you are a system administrator with superuser authority, you can inspect the report numbers of the log messages in a message subsystem by accessing the directory :LOCAL:PRU:LOGS:LOGDESC, and reading the message-subsystem file.

Reporting PRU and Other PRU. If you specify a reporting PRU, then only alarms generated by that PRU are eligible for printing. If you specify a value in the Other PRU field, then only alarms referring to that PRU are eligible for printing.

There are two ways to specify a PRU. The simpler way is to press <PRU

Names> when the cursor is in the Unit No field. The system then displays the PRU Names screen, listing PRUs. On that screen, use the arrow keys to select the PRU, and then press <Select>. The Print Selection screen then reappears, with the appropriate values for the unit number and PRU name. Alternatively, if you know the PRU's unit number, you can enter it in the Unit No field. For information on how to find a PRU's unit number, see 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Specifying a value in the Config No field is optional. You need to use this field only if there are multiple instances of the PRU, and you want to specify a particular instance. If you need a configuration number, see the procedure 'Finding a PRU's Unit Number and Configuration Number', later in this part.

Time and To. If you specify a time period, then only alarms generated within that period are eligible for printing.

Application Fixed Strings. A fixed string is a character string that can be used as an element of one or more alarm messages. You can specify up to five fixed strings. If you specify one or more fixed strings, then an alarm is eligible for printing only if it contains the specified string or strings. Any fixed strings contained in an alarm message are shown in the raw-details display. To display an alarm's raw details, select the alarm on the Alarm MMI Main Menu, press <More Details>, and then press <Raw Details>.

Match Mode. This is a display field. On this screen, match mode is always 'ON'. This means that when selecting alarms for printing, the system first scans the alarm history file and selects the alarms that you are entitled to access, as determined by your user group. (If you are a system administrator, then you are a member of group 0, which means that you are entitled to access all alarms generated for all groups. If you are not a system administrator, then you are entitled to access the alarms generated for your own group, and the broadcast alarms, which are available to all users.) From the alarms that you are entitled to access, the system then selects and prints only those that satisfy the selection criteria currently shown on the Print Selection screen.

Printer. In this field you specify the name of the print queue that is to be used for the print job.

To alter the value of this field, press <Toggle Field>.

Note: For information on defining print queues, see 'Printer Queue Administration', Part 14, 'Printer Administration'.

- (6) After entering the print criteria, press <Spool> to send the job to the print queue.
- (7) Return to the Alarm MMI Main Menu by pressing <Query Main Menu>.

Cutting off the Audible Alarm

An alarm triggers an audible signal. You can cut off the audible signal by accessing the Alarm MMI Main Menu and pressing <ACO> (see Figure 21-1).

The value of the STATE field for each currently active alarm changes from 'Active' to 'Active(ACO)'.

Modifying Alarm States

There are three alarm states: active, pending, and cleared. You can change an alarm's state from active to pending, or from pending to cleared. To change an alarm's state, take the following steps:

- (1) Starting on the Alarm MMI Main Menu, use the arrow keys to select the alarm, and press <More Softkeys>.

New softkeys appear (see Figure 21-1).

- (2) If the alarm is active, you make it pending by pressing <Make Pending>.

The alarm's STATE field changes from 'Active' or 'Active(ACO)' to 'Pending'.

- (3) If the alarm is pending, you can clear it by pressing <Clear>

The alarm's STATE field changes from 'Pending' to 'Cleared'.

Finding a PRU's Unit Number and Configuration Number

This procedure accesses the SAS configuration service for the purpose of determining a PRU's unit number and configuration number.

The menu structure is shown in Figure 21-3.

To determine a PRU's unit number and configuration number, take the following steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select CONFIGURATION, and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update or Scheduled Update and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (5) Select System Map and press ENTER.

The first Hardware Map screen appears, listing the SRUs in the first cabinet.

- (6) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the cabinet containing the SRU where the PRU resides.

- (7) Select the SRU, and press <Next Level>.

The system displays the Software Map screen, listing the PRUs that currently reside on the SRU.

- (8) Press <More Softkeys>.

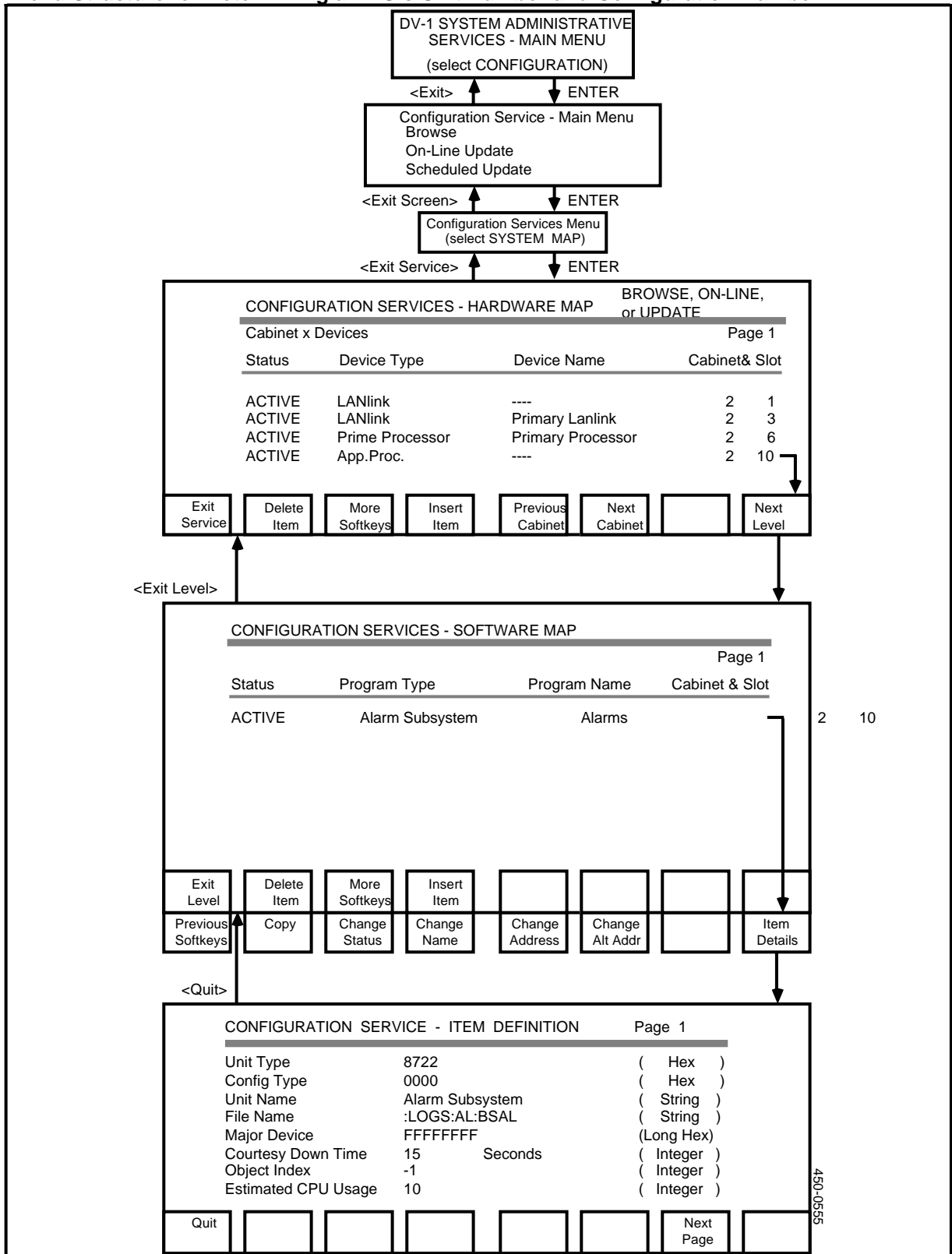
New softkeys appear.

- (9) Select the PRU and press <Item Details>.

The system displays the Item Details screen for the PRU. The values in the Unit Type and Config Type fields are the PRU's unit number and configuration number, respectively.

- (10) To exit, press <Quit>, then press <Previous Softkeys>, and then press the <Exit> softkeys until you arrive at the main menu.

Figure 21-3
Menu Structure for Determining a PRU's Unit Number and Configuration Number



22. Data Contents Save and Restore

Although some DNC applications have their own save-and-restore features, many applications use the save-and-restore feature described below. Consult your application's documentation. If the application's documentation refers you to this practice for information on saving and restoring, then this documentation applies.

Note: The Backup Management System (BMS) is an alternative means of backing up file servers. For more information, see Part 23, 'Backup Management System'.

Configuring the Save and Restore PRU

If you require Save and Restore, then you must configure the Save and Restore Subsystem PRU to run on one of the Applications Processors in the system. For information on configuring PRUs, see Part 7, 'Configuring Program Resource Units'.

Overview of Save and Restore

The following procedures describe how to save and restore the application-related contents (datafill) and the SAS configuration data using tape cartridges as the backup medium. The procedures do not save or restore the program resource units (PRUs) and the core software that is on the disk. These software items can be reinstalled from the system tapes if required.

The menu structure is shown in Figure 22-1.

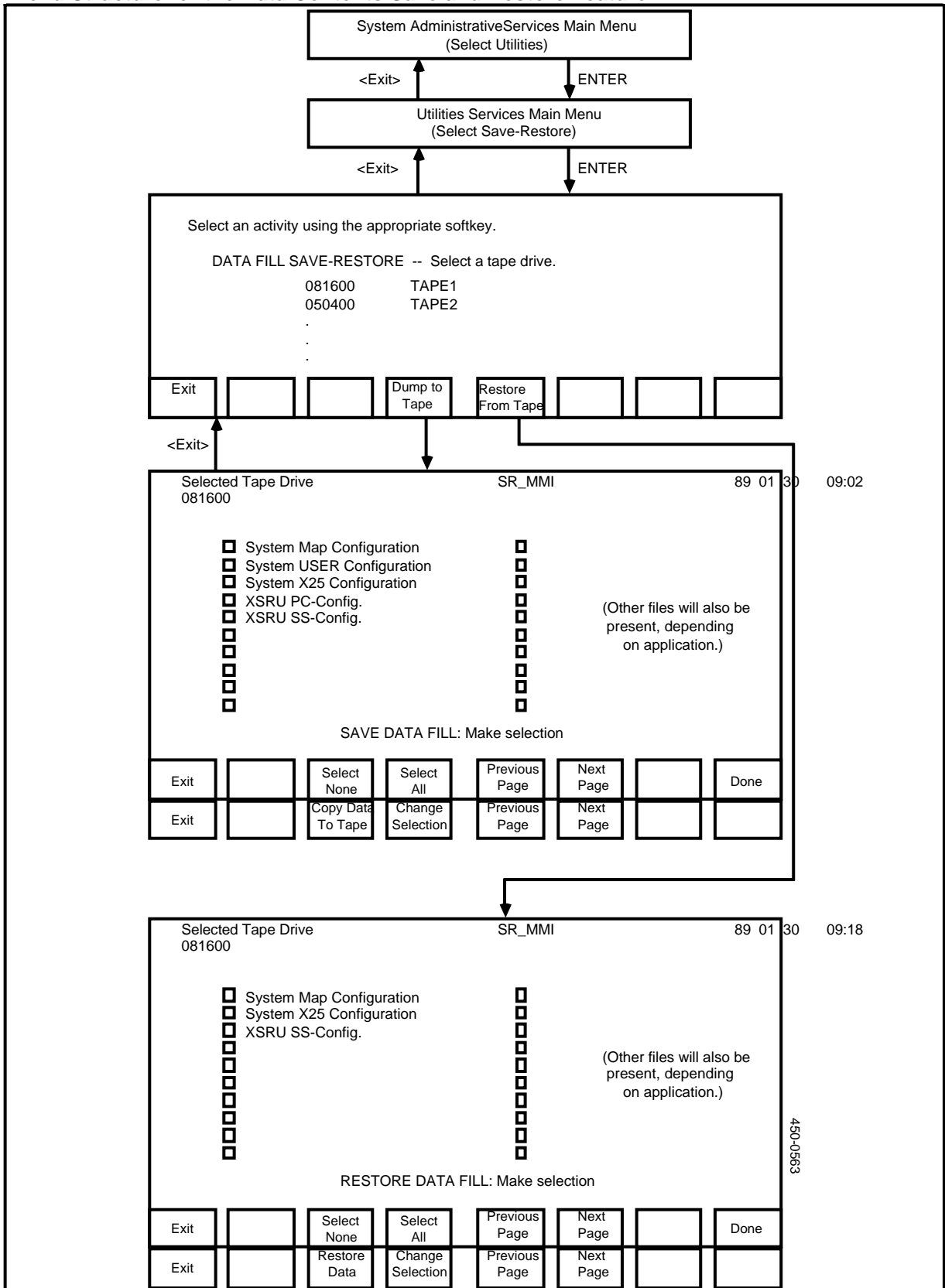
Preparing for a Save Operation

To complete a save operation, you need one or more cartridges containing either blank tapes or tapes that can be overwritten. The number of cartridges depends on the size of the application's datafill. The application documentation will tell you how many cartridges you require. To permit data to be written on a tape, set the cartridge's safety lock away from the SAFE position.

Before initiating a save operation or a restore operation, make preparations as follows:

- (1) Ensure that all other system functions, such as data collection, are stopped.
- (2) Clean the read/write head of the Mass Storage SRU prior to any dump or restore operation.

Figure 22-1
Menu Structure for the Data Contents Save and Restore Feature



Note: This step is important, as numerous errors are caused by dirty tape heads.

- (3) Sign on as a system administrator.
- (4) Select System Administrative Services and press ENTER.

The System Administrative Services Main Menu appears.

- (5) Select Utilities and press ENTER.

The Utilities Services Main Menu appears.

- (6) Select Save-Restore and press ENTER.

The system displays the Save and Restore Main Menu, which lists all available tape drives in the system. All tape drives are listed, including SRUs with cartridge tape drives and Nine-track Tape Units.

- (7) Indicate the tape drive to be used for the backup or restore operation. Use the arrow keys to select the tape drive.
- (8) Insert the cartridge tape in the SRU. Alternatively, if you have selected the Nine-track Tape Unit, load a tape on that device.
- (9) Go to either 'Saving Datafill' or 'Restoring Datafill' in this procedure.

Saving Datafill

This procedure explains how to save datafill. Note that during the backup operation, there may be long pauses during which there is no screen activity for several minutes. Do not assume that this is an indication of a malfunction. To save datafill, proceed as follows:

- (1) Press <Dump to Tape>.

The system displays a list of data sets that can be saved.

Note: A data set can be either a file or a directory.

- (2) Select the data sets that are to be saved.

Note: The total size of all the data sets involved in a single save operation must not exceed the capacity of a single cartridge tape (40 megabytes) If you try to save more than 40 megabytes on a tape, the system issues an error message when it reaches the end of the tape. Certain applications running on a DNC can have datafill in excess of 40 megabytes, and therefore require multiple cartridges for a full backup.

If an application requires multiple tapes for a full backup, the application documentation will inform you how many tapes to use, and which data sets to save on each tape. If the application documentation contains no such information, you can assume that you can do a full backup on a single tape.

- To select a data set, use the arrow keys to select the name of the file or directory on the screen, and then press the space bar. To show that the data set has been selected, a checkmark appears in the box beside the name of the file or directory. (An ASCII terminal displays an x within square brackets instead of a checkmark.)
- To deselect a data set that is already selected, use the arrow keys to select it on the screen, and press the space bar. To show that the data set is no longer selected, the system clears the mark.
- If the list of data sets extends beyond one page, press <Next Page> and <Previous Page> to change pages.
- To select all the data sets, press <Select All> on each page containing data sets.
- To deselect all the files, press <Select None> on each page containing data sets.

- CAUTION -

Each DNC configuration file is labeled *DNC Config*. To avoid corrupting the disk, never select one of these files without selecting the others as well.

- (3) After selecting all the required data sets, press <Done>.

New softkeys appear. Menu selection is frozen, but the <Next Page> and <Previous Page> softkeys are still active.

- (4) If the data-set selection is still not correct, press <Change Selection>. Otherwise, proceed with Step 5.
- (5) Press <Copy Data To Tape>.

The system displays messages indicating the progress of the backup. While the backup operation is in progress, only the <Exit> softkey is available. When the backup has been completed successfully, continue with the next step.

- (6) Remove the tape cartridge from the Mass Storage SRU and set the safety catch on the tape to the SAFE position. Alternatively, if you have used the Nine-track Tape Unit, unload and store the tape.
- (7) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Restoring Datafill

This procedure explains how to restore datafill. Note that during the restore operation, there may be long pauses during which there is no screen activity for several minutes. Do not assume that this is an indication of a malfunction. To restore datafill, proceed as follows:

- (1) Press <Restore From Tape>.

The system displays a list of the datafill data sets found on the tape.

Note: A data set can be either a file or a directory.

- (2) Select the data sets that are to be restored.
 - To select a data set, use the arrow keys to select the file or directory on the screen, and then press the space bar. To show that the data set has been selected, a checkmark appears in the box beside the name of the file or directory. (An ASCII terminal displays an x within square brackets instead of a checkmark.)
 - To deselect a data set that is already selected, use the arrow keys to select it on the screen, and press the space bar. To show that the data set is no longer selected, the system clears the mark.
 - To select all the data sets, press <Select All>.
 - To deselect all the data sets, press <Select None>.

If the list of data sets extends beyond one page, press <Next Page> and <Previous Page> to change pages.

- CAUTION -

Each DNC configuration file is labeled *DNC Config*. To avoid corrupting the disk, never select one of these files without selecting the others as well.

- (3) When all required data sets are selected, press <Done>.

New softkeys appear. Menu selection is frozen, but the <Next Page> and <Previous Page> softkeys are still available.

- (4) If the data-setselection is still not correct, press <Change Selection>. Otherwise, proceed with the next step.
- (5) Press <Restore Data>.

Messages indicate the progress of the restoration. While the restore operation is in progress, only the <Exit> softkey is available. When the restore is complete, continue with the next step.

- (6) Remove the cartridge tape from the Storage SRU. Alternatively, if you have used a Nine-track Tape Unit, rewind the tape and unload it from the device.
- (7) Press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.
- (8) If the *DNC Config* files have been restored, reboot the system.

23. Backup Management System

The Backup Management System (BMS) is a menu-driven software utility that simplifies the control, audit, and management of system disk backups. The backups are done on either magnetic tape or cartridge tape. BMS allows you to compose a different set of 'policies' for each file server in the system. The utility interacts with the administrator to ensure that the backup policies are carried out.

Backup Management System differs from Save and Restore. Unlike Save and Restore, which gives you a menu from which you can choose individual files to be backed up, BMS copies the entire file servers to tape. (A file server is defined as a logical volume.) Also, BMS does not do restore operations.

The Backup Management System recognizes two classes of users: administrators and operators. Administrators have full privileges in the BMS menus, and can create and modify backup policies for the file servers. The policies specify which backups are to be done, and when. Operators have limited privileges. They can carry out backups but cannot create or modify the backup policies.

The advantage of BMS is that the system administrator can program backup operations in advance. Subsequently, an operator can simply implement the policies.

BMS Menus

There are two major menu screens in BMS: the BMS Main Menu and the Administrator Menu. The Main Menu can be accessed by all users, but the Administrator Menu can be accessed only by users who know the administrator password. On each menu there is an option list at the top and a prompt near the bottom. The user selects an option by typing the first character of the option. To select the default option, the user can just press ENTER. (The default option appears in square brackets beside the prompt.) Many of the menu options evoke lower-level screens that display information or prompt the user for information. From any of the BMS screens, you can return to the preceding screen by pressing ESC, and you can return to the BMS Main Menu by pressing ESC repeatedly.

Note that the Administrator Menu does not contain all of the options used for BMS administration. Some administrative options are found on the BMS Main Menu. For example, the administrator must use Main Menu options to inspect the contents of the BMS log file and to display backup statistics and audit trails.

Starting BMS

If you are the superuser, you can start BMS. (Only the superuser can access the Utilities Services - Main Menu, as required by this procedure.)

To start BMS, take the following steps:

- (1) Sign on as the superuser.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

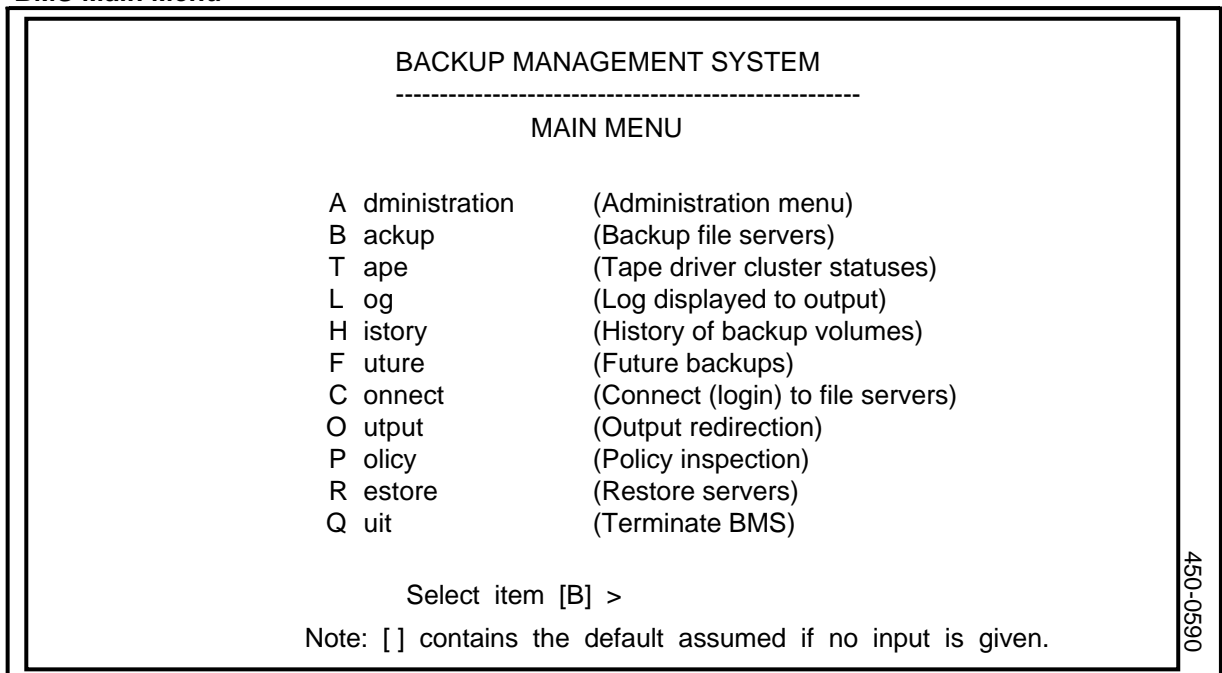
- (4) Select Helix Command Interpreter, and then press ENTER.

The system prompt appears. (It is usually '>'.)

- (5) Type BMS and press ENTER.

The system displays the BMS Main Menu (see Figure 23-1).

Figure 23-1
BMS Main Menu

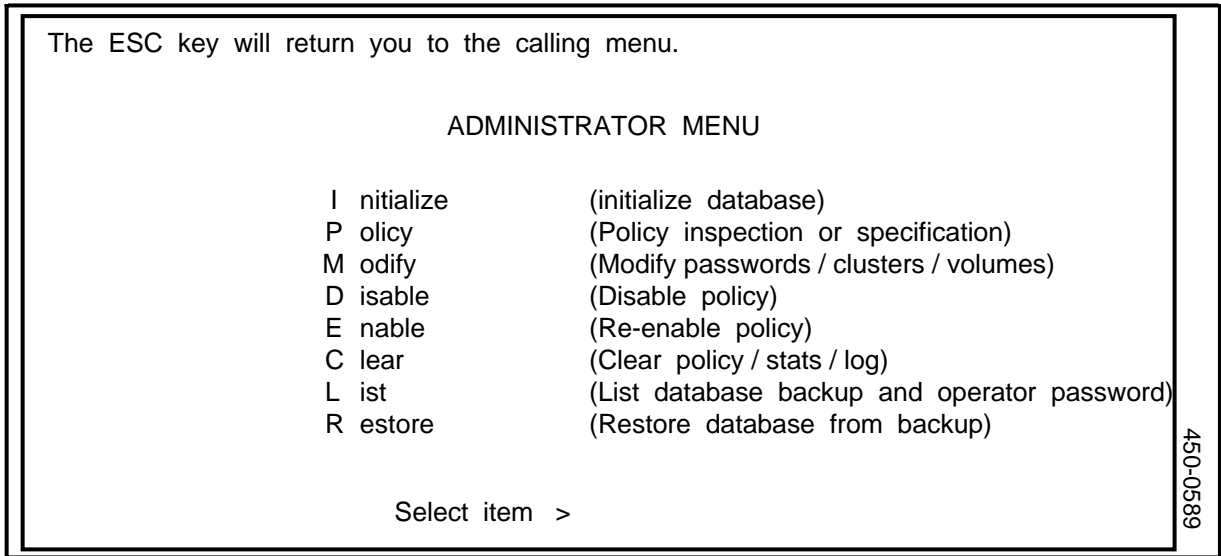


Accessing the Administrator Menu

If BMS has not yet been initially configured, you can access the Administrator Menu by typing the letter A at the prompt on the BMS Main Menu. After BMS has been configured, a user must supply the administrator password in order to access the Administrator Menu.

The system displays the Administrator Menu (see Figure 23-2).

Figure 23-2
BMS Administrator Menu



Initializing the BMS Database

The first time you start BMS, you must initialize the BMS database. The BMS database is the collection of files containing BMS information: the BMS log file, the file containing policies, and so on. Initialization creates an empty database for BMS.

When you type the letter I at the prompt on the Administrator Menu, the system displays a series of questions, prompting you to specify the following:

- (a) **Database Directory.** This is a pathname indicating where BMS is to create and maintain its data (under directory BMS_DB). The default is the current working directory.
- (b) **Administrator Password.** On subsequent BMS runs, a user can gain administrator access only if he or she can supply this password.
- (c) **Operator Password.** This password is required to access the database. The operator can use all the options on the BMS Main Menu except the Administration option.
- (d) **Duplicate Database Location.** Specifying a duplicate location is optional. If you specify a location, then BMS duplicates its database whenever it terminates. The duplicate should reside on a different file server, in case of a file server data loss. If you specify a pathname for a duplicate database, the path must exist, and, for security reasons, must not contain an existing database. When the BMS database opens, it is compared to the duplicate to ensure they are identical. If there is a disparity, BMS informs the user, who then chooses to continue, quit, or restore the database.

Creating, Modifying, and Inspecting BMS Policies

To create, modify, or inspect BMS policies, type P at the prompt on the Administrator Menu. The system then prompts you to indicate whether you want to specify new policies or to inspect existing ones. When specifying a policy, you must supply values for the policy parameters:

- (a) **Server Name.** This specifies the name of one of the file servers that have been specified using File Processor Administration, including file servers on other systems that are accessible through a Local Data Net network. (See Part 12 for information on File Processor Administration, and see Part 15 for information on Local Data Net.)
- (b) **Number of backup cycles.** This specifies the number of backup cycles. There can be as many as four cycles for each file server. Each cycle is defined by its backup interval and its number of volumes. For example, if you want to do a backup every seven days, the interval is seven. If when you reach the seventh backup you reuse the tapes on which you did the first backup, the number of volumes is six.
- (c) **Number of days between full backups.** This must be specified for each cycle.
- (d) **Number of backup volumes in cycle.** This must be specified for each cycle.
- (e) **Are backup volumes to be stored offsite.** 'Y' must be specified for each cycle, if the backup volumes are stored off-site.
- (f) **Skewing of backups.** You specify Y or N. If you skew the backups, then BMS calculates when the next backup is due by counting from the most recent actual backup, rather than by counting from the most recently scheduled backup. (The two calculations may differ because a user can order BMS to perform an unscheduled backup.)
- (g) **Number of days between incremental backups.** Specify the number of days to elapse between incremental backups. An incremental backup saves all the changes that have been made since the last backup.
- (h) **Number of volumes in an incremental backup set.** This is the number of backups you want to accumulate before you start reusing the backup tapes. This is normally $2 * (\text{No. of days between full backups in cycle } 1) / (\text{No. of days between incremental backups}) + 1$.
- (i) **Number of tapes required to force a full backup.** If the number of tapes used in doing the last incremental backup was greater than this value, BMS triggers a full backup instead of continuing with lengthy incrementals.
- (j) **To which cluster is file server assigned?** This is the name of the fast backup tape cluster to which the file server is connected.
- (k) **In how many days is the policy to be activated?** By default, a backup policy is activated on the day it is specified.

Making Minor Modifications

To make simple modifications to the BMS database and backup policies without reinitializing or performing policy redefinitions, type M at the prompt on the Administrator Menu. The system then displays the Modify Menu, where you can modify:

- the physical location of the backup volumes
- the operator password

- skewing of backups
- the cluster name to which the file server is assigned
- the administrator password
- the pathname of the duplicate database
- the number of incremental tapes required to trigger a full backup.

Disabling and Enabling Policies

BMS informs the operator when to do backups, based on the current date and the BMS policies that are in effect. You can temporarily disable a file server's backup policies and thus prevent BMS from prompting the operator to do the backups. To disable policies, type D at the prompt on the Administrator Menu. A new prompt then appears, asking you to specify the file server.

To reenable the policies for a file server, type E at the prompt on the Administrator Menu, and then specify the file server

Clearing Information from the BMS Files

To clear information from the BMS files, use the Clear Menu, which you reach by typing C at the prompt on the Administrator Menu. On the Clear Menu, you can:

- permanently delete BMS policies
- reset backup statistics
- erase BMS_DB:LOG, the BMS log file.

Other Options on the Administrator Menu

You can make the system display the operator password and the pathname of the duplicate database, by typing L at the prompt on the Administrator Menu.

If you specify a duplicate database, then you can use it to restore the primary BMS database by typing R at the prompt on the Administrator Menu.

Monitoring BMS

To monitor BMS, use the L, P, and H options on the BMS Main Menu. These options allow you to display the contents of the BMS log file, BMS policies, operational statistics, and audit trails. You can obtain this useful information in printed form by using the O option on the same menu to redirect the output.

Displaying the Log File

When you type L at the prompt on the BMS Main Menu, the system displays the contents of the BMS log file, BMS_DB:LOG. The first screen displayed contains the most recent log entries.

The BMS administrator should inspect the log file frequently to ensure that operational anomalies do not exist. (Examples of anomalies are tape problems and overdue backups.)

The log file can very quickly grow to a large size, which makes it difficult to work with. If you prefer to work with a small log file, you can periodically archive it and shorten it. (The log file can be backed up and edited outside BMS.)

Displaying Statistics and Audit Trails

When you type H at the prompt on the BMS Main Menu, the system prompts you to choose from two options:

- **Volumes.** This option displays, for each selected file server, the backup audit trail. The information is listed in reverse chronological order.
- **Statistics.** This option displays the backup completion statistics by type and file server.

Displaying Policies

To display policies, type P at the prompt on the BMS Main Menu. The system then prompts you to specify the name of a file server. When you supply this information, the system displays the BMS backup policies for that server.

For each policy, the system displays the following information:

- the name of the file server
- the name of the tape cluster to which the file server is connected
- the type of backup, incremental or full
- the cycle number (1, 2, 3, or 4) for each full backup
- the number of days between backups
- the activation threshold (the number of days elapsing between full backups, or the the incremental backup size, expressed as a number of tapes, that triggers a full backup)
- the physical location of volumes if not kept on site.

This option duplicates one of the options on the Administrator Menu, allowing operators to view the policies. The Main Menu option is useful for administrators too, because it can be used to produce a hard copy of the policies.

Redirecting Output, Obtaining Hard Copy

By default, all BMS output is displayed on the terminal screen, but you can redirect the output generated in response to the L, P, and H options on the Main Menu. To do so, type O at the prompt on the BMS Main Menu. The system then prompts you to specify the name of a disk file to which the output is to be redirected. Later, you can edit or print that file.

Managing Tapes

When you type T in response to the prompt on the BMS Main Menu, the system displays the Tape Cluster Status Board. For each tape cluster, the status board displays the following information:

- the cluster name

- the cluster state (free, backing up, restoring, aborting, or locked out)
- the tape label (composed of the volume name and the ordinal number)
- the operator action required.

If the Operator Action field for a tape cluster displays ‘attention required’, then use the arrow keys to move the cursor to the screen line displaying the cluster information, and press RETURN. In response, BMS displays a message informing you of the problem, and asking you to choose one of the following actions:

- Retry
- Discontinue
- Fail the Backup.

If a file server goes into fault mode while being backed up, then the system displays an error message on the cluster’s display line on the status board, and disables the cluster tape drive. To reenable the tape drive, use the arrow keys to move the cursor to the cluster’s display line and press RETURN.

Reconnecting after a File Server Fails

If you are going to back up a file server using BMS, then you must be logged on to the server as the administrator or have a link to the file server’s system directory file (SYSMAP). Typically, BMS operators log on to the file server before executing BMS.

If a file server fails during the BMS session and is subsequently recovered, you must log on to the server once again. You do not need to exit from BMS to log on to the file server. Instead, type C at the prompt on the BMS Main Menu. The system then prompts you for your user-ID, your password, and the name of the file server. After you enter this information, the system logs you on.

Viewing the Schedule of Future Backups

To preview the backups required on some future date, type F at the prompt on the BMS Main Menu. The system then prompts you for the number of days in the future. After you enter that information, the system displays a list of backups required on that date.

In calculating the backups required on that date, BMS assumes that unscheduled backups will not occur between the current date and the specified future date. Also, if a backup is in progress when you use the F option, BMS ignores the file servers involved in that backup, because the future backup date depends on whether the current backup is successful.

Doing Backups

If you intend to do a backup using BMS, then the Tape Server PRU must be configured and active in the system. To perform the backup, take the following steps:

- (1) Access the BMS Main Menu and type B at the prompt on that menu. In response, the system displays a list of the servers requiring backup. If any of

the backups are overdue, the system prompts you to enter the reason, and it records your answer in the BMS log file.

- (2) Type in the name of a file server that you want to back up and then press ENTER.
- (3) If you want to back up more than one file server, then press the space bar to clear the previously entered file-server name from the data-entry field, and repeat Step 2.
- (4) If you want to force a full backup of a server for which the policies require only an incremental backup, then append .f to the file server name when you specify it. For example, to force a full backup of file server ABC, type in ABC.F.
- (5) After entering the names of all file servers that are to be backed up, press ESC.

The system redisplay the BMS Main Menu.

- (6) Type T at the prompt on the BMS Main Menu.

The system displays the Tape Cluster Status Board, which lists the status of the current backup.

- (7) Write down the label that is displayed in the Label field on the Tape Cluster Status Board. Each of the tapes used for the backup should have a sticker bearing the label. The backup operation may require multiple tapes, so the last component of each tape's label is an ordinal number indicating the sequence of the tapes.
- (8) Carry out the instructions that the system displays in the Operator Action field on the Tape Cluster Status Board.
- (9) When the backup operation is complete, press ESC.

The system redisplay the BMS Main Menu.

Doing Restores

You can use BMS to restore a file server. The procedure differs, depending on whether the server is controlled by the Primary Processor SRU or by a File Processor SRU.

Restoring a File Server Controlled by a File Processor

When using BMS to restore a file server that is controlled by a File Processor SRU, use the M4000 terminal. Press ENTER after typing in each command.

Before beginning, you must know the region number of the file server that is to be restored. A File Processor SRU can control up to four file servers, and each server has a region number. The file server's region number is the number of the associated File Server PRU. The PRU runs on the File Processor SRU, and has the name FS-PRU-n, where n is the region number. For more information see 'Pairings of File Server PRUs and File Server Regions' in Part 12.

To restore a file server controlled by a File Processor SRU, take the following steps:

- (1) Sign on as the superuser.
The main menu appears.
- (2) Select SYSTEM ADMINISTRATIVE SERVICES and press ENTER.
The System Administrative Services - Main Menu appears.
- (3) Select Utilities and press ENTER.
The Utilities Service - Main Menu appears.
- (4) Select Helix Command Interpreter and then press ENTER.
The system prompt appears. (It is usually '>'.)
- (5) Insert the first BMS backup tape in the drive. (The first tape is the one whose name ends in .1.)
- (6) Type in
FSRESTORE
and then press ENTER.
- (7) When the system prompts you for the server's cabinet and slot numbers, type in the address of the File Processor SRU. Use leading zeros if necessary. For example, for cabinet 2 slot 4, type 0204. Then press ENTER.
- (8) When the system prompts you for the File Server Region, type in the number (1, 2, 3, or 4) and press ENTER.
- (9) When the system prompts you for the restore type, type in F (for a full restore) and then press ENTER.
- (10) When the system prompts you for the tape type, type in C if you are using cartridge tapes, or M if you are using tapes that load on a Nine-track Magnetic Tape Unit. Then press ENTER.
- (11) When the system prompts you for the volume name, enter the backup tape's volume name. This name can be found on a sticker on the backup tape.
The system displays messages telling you that it is proceeding and restoring.
- (12) When the system prompts you to do so, insert the second tape and then subsequent tapes, until you have gone through all the tapes in the backup set.
- (13) After the system has read the entire set of backup tapes, it again prompts you for the restore type. Type in Q (for quit), and press RETURN. Then remove the tape from the tape drive.
- (14) Reboot the system by powering it down, waiting 30 seconds, and powering it up again.

Restoring a File Server Controlled by the Primary Processor

If you intend to use BMS to restore a file server that is controlled by the Primary Processor SRU, then before beginning the restore operation, get the site-records

binder and open it to the BMS-backup Information Form. (The form is illustrated in Figure 23-3.) The BMS-backup Information Form lists information that you will need:

- the Primary Processor type (SASI or SCSI) and model
- the volume ID of the disk drive in the Mass Storage SRU
- the volume name of the disk drive in the Mass Storage SRU
- any nondefault values that must be specified for file-system-configuration parameters.

**Figure 23-3
BMS-backup Information Form**

<u>BMS-BACKUP INFORMATION FORM</u>	
PRIMARY PROCESSOR MODEL: _____	
SASI OR SCSI: _____	
DISK VOLUME ID: _____	
DISK VOLUME NAME: _____	
 FILE SYSTEM CONFIGURATION PARAMETERS (Record NONDEFAULT parameter values only.)	
PARAMETERS	NONDEFAULT VALUES
Default file protection mask / Default protection mask . . .	_____
Number of object tasks	_____
Number of agent tasks	_____
Number of Helix communication buffers	_____
Number of open files / Total open instances	_____
Number of open file clients / Total number of clients . . .	_____
Number of small (1K) cache frames	_____
Number of large (4K) cache frames	_____
Daily audit time -- HOUR	_____
Daily audit time -- MINUTE	_____
File server timeout	_____
Number of FOS communication buffers	_____
Number of 32K backup agent buffers / Number of 32K backup buffers	_____
Number of users / Number of logins	_____
Max retries on security agent failures / Max security agent communications failures	_____
User audit delay / Agent client audit delay	_____
Transactional file set commit timeout (SCSI systems only)	_____
Static RAM commit frequency / Commit to disk frequency	_____
Static RAM commit timeout / Commit to disk timeout . . .	_____
Do initial FID directory and bitmap audit / Audit FID dir and mark bit map	_____
Do initial file audit / Do initial audit	_____
File server write protected (SCSI systems only)	_____

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When using BMS to restore a file server controlled by the Primary Processor SRU, use an ASCII terminal attached to the rear of the Primary Processor SRU. Press RETURN after typing in each command.

If you make a mistake while entering the commands for this procedure, or if the system fails to respond to a command that you enter, you can enter the command again. Alternatively, you can restart the procedure at any point by pressing the ESC key.

To restore a file server controlled by the Primary Processor SRU, take the following steps:

- (1) If you have not already done so, connect an ASCII terminal to the lower port on the rear of the Primary Processor SRU. Set the terminal for full duplex operation at 9600 baud.

Note: For this procedure, enter all commands at the ASCII terminal.

- (2) Ensure that there is a LANlink SRU in either cabinet 1, slot 3, or cabinet 1, slot 15, and that there is an M4020 terminal attached to line 1 of the LANlink SRU.
- (3) If you have not already done so, clean the tape heads on the tape drive. (See 'Cleaning the Tape Heads' in Part 3 for instructions.)
- (4) Insert the install tape in the tape drive connected to the Primary Processor. Use Tape 1A if the Primary Processor is a 68010-based model; use Tape 1B if it is a 68020-based model.
- (5) Power the system down, wait 30 seconds, and then power it up again. (See 'Powering the System Up and Down' in Part 3 for instructions.)

The system boots from the tape. This takes approximately five minutes. When the system finishes its boot run, the INSTALL=> prompt appears. You are now running the Command Interpreter using the tape as your file system.

- (6) Consult the BMS-backup Information Form, which will tell you whether the system has a SASI Primary Processor or a SCSI Primary Processor.

If the system has a SCSI Primary Processor, type:

```
SCSIINIT 1
```

If the system has a SASI Primary Processor, type:

```
FXT :#TAPE:DV1TAPE1:aaaa.CONFIG
```

where "aaaa" is: for a:

CDC	CDC disk drive
MICROPOLIS	MICROPOLIS disk drive
CDCMSD	CDC/MSD Mercury combination
MICMSD	MICROPOLIS/MSD Mercury combination

- (7) When the “Continue (Y/N)?” prompt appears, type Y and press RETURN. (Ignore the “Keyword not recognized” error message.)
- (8) The “Reformat (Y/N)?” prompt appears. The prompt determines whether the disk is reformatted or not. Type N and press RETURN.
- (9) To initialize the disk and configure the file system for a SASI Primary Processor, enter:

```
FXINI_P1
```

(The command is automatically entered for a SCSI Primary Processor.)

After this step is completed, the system displays a series of prompts.

- (10) The first prompt asks if you want to reinitialize the disk. Type Y and press RETURN at the “Reinitialize (Y/N)?” prompt. If anything, such as a previous system, was on the disk, it is now erased.
- (11) The system then prompts you for a volume ID and volume name. See the BMS-backup Information Form for the volume ID and volume name. Type them on the same line, separated by a character space.
- (12) The system prompts you for a number of file-system-configuration parameters. Consult the BMS-backup Information Form, which lists any nondefault parameter values that you must specify. (If the form does not specify a nondefault value for a parameter, you can assume that the default value applies. To specify the default value, just press RETURN in response to the prompt.)

If you do not have the BMS-backup information Form, you will have to use the following information to decide what values to specify. In this case, make a written record of the values you specify so that you can use the same values during future backups.

If you do not wish to use the default value for a parameter, change the value according to Tables 23-A and 23-B. The tables show the default values, as well as the recommended settings for large and minimal systems. A large system consists of three or more Applications Processor SRUs. Specify minimal-system values if application software (Call Processing in particular) is configured on the Primary Processor. Specify large-system values if the system is to run the Business Network Management (BNM) application.

Note: When the system prompts for “total open instances” (the fifth parameter listed in Table 23-A), set the value to at least two or three times the number of Primary and Applications Processor SRUs in your system. If you are using Local Data Net, you may need to increase the number of logins. (200 is a reasonable number to use.)

Table 23-A
Configuration Parameters for SASI File Systems

CONFIGURATION ITEM	DEFAULT	LARGE	MINIMAL
Default protection mask	755		
Number of object tasks	10	30	1
Number of agent tasks	5		1
Number of Helix communication buffers	30		4
Total open instances	50 (see note)	81	10 (65 with MSD)
Total number of clients	100		10
Number of small (1K) cache frames	200		40
Number of large (4K) cache frames	2		2
Daily audit time - HOUR	3		
Daily audit time - MINUTE	0		
File server timeout	500		
Number of FOS communication manager buffers	10		4
Number of 32K backup buffers (0...16)	2		
Number of logins	50 (see note)		10
Max security agent communications failures	1		
Agent client audit delay	3000		
Commit to disk frequency	5		
Commit to disk timeout	1000		
Audit FID dir and mark bit map	TRUE		
Do initial audit	TRUE		

Table 23-B
Configuration Parameters for SCSI File Systems

CONFIGURATION ITEM	DEFAULT	LARGE	MINIMAL
Default file protection mask	755		
Number of object tasks	10	30	1
Number of agent tasks	5		1
Number of Helix communication buffers	30		4
Number of open files	50	81	10
Number of open file clients	100		10
Number of small (1K) cache frames	200		40
Number of large (4K) cache frames	4		2
Daily audit time - HOUR	3		
Daily audit time - MINUTE	0		
File server timeout	500		
Number of FOS communication buffers	10		4
Number of 32K backup agent buffers (0..16)	0		
Number of users	50		10
Max retries on security agent failures	1		
User audit delay	3000		
Transactional file set commit time out	500		
Static RAM commit frequency	5		
Static RAM commit timeout	3000		
Do initial FID directory and bitmap audit	TRUE		
Do initial file audit	TRUE		
File Server Write Protected	FALSE		

- (13) If your system has a SASI Primary Processor, then after you have finished entering all the values for the configuration parameters, enter the following command:

```
FXINI_P2
```

This command takes about 40 seconds to execute. (If your system is equipped with a SCSI Primary Processor, then SCIINT executes this step for you.)

- (14) Enter the following command:

```
DV1FSRESTORE
```

and then press RETURN.

- (15) When the system prompts you for the server's cabinet and slot numbers, type in 0816 and then press RETURN.
- (16) When the system prompts you for the File Server Region, type in 1 and then press RETURN.
- (17) When the system prompts you for the restore type, type in F (for a full restore) and then press RETURN.
- (18) When the system prompts you for the tape type, type in C if you are using cartridge tapes, or M if you are using tapes that load on a Nine-track Magnetic Tape Unit. Then press RETURN.
- (19) When the system prompts you for the volume name, enter the backup tape's volume name. This name can be found on a sticker on the backup tape.
- (20) When the system prompts you to do so, remove the install tape from the tape drive, insert the first backup tape (the one whose name ends in .1), and press RETURN
- (21) When the system prompts you to do so, insert the second tape and then subsequent tapes, until you have gone through all the tapes in the backup set.
- (22) After the system has read the entire set of backup tapes, it again prompts you for the restore type. Type in Q (for quit), and press RETURN. Then remove the tape from the tape drive.
- (23) Reboot the system by powering it down, waiting 30 seconds, and powering it up again.
- (24) Disconnect the ASCII terminal from the Primary Processor.

Locking out Tape Clusters

If a tape drive is not exclusively dedicated to BMS, then BMS must not try to access the drive. In this case you must lock out the tape cluster.

- CAUTION -

If another application tries to use a cluster tape drive while BMS is using it, both the external application and BMS may fail.

To instruct BMS not to access a tape cluster, type R at the prompt on the BMS Main Menu. On the screen that appears next, use the L option to lock out the cluster.

Exiting from BMS

To exit from BMS, take the following steps:

- (1) If you are on any BMS screen other than the BMS Main Menu, press ESC repeatedly until you arrive at the BMS Main Menu.
- (2) On the BMS Main Menu, type Q at the prompt.

The system closes the BMS database, copies it to its duplicate (if the administrator specified a duplicate), and terminates the BMS program.

The system prompt reappears.

- (3) Type in 'EXIT' and press ENTER.

The system displays the main menu.

24. Overview of Maintenance Services

You enter Maintenance Services from the main menu by selecting MAINTENANCE and pressing ENTER. Using Maintenance Services, you can:

- display the state of active software and hardware components configured in the system map
- list faulty components
- run diagnostic tests on some components
- take a component out of service without disrupting the use of the system
- put a component back into service if it is able to resume operation.

The software components that Maintenance Services act on are the program resource units (PRUs) that reside in SRUs, and the port personalities that reside in LIUs. The hardware components that Maintenance Services act on are the shared resource units (SRUs) installed in the cabinets, and the remote resource units (RRUs) connected to LANlink SRUs. (The RRUs are M4000-series terminals and LAN Interface Units.) The Maintenance Services do not act on the peripheral devices that connect to the ports of an LIU.

Component States

Using Maintenance Services, you can display State Display screens that show the operational status of system components. A component may be in one of the following states:

- (a) **Working.** This state indicates that everything is currently operational and the component is ready for use
- (b) **Preload.** This indicates that the component has been enabled by the system and that the system is ready to make the component operational. Preload should change to Loading within three minutes.
- (c) **Loading** This is a prelude to Working, and should change to Working within six minutes.
- (d) **Down.** This usually indicates that the component has been taken out of service by means of the <Courtesy Down> softkey that is available in Maintenance Services.

- (e) **UnLoading.** This indicates that the system is in the process of taking the component out of service. This occurs after you press the <Courtesy Down> softkey that is available in Maintenance Services. When the unloading process is finished, the system changes the state to Down.
- (f) **Test.** This indicates that the system is currently running a diagnostic test on the component. You initiate the test by pressing the <Diagnose> softkey that is available in Maintenance Services.
- (g) **Test OK.** This indicates that the system has finished running a diagnostic test on the component, and has given the component a clean bill of health.
- (h) **Trouble.** This indicates that the component is suspected of causing trouble and is currently being evaluated by the system. When the system completes its evaluation, it changes the state to Working (if no fault exists) or to FAULTY (if there is a fault).
- (i) **FAULTY.** This indicates that the system has established that the component has a fault or error, and has taken the component out of service

Getting around in Maintenance Services

You enter Maintenance Services from the System Administrative Services Main Menu. The first screen that appears is the Faulty Units screen, which lists the address, type, and name of all system components that are currently in the FAULTY state.

From the Faulty Units screen, you can move to the State Display screens by pressing <Cabinet State>.

The State Display screens are arranged in a hierarchy, as shown in Figure 24-1. The highest level is the cabinet level. At this level there are SRU State Display screens, which list the slot, type, name, and state of the the active SRUs in each cabinet.

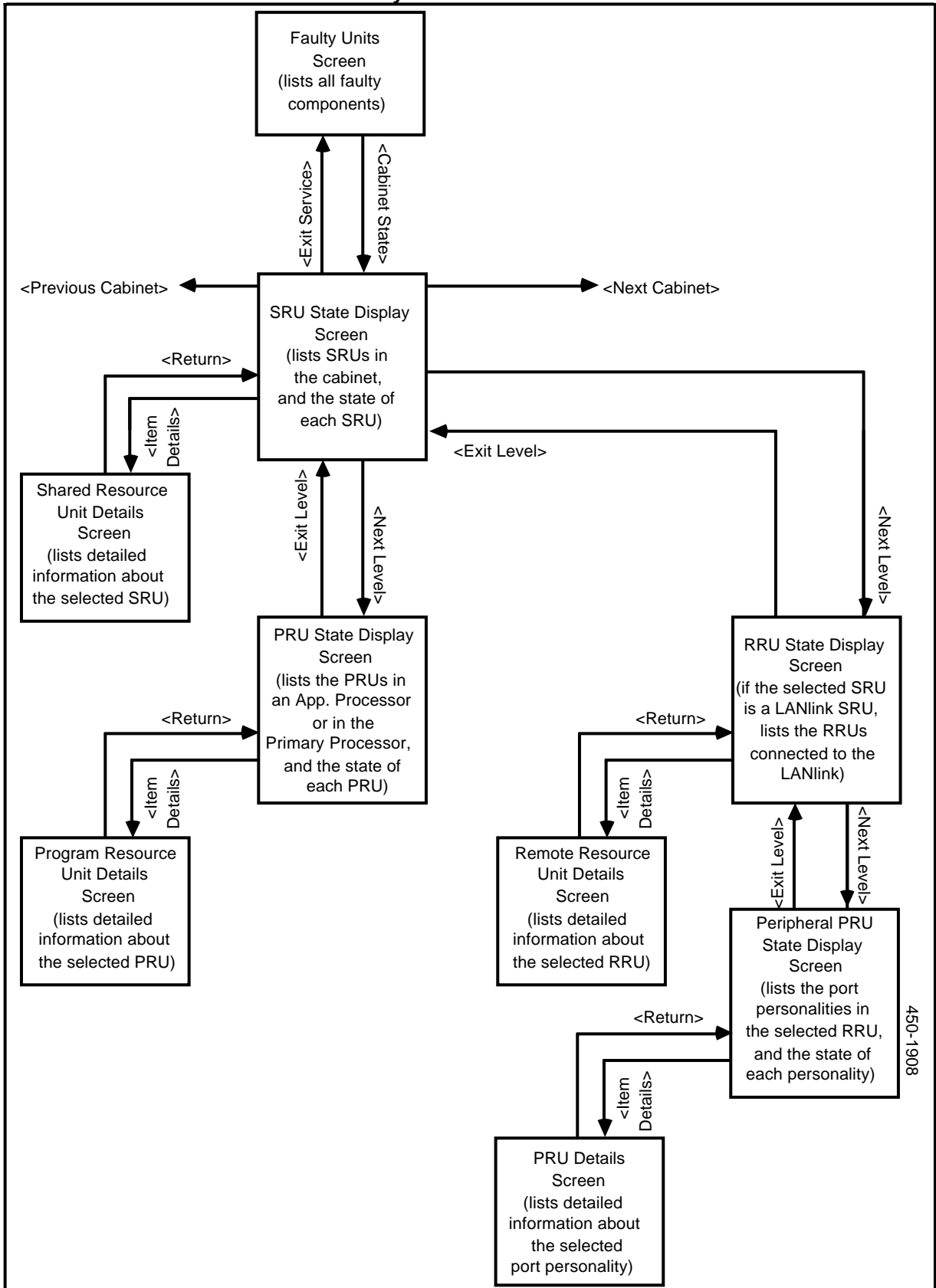
The second level is the SRU level. To display an SRU-level screen, you select a particular SRU on an SRU State Display screen, and then press <Next Level>. Depending on the type of SRU, the system then displays either a PRU State Display screen or an RRU State Display screen. The Primary Processor SRU, the Applications Processor SRUs, File Processor SRUs, and Conference Services SRUs contain program resource units (PRUs). For each one of these SRUs, the system displays a PRU State Display screen, listing the states of the PRUs in the SRU. LANlink SRUs connect to M4000-series terminals and LAN Interface Units. For a LANlink SRU, the system displays the RRU State Display screen, listing the states of the terminals and LIUs.

The third level is the LIU level. To display an LIU-level screen, you select a particular LIU on an RRU State Display screen, and then press <Next Level>. The system then displays a Peripheral PRU State Display screen. This screen shows the state of each port personality contained in the LIU.

Note: The Peripheral PRU State Display screen does not contain information about peripheral input/output hardware devices. It contains

information about the software in the LIU that enables the LIU to communicate with those devices.

Figure 24-1
Maintenance Services Screen Hierarchy



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Each State Display screen has an associated Unit Details screen, which displays more information about the currently selected system component. To display the Unit Details screen, press <Item Details>. After inspecting the unit details, press <Return> to return to the State Display screen,

At the cabinet level you can move to the State Display screen for any cabinet by using the <Next Cabinet> and <Previous Cabinet> softkeys.

To move down from one level to the next, use the arrow keys to select one of the components on the currently displayed State Display screen, and then press <Next Level>. To move up from one level to the next, press <Exit Level>. To return directly to the Faulty Units screen from any one of the State Display screens, press <Faulty Units>.

25. Performing Maintenance on System Components

This part explains how to use the SAS maintenance system to perform maintenance on system components. Using the maintenance system, you can

- view the state of a component
- remove a component from active service
- run a diagnostic test on a component
- restore a component to active service.

The system components that the maintenance system acts on are:

- SRUs
- PRUs
- RRUs (M4000-series terminals and LIUs)
- port personalities.

Maintenance for Shared Resource Units

The menu structure for maintenance services on SRUs is shown in Figure 25-1.

Displaying SRU Status and Detail Information

To display SRU status and detail information, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

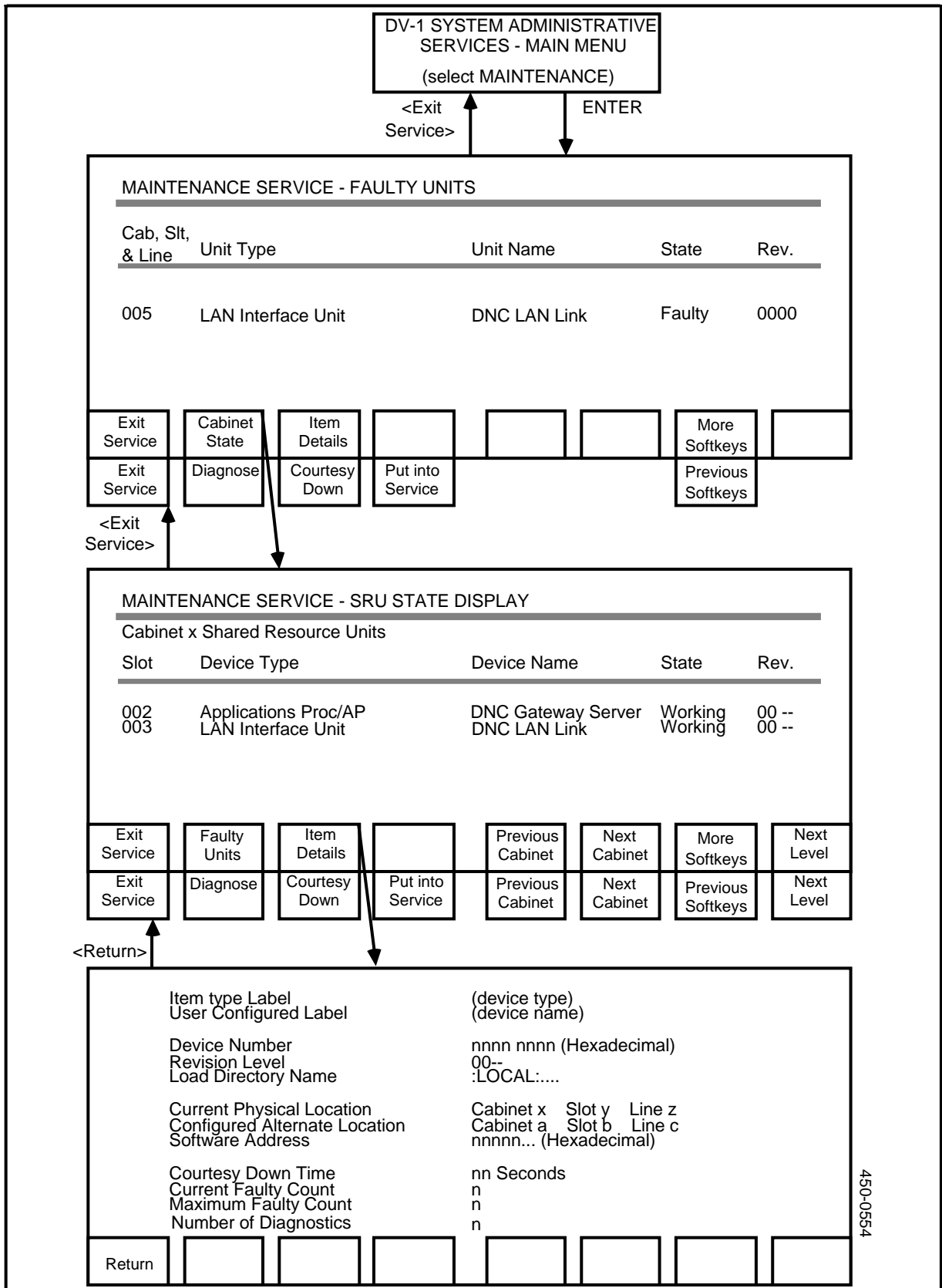
- (2) Select **SYSTEM ADMINISTRATIVE SERVICES**, and press **ENTER**.

The System Administrative Services Main Menu appears.

- (3) Select **MAINTENANCE**, and then press **ENTER**.

The system displays the Faulty Units screen.

Figure 25-1
Menu Structure for the SAS Maintenance Service for SRUs



The Faulty Units screen displays only those devices that the system has identified as faulty. If there are no faulty units, the display is blank, and the <Faulty Units> softkey does not appear on other screens. If faulty units are identified, refer to the troubleshooting instructions in NTP 450-1011-501.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

The SRUs can have the following status:

- **Working:** the unit is working correctly and being used by the system.
 - **Down:** the unit has been taken out of service through a command from the administrator.
 - **Unloading:** a unit is going into a Down state.
 - **Preload:** a unit is in the process of being booted prior to loading.
 - **Loading:** a unit is being loaded into an SRU.
 - **Faulty:** a fault has been found in the unit and it has been taken out of service automatically by the system.
 - **Trouble:** a fault has been found in the unit but it has not yet been taken out of service.
- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the SRU you are interested in. (The cabinets are numbered sequentially.)
- (6) To display detailed information about an SRU, use the arrow keys to select the SRU and then press <Item Details>.

The system displays the Shared Resource Unit Details screen, containing the following fields:

- **Item Type Label.** Same as the device type.
- **User Configured Label.** Same as the user-defined name.
- **Device Number.** A hexadecimal field for the internal use of the system.
- **Revision Level.** Issue of software used.
- **Load Directory Name.** Name of path used to load this software item.
- **Current Physical Location.** Cabinet, slot and line where the hardware is located.
- **Configured Alternate Location.** The location at which an alternate piece of hardware exists. If this unit experiences a loss of function, its software is reloaded into the device at this location.
- **Software Address.** A hexadecimal field for the internal use of the system.
- **Courtesy Down Time.** Maximum amount of time allowable for the unit to be taken out of service. This value is determined separately for each unit or device. If it is exceeded, the unit or device is reloaded at the alternate address.
- **Current Faulty Count.** Number of times the device has gone faulty within the last 24-hour period. (A 24-hour period begins from the time the system is powered on.)
- **Maximum Faulty Count.** This parameter prevents the system from attempting to reboot a faulty device indefinitely. The parameter establishes

the number of times that the device or PRU can go faulty within 24 hours and be automatically rebooted by the system. If the Current Faulty Count (see above) exceeds this number, the system will not attempt to reboot the device or PRU.

- **Number of Diagnostics.** The number of different tests scheduled for this hardware unit (SRU or RRU) when you press <Diagnose>.
- (7) To exit from the Shared Resource Unit Details screen, press <Return>.

The system redisplay the SRU State Display screen.

- (8) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Removing an SRU from Service by Using ‘Courtesy Down’

This procedure describes how to courtesy down an SRU so that it can be removed from the cabinet for maintenance or for some other purpose. For removal and installation instructions, see NTP 450-1011-201.

- WARNING -

Mass Storage SRUs are heavy for their size.

- CAUTION -

Use anti-static precautions when handling the plug-in units.

The ‘Courtesy Down’ operation is not allowed for the following SRUs:

- the Primary Processor SRU
- SRUs that support the System Administrative Services SRU
- the LANlink SRU that supports the terminal that is currently being used by the System administrator UserID
- SRUs in transition between states
- SRUs currently undergoing diagnostic tests.

To remove an SRU from service, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, for the first cabinet.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the screen for the cabinet containing the SRU that you want to take out of service.

- (6) Press <More Softkeys>.

New softkeys appear.

- (7) Use the arrow keys to select the SRU and press <Courtesy Down>.

New softkeys appear.

- (8) Press <Down Only>.

The state of the selected SRU changes to unloading, and then to down.

- (9) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Running Diagnostic Tests on an SRU

There are two types of diagnostic tests: basic and extended. This procedure applies to the basic tests.

To run basic diagnostic tests on an SRU, take the following steps:

- (1) Sign on as a system administrator, and take the SRU out of service, as explained in the previous section.
- (2) On the SRU State Display screen, press <More Softkeys>.

New softkeys appear.

- (3) Use the arrow keys to select the SRU, and then press <Diagnose>.

The system runs a diagnostic test for the SRU. If the device does not have diagnostic capabilities, a message appears on the screen. When the test is invoked, a 'Courtesy Down' function is initiated automatically. The test is then run. The duration of the test may range from a few seconds to several minutes. The STATUS column indicates the current condition throughout the sequence, and ends with either a 'Test OK' or a 'Faulty' status.

Extended Diagnostics

Extended diagnostics are available for certain SRUs, but only the superuser can run the extended tests. For information on extended diagnostics, see NTP 450-10110-505.

Restoring an SRU to Service

To put an SRU back into service, take the following steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, for the first cabinet.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to locate the screen for the cabinet containing the SRU that is to be put back into service.

- (6) Press <More Softkeys>.

New softkeys appear.

- (7) Use the arrow keys to select the SRU, and then press <Put Into Service>.

The status changes to preload, then loading, and then working.

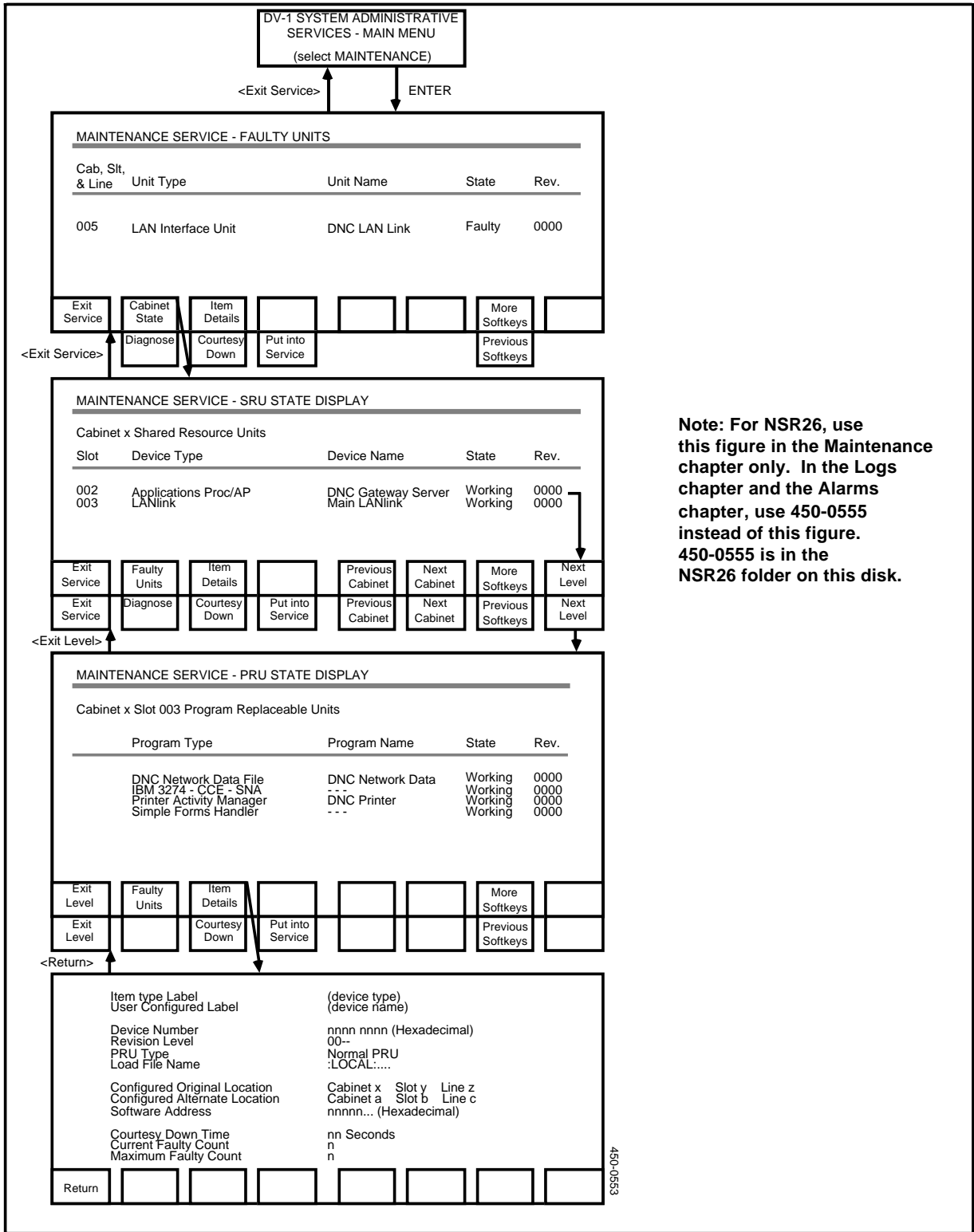
If the device was already working, the <Put Into Service> softkey has no effect.

- (8) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Maintenance for Program Resource Units

The menu structure for maintenance services on PRUs is shown in Figure 25-2.

Figure 25-2
Menu Structure for the SAS Maintenance Service for PRUs



Note: For NSR26, use this figure in the Maintenance chapter only. In the Logs chapter and the Alarms chapter, use 450-0555 instead of this figure. 450-0555 is in the NSR26 folder on this disk.

Displaying PRU Status and Detail Information

To display PRU status and detail information, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the SRU where the PRU resides.

- (6) Use the arrow keys to select the SRU, and press <Next Level>.

The system displays the PRU State Display screen, which lists the name and status of each PRU residing on the SRU.

- The PRUs can have the following status:
 - **Working:** the unit is working correctly and being used by the system.
 - **Down:** the unit has been taken out of service through a command from the administrator.
 - **Unloading:** a unit is going into a Down state.
 - **Preload:** a unit is in the process of being booted, prior to loading.
 - **Loading:** a unit is being loaded into an SRU.
 - **Faulty:** a fault has been found in the unit and it has been taken out of service automatically by the system. (In some cases, a PRU encountering this condition will reload automatically.)
 - **Trouble:** a fault has been found in the unit but it has not yet been taken out of service.
- (7) To display detailed information about a PRU, use the arrow keys to select the PRU, and then press <Item Details>.

The system displays the Program Resource Unit Details screen, which contains the following fields:

- **Item Type Label.** Same as the device type.
- **User Configured Label.** Same as the user-defined name.
- **Device Number.** A hexadecimal field for the internal use of the system.
- **Revision Level.** Issue of software used.
- **PRU Type.** Type of program used by the device.
- **Load File Name.** Name of path used to load this software item.
- **Configured Original Location.** Cabinet, slot and line where the hardware is located.
- **Configured Alternate Location.** The location at which an alternate piece of hardware exists. If this unit experiences a loss of function, its software is reloaded into the device at this location.

- **Software Address.** A hexadecimal field for the internal use of the system.
 - **Courtesy Down Time.** Maximum amount of time allowable for the unit to be taken out of service. This value is determined separately for each unit or device. If exceeded, the unit or device is reloaded at the alternate address.
 - **Current Faulty Count.** Number of faults detected in the last 24 hours.
 - **Maximum Faulty Count.** Maximum number of faults allowed in the most recent 24 hour period before the unit or device is taken out of service and reloaded at the alternate address.
- (8) To return to the PRU State Display screen, press <Return>.

The system redisplay the PRU State Display screen

- (9) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Removing a PRU from Service by Using 'Courtesy Down'

This procedure describes how to courtesy down a PRU. The 'Courtesy Down' function is not allowed for the following PRUs:

- most core system PRUs
- any PRUs on the Primary Processor SRU that support the System Administrative Services menu functions
- PRUs in transition between states
- PRUs currently undergoing diagnostic tests.

To remove a PRU from service, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the SRU where the PRU resides.
- (6) Use the arrow keys to select the SRU, and press <Next Level>.

The system displays the PRU State Display screen, which lists the name and status of each PRU that resides on the SRU.

- (7) Use the arrow keys to select the PRU and press <Courtesy Down>.

New softkeys appear.

- (8) Press <Down Only>.

The state of the selected PRU changes to unloading, and then to down.

Restoring a PRU to Service

To put a PRU back into service, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the SRU where the PRU resides.
- (6) Use the arrow keys to select the SRU, and press <Next Level>.

The system displays the PRU State Display screen, which lists the name and status of each PRU that resides on the SRU.

- (7) Use the arrow keys to select the PRU, and then press <Put Into Service>.

The PRU's state changes to preload, then loading, and then working.

If the device was already working, the <Put Into Service> softkey has no effect.

- (8) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Maintenance for Remote Resource Units

The menu structure for maintenance services on RRUs is shown in Figure 25-3.

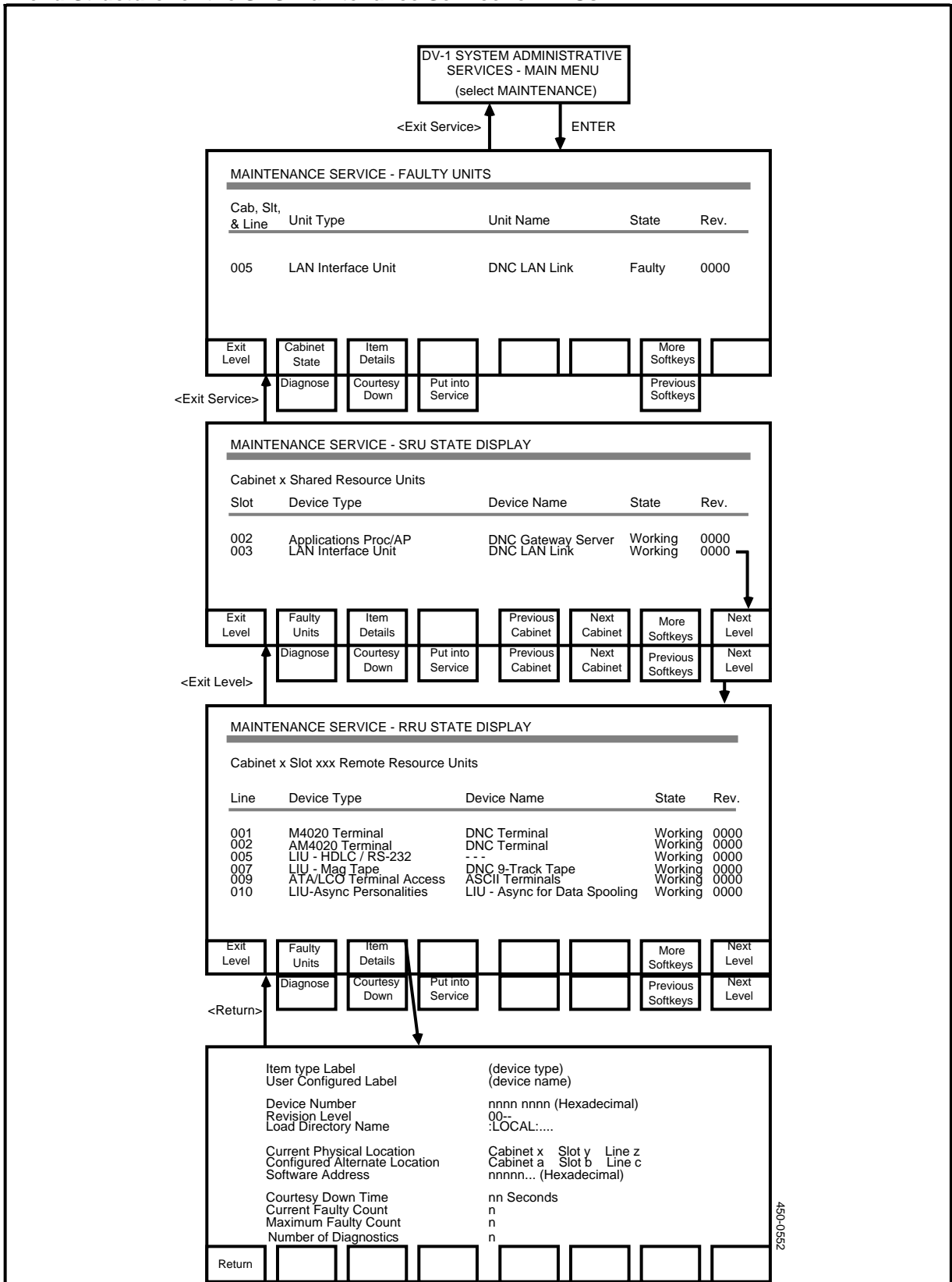
Displaying RRU Status and Detail Information

To display RRU status and detail information, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

Figure 25-3
Menu Structure for the SAS Maintenance Service for RRUs



- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The Faulty Units screen appears.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, listing all the SRUs located in the first cabinet, and the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the LANlink SRU to which the RRU is connected.

- (6) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

The system displays the RRU State Display screen, listing the LANlink's lines. The screen also lists the RRU (an M4000-series terminal or an LIU) connected to each line, and the status of each RRU.

If there is no next level, a screen message is displayed. At this point <Exit Level> returns to the SRU State Display screen.

- The RRUs can have the following status:
 - **Working:** the unit is working correctly and being used by the system.
 - **Down:** the unit has been taken out of service through a command from the administrator.
 - **Unloading:** a unit is going unto a Down state.
 - **Preload:** a unit is in the process of being booted prior to loading.
 - **Loading:** a unit is being loaded into an SRU.
 - **Faulty:** a fault has been found in the unit, and the unit has been taken out of service automatically by the system.
 - **Trouble:** a fault has been found in the unit but the unit has not yet been taken out of service.
- (7) To display detailed information about an RRU, use the arrow keys to select the RRU, and then press <Item Details>.

The system displays the Remote Resource Units Details screen, which contains the following fields:

- **Item Type Label.** Same as the device type.
- **User Configured Label.** Same as the user-defined name.
- **Device Number.** A hexadecimal field for the internal use of the system.
- **Revision Level.** Issue of software used.
- **Load Directory Name.** Name of path used to load this software item.
- **Current Physical Location.** Cabinet, slot and line where the hardware is located.
- **Configured Alternate Location.** The location at which an alternate piece of hardware exists. If this unit experiences a loss of function, its software is reloaded into the device at this location.

- **Software Address.** A hexadecimal field for the internal use of the system.
 - **Courtesy Down Time.** Maximum amount of time allowable for the unit to be taken out of service. This value is determined separately for each unit or device. If the maximum is exceeded, the unit or device is reloaded at the alternate address.
 - **Current Faulty Count.** Number of faults detected in the last 24 hours.
 - **Maximum Faulty Count.** Maximum number of faults allowed in the most recent 24-hour period before the unit or device is taken out of service and reloaded at the alternate address.
 - **Number of Diagnostics.**
- (8) To return to the RRU State Display screen, press <Return>.

The system redisplay the RRU State Display screen.

- (9) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Removing an RRU from Service by Using 'Courtesy Down'

To remove an RRU from service, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the LANlink SRU to which the RRU is connected.

- (6) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

The system displays the RRU State Display screen, which lists the name and status of each RRU connected to the LANlink SRU.

- (7) On the RRU State Display screen, press <More Softkeys>.

New softkeys appear.

- (8) Use the arrow keys to select the RRU and press <Courtesy Down>.

New softkeys appear.

- (9) Press <Down Only>.

The state of the selected RRU changes to unloading, and then to down.

Note: ‘Courtesy Down’ is not allowed for the following remote resource units:

- if an M4000 terminal is currently being used by the System Administrator UserID, that M4000 terminal
 - if an ASCII terminal is being used by the System Administrator UserID, the LIU to which the terminal is connected
 - RRUs in transition between states
 - RRUs currently undergoing diagnostic tests.
- (10) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Running a Diagnostic Test on an RRU

To run a diagnostic test on an RRU, take the following steps:

- (1) Take the RRU out of service, as explained in the previous section.
- (2) On the RRU State Display screen, press <More Softkeys>.

New softkeys appear.

- (3) Use the arrow keys to select the RRU, and then press <Diagnose>.

The system runs a diagnostic test on the selected RRU. If the device does not have diagnostic capabilities, a message appears on the screen. When the test is invoked, a ‘Courtesy Down’ function is initiated automatically. The test is then run. The duration of the test may range from a few seconds to several minutes. The Status column indicates the current condition throughout the sequence, and ends with either a ‘Test OK’ or a ‘Faulty’ status.

Restoring an RRU to Service

To put an RRU back into service, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

(5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the cabinet containing the LANlink SRU to which the RRU is connected.

(6) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

The system displays the RRU State Display screen.

(7) On the RRU State Display screen, press <More Softkeys>.

New softkeys appear.

(8) Use the arrow keys to select the RRU that is to be put into service, and then press <Put Into Service>.

The status changes to preload, then to loading, and then to working.

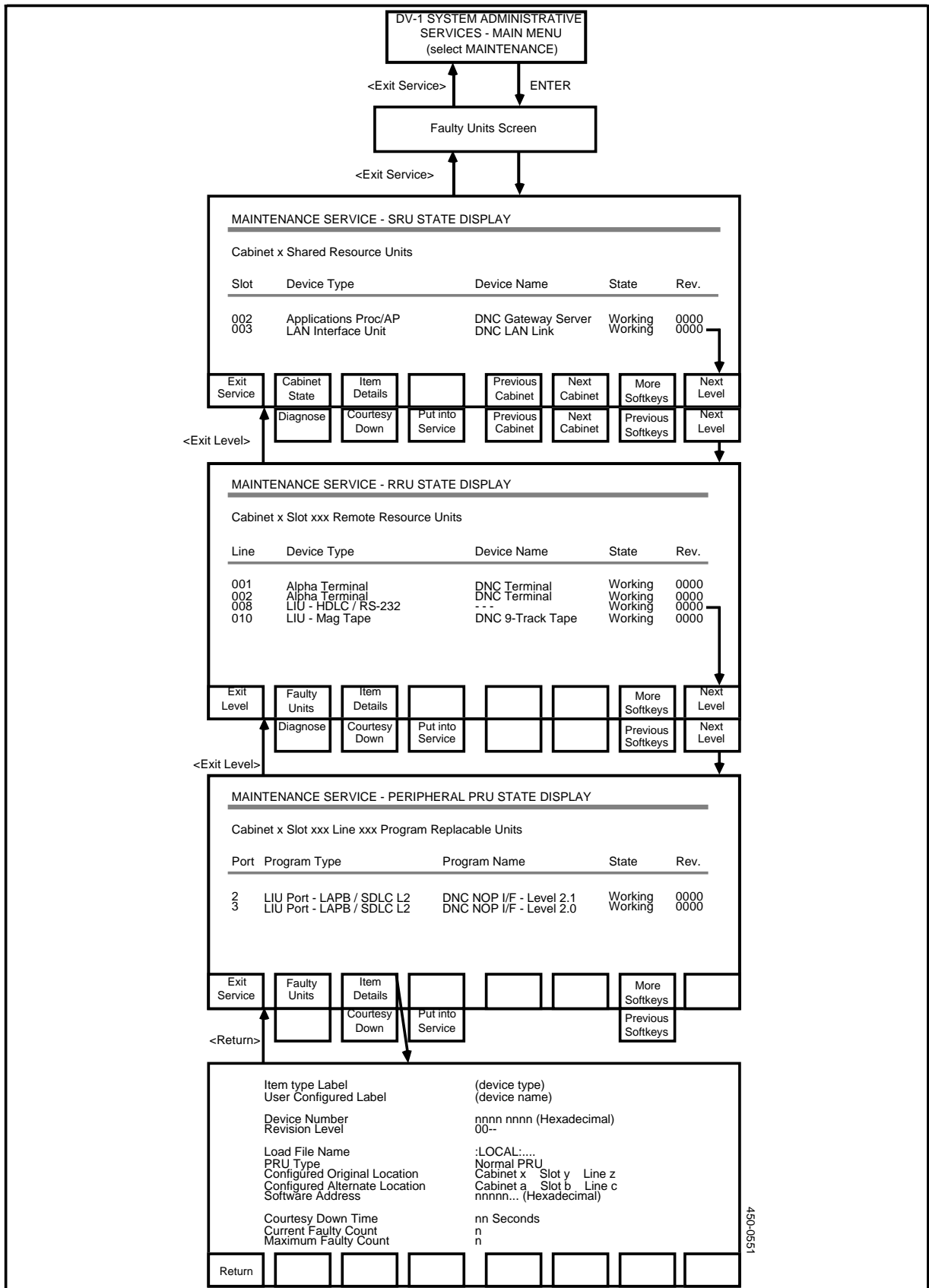
If the device was already working, the <Put Into Service> softkey has no effect.

(9) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Maintenance for Port Personalities

The menu structure for maintenance services on port personalities is shown in Figure 25-4.

Figure 25-4
Menu Structure for the Maintenance Service for Port Personalities



Displaying Status and Detail Information for Port Personalities

To display status and detailed information about port personalities, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the LANlink SRU to which is connected the LIU whose port personalities you are interested in.

- (6) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

The system displays the RRU State Display screen, which lists the LANlink's lines and the RRUs associated with the lines.

- (7) Use the arrow keys to select the LANlink line for the LIU that contains the port personality and then press <Next Level>.

The system displays the Peripheral PRU State Display screen, which lists the LIU's ports and the port personalities associated with the ports. (The port personalities are listed under the Program Type heading.)

If there is no next level, a screen message is displayed.

A port personality can have any of the following statuses:

- **Working:** the unit is working correctly and being used by the system
- **Down:** the unit has been taken out of service through a command from the administrator.
- **Unloading:** a unit is going into a Down state.
- **Preload:** a unit is in the process of being booted, prior to loading.
- **Loading:** a unit is being loaded into an SRU.
- **Faulty:** a fault has been found in the unit and the unit has been taken out of service automatically by the system.
- **Trouble:** a fault has been found in the unit but the unit has not yet been taken out of service.

- (8) To display detailed information about a port personality, use the arrow keys to select the port personality PRU on the Peripheral PRU State Display screen, and press <Item Details>.

The system displays the Program Resource Unit Details screen, which contains the following fields:

- **Item Type Label.** Same as the device type.
 - **User Configured Label.** Same as the user-defined name.
 - **Device Number.** A hexadecimal field for the internal use of the system.
 - **Revision Level.** Issue of software used.
 - **PRU Type.** Type of program used by the device.
 - **Load File Name.** Name of path used to load this software item.
 - **Current Physical Location.** Cabinet, slot and line where the hardware is located.
 - **Configured Alternate Location.** The location at which an alternate piece of hardware exists. If this unit experiences a loss of function, its software is reloaded into the device at this location.
 - **Software Address.** A hexadecimal field for the internal use of the system.
 - **Courtesy Down Time.** Maximum amount of time allowable for the unit to be taken out of service. This value is determined separately for each unit or device. If exceeded, the unit or device is reloaded at the alternate address.
 - **Current Faulty Count.** Number of faults detected in the last 24 h.
 - **Maximum Faulty Count.** Maximum number of faults allowed in the most recent 24-hour period before the unit or device is taken out of service and reloaded at the alternate address.
- (9) To exit from the screen, press <Return>.

The system redisplay the PRU State Display screen.

- (10) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

Removing a Port Personality from Service by Using ‘Courtesy Down’

To remove a port personality from service, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the cabinet containing the LANlink SRU to which is connected the LIU that contains the port personality that is to be taken out of service.
- (6) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

The system displays the RRU State Display screen, which lists the LANlink's lines, and the RRUs associated with the lines.

- (7) Use the arrow keys to select the LANlink line for the LIU that contains the port personality, and then press <Next Level>.

The system displays the Peripheral PRU State Display screen, which lists the LIU's ports, and the port personalities associated with the ports. (The port personalities are listed under the Program Type heading.)

- (8) On the Peripheral PRU State Display screen, press <More Softkeys>.

New softkeys appear.

- (9) Use the arrow keys to select the port personality and then press <Courtesy Down>.

New softkeys appear.

- (10) Press <Down Only>.

The state of the port personality changes to unloading, and then to down.

Note: 'Courtesy Down' is not allowed for the following port personalities:

- if an ASCII terminal is currently being used by the System Administrator User ID, the personality of the LIU port to which that terminal is connected
 - port personalities in transition between states
 - port personalities currently undergoing diagnostic tests.
- (11) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main menu.

Restoring a Port Personality PRU to Service

To put a port personality back into service, proceed as follows:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES, and press ENTER.

The System Administrative Services Main Menu appears.

- (3) Select MAINTENANCE, and then press ENTER.

The system displays the Faulty Units screen.

- (4) On the Faulty Units screen, press <Cabinet State>.

The system displays the SRU State Display screen, which lists all SRUs located in the first cabinet, and gives the status of each.

- (5) If necessary, use the <Next Cabinet> and <Previous Cabinet> softkeys to display the screen for the cabinet containing the LANLINK SRU to which is connected the LIU whose port personality is to be put back into service.
- (6) Use the arrow keys to select the LANlink SRU, and press <Next Level>.

The system displays the RRU State Display screen, which lists the LANlink's lines, and the RRUs associated with lines.

- (7) Use the arrow keys to select the LANlink line for the LIU that contains the port personality, and then press <Next Level>.

The system displays the Peripheral PRU State Display screen, which lists the LIU's ports, and the port personalities associated with the ports. (The port personalities are listed under the Program Type heading.)

- (8) On the Peripheral PRU State Display screen, use the arrow keys to select the port personality, and then press <More Softkeys>.

New softkeys appear.

- (9) Press <Put into Service>.

The status of the port personality PRU changes to preload, then to loading, and then to working.

If the device was already working, the <Put Into Service> softkey has no effect.

- (10) To exit, press the <Exit> softkeys until you arrive at the System Administrative Services Main Menu.

26. Loading and Unloading the Nine-track Magnetic Tape Unit

This procedure describes how to load and unload a reel of tape in the nine-track magnetic tape unit. It applies to tape units used with both the SASI and SCSI interfaces. At the end of this procedure, the tape will be ready to be written by the system.

Note 1: Before use, the tape drive heads must be cleaned (as described in 450-1011-501). Use top quality tape.

Loading a Tape

- (1) Ensure that the Write Enable ring is inserted into the recessed groove in the rear of the tape reel.
- (2) Open the dust cover door (see Figure 26-1). Ensure that the circuit breaker is set on ('1' depressed).

The LOGIC OFF indicator lights.

- (3) Press LOGIC ON.

The LOGIC ON, FILE PRO, and SELECT indicators light.

Note: If a fault code appears on the display, press the RESET and LOGIC OFF keys to clear display. Press LOGIC ON again. If the fault code reappears, consult the tape unit documentation.

- (4) Press the button in the center of the supply reel hub.
- (5) Lower the supply reel onto the hub. The back of reel (with write ring) should be solidly against rear flange.
- (6) Press the ring on the outside edge of the hub face to lock the reel in place.
- (7) Thread the tape over the tape path (see Figure 26-2).
- (8) Wrap the tape around the take-up reel for two or three turns.

Figure 26-1
The Nine-track Magnetic Tape Unit and Its Features

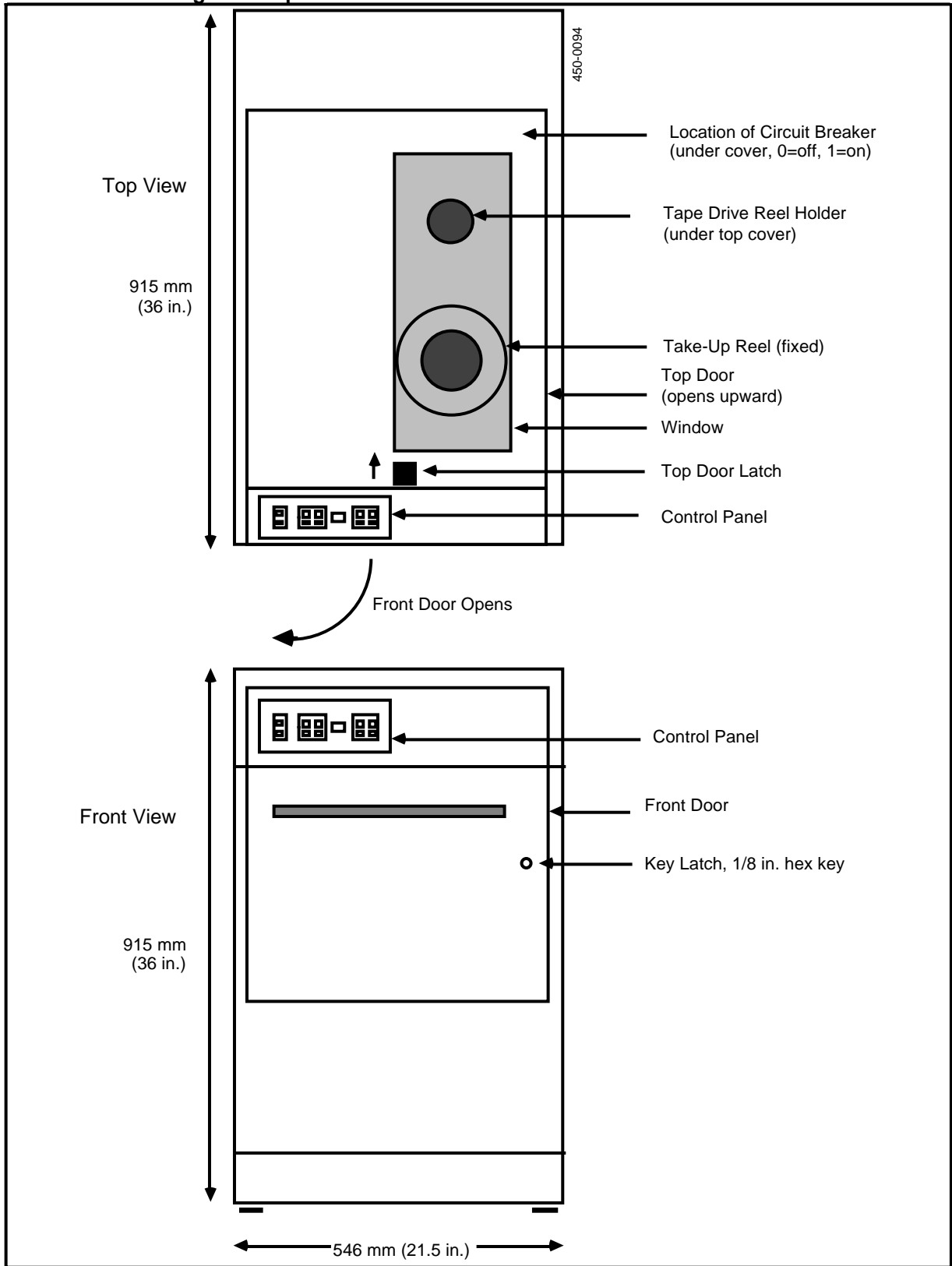
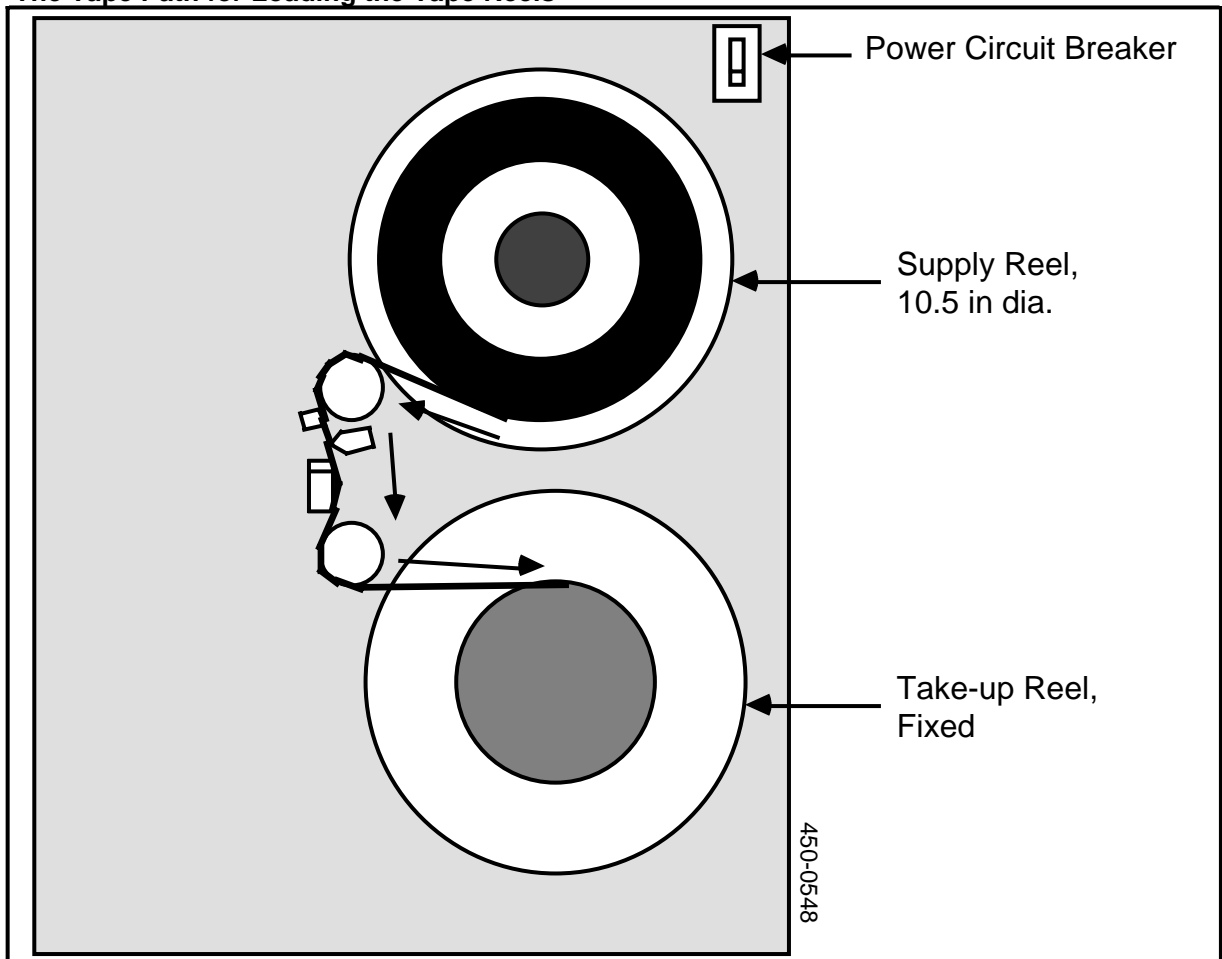


Figure 26-2
The Tape Path for Loading the Tape Reels



- CAUTION -

Ensure that the tape is positioned properly over all parts of the tape path; otherwise, tape damage may occur.

- (9) Close the dust cover.
- (10) Press the LOAD/REWIND switch.

The air pump motor starts. Forward motion starts, and continues until the Beginning of Tape (BOT) reflective marker is detected. If the marker was positioned past the sensor, the forward motion continues for about 12 m (40 ft), then reverses until the BOT marker is detected.

- (11) Press ON-LINE (the load can still be in progress).

When the load is finished, the ON-LINE indicator lights.

- (12) The tape unit is now ready to write.

Unloading a Tape

- (1) Press RESET.
- (2) Press UNLOAD.

The tape rewinds. until clear of all tape path areas.

- (3) Open the dust cover.
- (4) Press button in the center of supply reel hub.
- (5) Lift supply reel from the hub.
- (6) Close the dust cover door to prevent dust accumulation.

27. Broadcasting Messages

The superuser can broadcast a message. The system sends such a message to the terminal of every user who is currently logged on to the system. The message can be up to 72 characters. It appears on the second notification line of each user's terminal (line 2). The message remains on display for approximately 15 seconds, after which the system redisplay the previous contents of the second notification line.

To broadcast a message, you use the broadcast utility, which you invoke from the command line of the Helix Command Interpreter. The broadcast utility can function in interactive mode, in which it prompts you for information, or in command mode, in which you specify all the required information on a single line.

Using the Broadcast Utility

This procedure explains how to use the broadcast utility in both the interactive mode and the command mode. Proceed as follows:

- (1) Sign on as the superuser.
- (2) Select `SYSTEM ADMINISTRATIVE SERVICES` and press `ENTER`.

The System Administrative Services - Main Menu appears.

- (3) Select `UTILITIES` and press `ENTER`.

The Utilities Services - Main Menu appears.

- (4) Select `Helix Command Interpreter` and press `ENTER`.

The system prompt appears. (It is usually `'>'`.)

Steps 5 to 9 explain how to use the broadcast utility in interactive mode. For information on command mode, go to Step 10.

- (5) To start the broadcast utility program, type in the following command on the Helix command line:

```
BROADCAST
```

and press `ENTER`.

The system prompts you to type in the message.

- (6) Type in your message (maximum 72 characters) and then press `ENTER`.

The system prompts for the user IDs of the users who are to receive the message.

- (7) To indicate that all users are to receive the message, type an asterisk in response to the prompt, and press ENTER. Alternatively, if only selected users are to receive the message, type in their user IDs in response to the prompt and press ENTER.

The system sends your message. It appears on line 2 of the users' terminals, and remains on display for approximately 15 seconds. On your screen, the system displays a list of the names and addresses of the users who received your message.

- (8) The system displays the "Send previous message?" prompt.

To send the previous message again, press ENTER. If you want to send a different message, press N and then specify the next message in the same manner as explained above.

- (9) If you have no more messages to broadcast, then when the system displays the "Send previous message?" prompt, press the ESC key.

The system prompt reappears on the command line.

- (10) You can use command mode to broadcast a message if you can fit all the necessary parameters on the command line. Just type in the command and press ENTER. The syntax of the broadcast command is:

```
BROADCAST user-list 'message'
```

where user-list is either an asterisk (indicating all users) or a list of user IDs, and message the message (maximum 72 characters), enclosed in single quotation marks.

Note: The single quotation marks surrounding the message are used only in command mode.

If the command line contains enough information to start processing, the system sends your message when you press ENTER. Alternatively, if the command line does not contain enough information to start processing, then when you press ENTER, the broadcast utility goes into interactive mode and prompts you until it has the needed information. It then sends your message.

When the system broadcasts your message, it appears on line 2 of the users' terminals, and remains on display for approximately 15 seconds. On your screen, the system displays a list of the names and addresses of the users who received your message. Then the system prompt reappears on the command line.

28. Using SDM Tables

Service Data Manager (SDM) tables are files that contain data in list form. Each table is composed of two files, the data dictionary file and the data file. The data dictionary file contains the definition of the record structure, and information regarding the access rights of various users and user groups. The data file is composed of a series of records, each structured according to the definition in the data dictionary file.

All DNC applications can use SDM tables, and the information found in this part is applicable to all SDM tables.

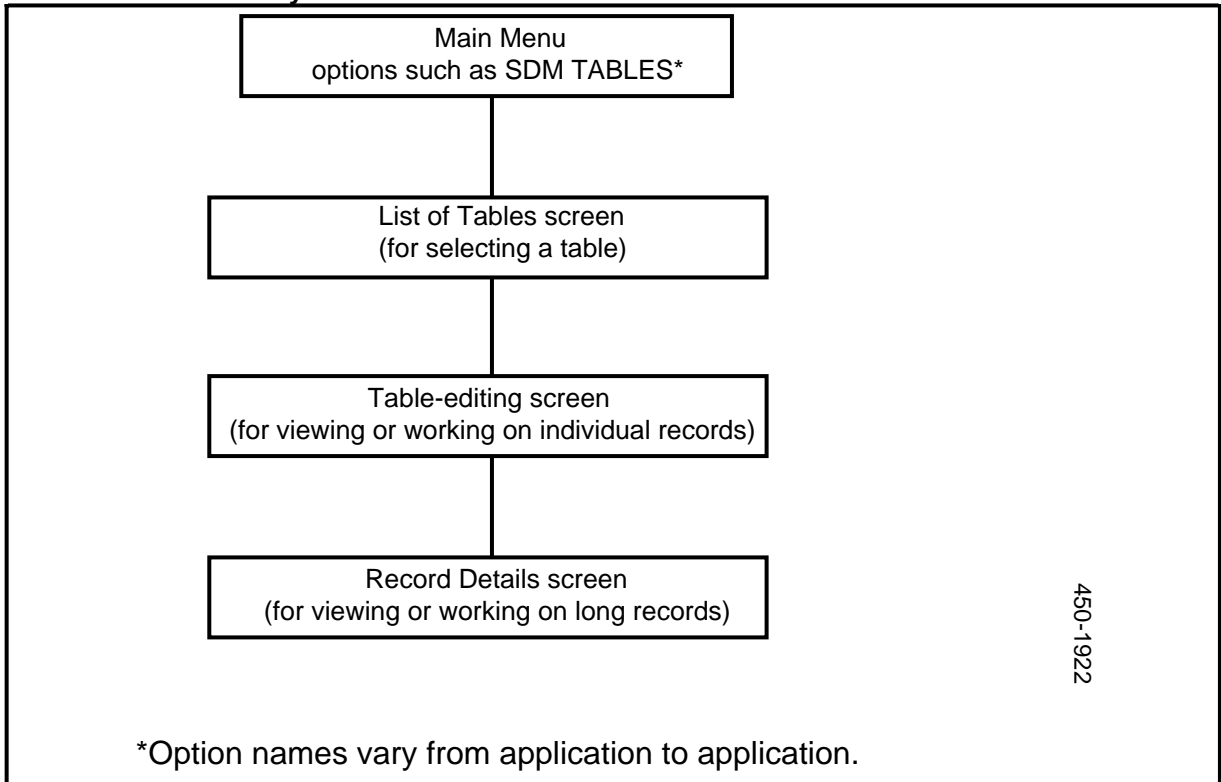
Overview of the Screen Interface for SDM Tables

You enter the screen interface for SDM tables by selecting a main-menu option such as SDM Tables, Service Data, or Table Editor, and then pressing ENTER. (The wording of the main-menu option varies from application to application.) The system then displays the List of Tables screen, the first screen of the SDM interface.

The SDM interface is composed of three screens: the List of Tables screen, the Table-editing screen, and the Record Details screen. On the List of Tables screen you select the SDM table that you want to work with. After you select a table, the system displays the Table-editing screen. This screen lists the records in the table, one record per line. The Record Details screen comes into action whenever you want to view, add, or change a data record that is too long to be shown in its entirety on the Table-editing screen.

Figure 28-1 illustrates the SDM screen hierarchy.

Figure 28-1
SDM Screen Hierarchy



The SDM Screens

The List of Tables screen displays a list of tables, as shown in Figure 28-2.

The Table-editing screen lists the data records found in the table. The screen lists ten records at a time, and devotes one line to each record. (Records that exceed the screen's line length are truncated.) You can use the screen to browse through the table. Depending on your access rights, you may be able to use the Table-editing screen to add records, delete records, or edit the content of records. Figure 28-2 illustrates the Table-editing screen.

The Record Details screen enables you to work with data records that are longer than a single line on the terminal screen. For example, you may want to view a record that is so long that it does not fit on a single line of the Table-editing screen. In this case, you select the record on the Table-editing screen and then press a softkey that calls up the Record Details screen, which displays the record in its entirety. You also use the Record Details screen when you add or edit long data records. See Figure 28-3 for an example of the Record Details screen.

Figure 28-2
The List of Tables Screen and the Table-editing Screen

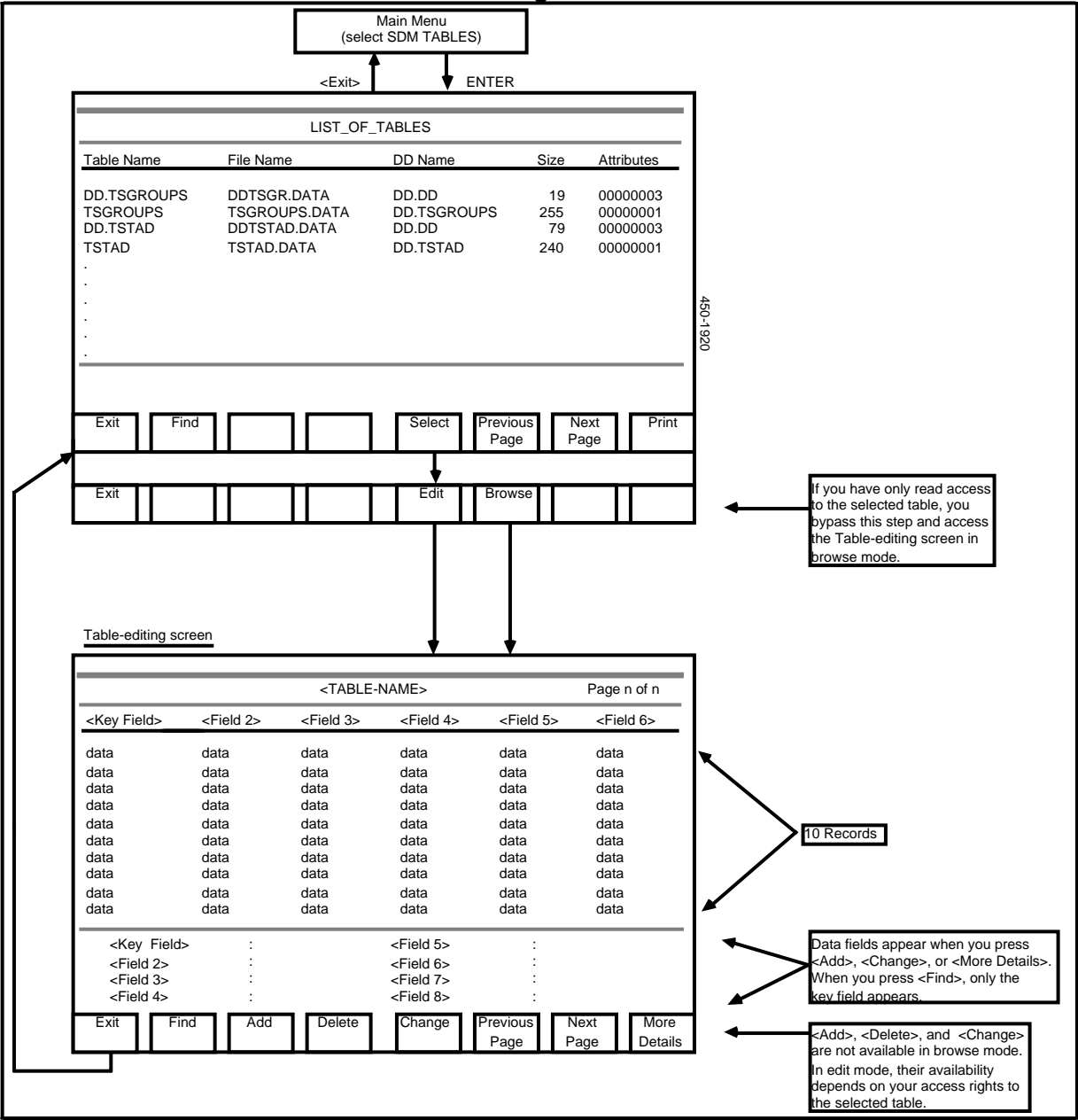
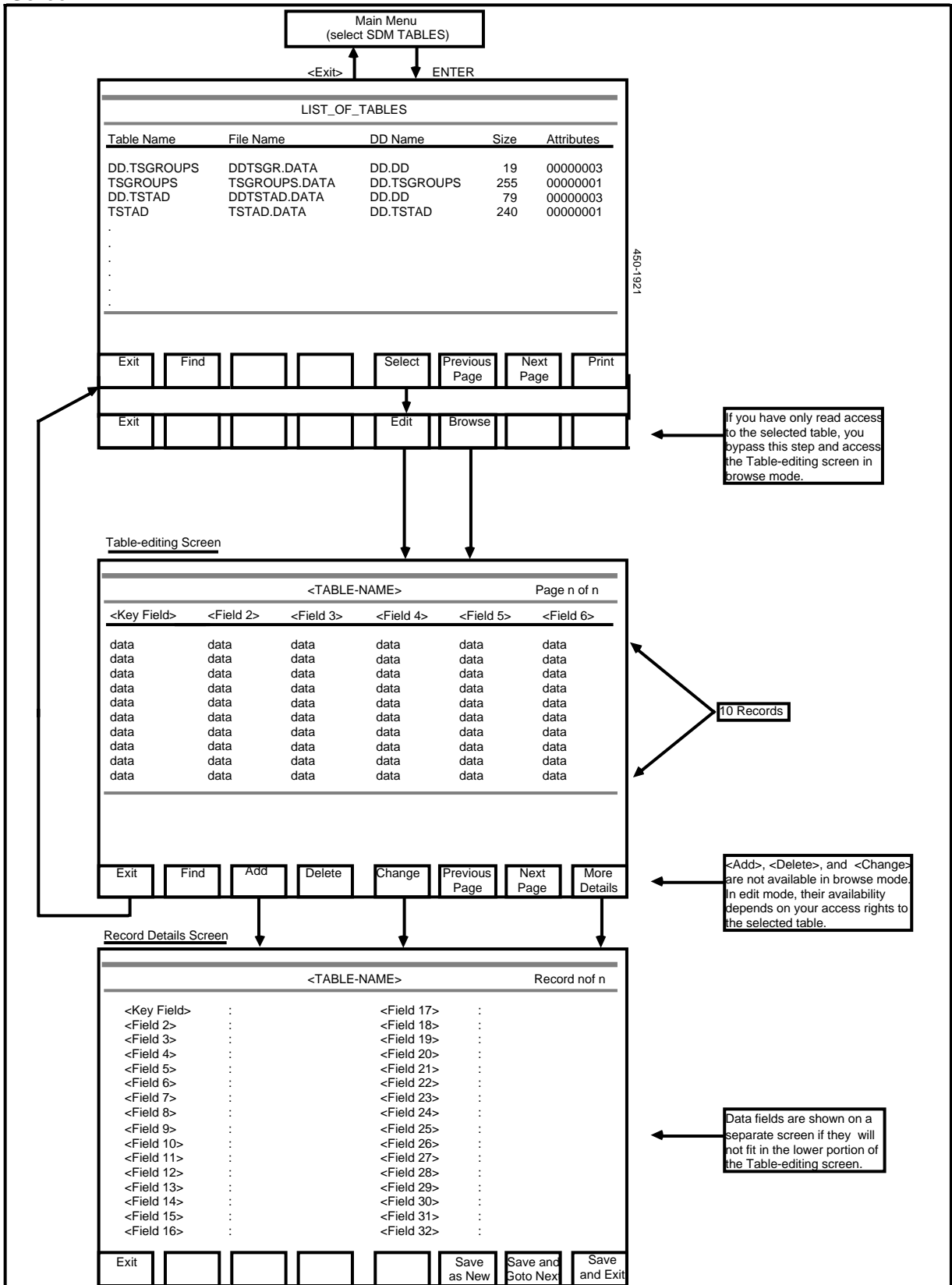


Figure 28-3
The List of Tables Screen, the Table-editing Screen, and the Record Details
Screen



Selecting an SDM Table

This procedure explains how to select an SDM table from the list displayed on the List of Tables screen. This procedure assumes that you have already signed on, selected a main-menu option such as SDM TABLES or SERVICE DATA, and pressed ENTER. The system is now displaying a list of tables on the List of Tables screen, as shown in Figure 28-2. To select a table, proceed as follows:

- (1) If the name of the desired table is shown on the screen, use the arrow keys to select the table name, and proceed to Step 2. If the name is not shown, then use one of the following methods to select the table name:
 - Use the <Next Page> and <Previous Page> softkeys to page through the list until the name of the desired table appears on the screen, and then use the arrow keys to select the table name.
 - Press the <Find> softkey. The system prompts you to type in the name of the desired table, and it displays new softkeys, <Exit> and <Execute>. Type in the table name and press <Execute>. The previous softkeys reappear, and if the specified table is in the list, the system displays the appropriate page, with the table name selected.
- (2) Press <Select>.

If your access rights to the selected table do not allow you to change the table (by adding, deleting, or changing records), then immediately after you press the <Select> softkey, the system displays the Table-editing screen for the selected table, in browse mode.

If your access rights to the selected table allow you to change the table, then immediately after you press the <Select> softkey, new softkeys appear: <Edit> and <Browse>. Press one or the other of these softkeys to specify the mode in which you want to access the table, and the system then displays the Table-editing screen for the table.

Using the Table-editing Screen

You can use the Table-editing screen to view the records in an SDM table and to find records containing specified key values. Depending on your access rights, you may also be able to use the screen to perform some or all of the following functions:

- adding records to the table
- deleting records from the table
- changing the contents of records in the table.

Typically, only system administrators can add, delete, or change records, and in any given SDM table, some or all of these functions may be unavailable even to system administrators.

Viewing Records in an SDM Table

This procedure explains how to view the records in an SDM table. The starting point for the procedure is the Table-editing screen for the table. Anyone who can access this screen can use it to view records. You arrive at the Table-editing screen by following the steps in the section titled ‘Selecting an SDM Table’.

An example of the Table-editing screen is shown in Figure 28-2.

Note: When you work with the Table-editing screen, one or more of the following softkeys may not be available: <Add>, <Delete>, and <Edit>. The availability of these softkeys depends on your access rights to the selected SDM table.

To view the records in an SDM table, proceed as follows:

- (1) Page through the list of records by pressing <Next Page> and <Previous Page>.
- (2) If all the fields in each record will not fit in the space devoted to a single record entry on the Table-editing screen, then the <More Details> softkey is available. To view a long record in its entirety, select the record and press <More Details>.

If all the fields in the record structure can fit into the unused four-line area in the lower portion of the Table-editing screen, then the system displays the record in that area, as in Figure 28-2. If the record structure is so long that it does not fit into that area, then the system displays it on the Record Details screen, as in Figure 28-3.

- (3) If the Record Details screen is on display, you can return to the Table-editing screen by pressing <Exit>.
- (4) To exit, press the <Exit> softkeys until you arrive at the main menu.

Finding Records in an SDM Table

This procedure explains how to find a record in an SDM table. The starting point for the procedure is the Table-editing screen for the table. Anyone who can access this screen can use it to find records. You arrive at the Table-editing screen by following the steps in the section titled ‘Selecting an SDM Table’.

An example of the Table-editing screen is shown in Figure 28-2.

Note: When you work with the Table-editing screen, one or more of the following softkeys may not be available: <Add>, <Delete>, and <Edit>. The availability of these softkeys depends on your access rights to the selected SDM table.

To find a record in an SDM table, take the following steps:

- (1) Press <Find>.

In the lower portion of the screen, the system prompts you for a key value.

- (2) Type in the key value of the desired record, and then press <Execute>.

The system scans the table. If the table contains a record with the specified key value, the system displays the page containing that record, with the record selected. If the table does not contain such a record, the system displays a message informing you of the fact.

- (3) To exit, press the <Exit> softkeys until you arrive at the main menu.

Adding Records to an SDM Table

This procedure explains how to add records to an SDM table. The starting point for the procedure is a Table-editing screen on which the <Add> softkey is available to you. You arrive at the Table-editing screen by following the steps in the section titled 'Selecting an SDM Table'. You can use the add function on the Table-editing screen only if:

- you have suitable access rights to the table
- you access the table in edit mode.

An example of the Table-editing screen is shown in Figure 28-2.

Note: When you work with the Table-editing screen, one or more of the following softkeys may not be available: <Add>, <Delete>, and <Edit>. The availability of these softkeys depends on your access rights to the selected SDM table.

To add one or more records to an SDM table, take the following steps:

- (1) On the Table-editing screen, press <Add>.

If all the fields in the record structure can fit into the unused four-line area in the lower portion of the Table-editing screen, then the system displays an empty record in that area, as in Figure 28-2. If the record structure is so long that it does not fit into that area, then the system displays an empty record on the Record Details screen, as in Figure 28-3.

- (2) Type in the data for the new record in the data-entry fields. To move from field to field, press TAB.
- (3) If you want to add more than one new record, then after typing in the data for one record, press <Save and Goto Next>.

The system clears the data-entry fields so that you can type in more data.

- (4) After entering all the data for the one or more new records, press <Save and Exit>.

The system adds the one or more new records to the table, and redisplay the Table-editing screen.

- (5) To exit, press the <Exit> softkeys until you arrive at the main menu.

Deleting Records from an SDM Table

This procedure explains how to delete a record from an SDM table. The starting point for the procedure is a Table-editing screen on which the <Delete> softkey is available to you. You arrive at the Table-editing screen by following the steps in the section titled 'Selecting an SDM Table'. You can use the delete function on the Table-editing screen only if:

- you have suitable access rights to the table
- you access the table in edit mode.

An example of the Table-editing screen is shown in Figure 28-2.

Note: When you work with the Table-editing screen, one or more of the following softkeys may not be available: <Add>, <Delete>, and <Edit>. The availability of these softkeys depends on your access rights to the selected SDM table.

To delete a record from an SDM table, take the following steps:

- (1) Select the record that is to be deleted. If the list of records extends beyond a single page, you can use one of the following methods to locate the record:
 - Use the <Next Page> and <Previous Page> softkeys to page through the list until you arrive at the proper page, and then use the arrow keys to select the record.
 - Use the find function, as explained in 'Finding Records in an SDM Table', earlier in this part.
- (2) After selecting the record, press <Delete>.

New softkeys appear: <Cancel> and <Confirm>.

- (3) Press <Confirm>.

The system deletes the record from the table.

- (4) To exit, press the <Exit> softkeys until you arrive at the main menu.

Changing Records in an SDM Table

This procedure explains how to change one record or several consecutive records in an SDM table. The starting point for the procedure is a Table-editing screen on which the <Change> softkey is available to you. You arrive at the Table-editing screen by following the steps in the section titled 'Selecting an SDM Table'. You can use the change function on the Table-editing screen only if

- you have suitable access rights to the table
- you access the table in edit mode.

An example of the Table-editing screen is shown in Figure 28-2.

Note: When you work with the Table-editing screen, one or more of the following softkeys may not be available: <Add>, <Delete>, and <Edit>. The availability of these softkeys depends on your access rights to the selected SDM table.

To change one or more records to an SDM table, take the following steps:

- (1) Select the record that is to be changed. If the list of records extends beyond a single page, you can use one of the following methods to locate the record:
 - Use the <Next Page> and <Previous Page> softkeys to page through the list until you arrive at the proper page, and then use the arrow keys to select the record.
 - Use the find function, as explained in 'Finding Records in an SDM Table', earlier in this part.
- (2) After selecting the record, press <Change>.

If all the fields in the record structure can fit into the unused four-line area in the lower portion of the Table-editing screen, then the system displays the record in that area, as in Figure 28-2. If the record structure is so long that it does not fit into that area, then the system displays the record on the Record Details screen, as in Figure 28-3.

- (3) Type in the changed data for the record in the data-entry fields. To move from field to field, press TAB.
- (4) If you want to change consecutive data records, then after typing in the changed data for one record, press <Save and Goto Next>.

The system displays the next record so that you can type in changed data.

- (5) After entering all the changed data, press <Save and Exit>.

The system updates the records and redisplay the Table-editing screen.

- (6) To exit, press the <Exit> softkeys until you arrive at the main menu.

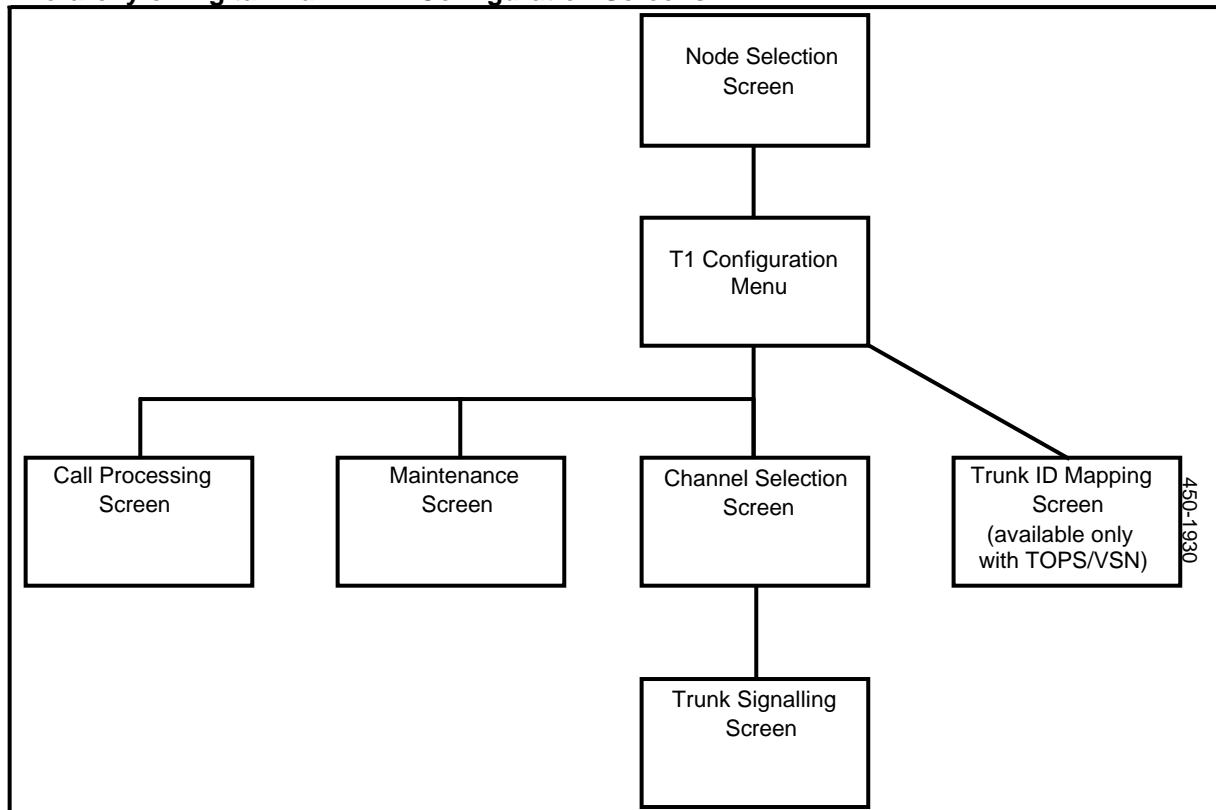
29. Digital Trunk Link Configuration

This part explains Digital Trunk Link Configuration, which is the process of specifying the operating parameters of the Digital Trunk Link SRU (also known as the T1 SRU). It will be necessary to do Digital Trunk Link Configuration if your system is running the TOPS/VSN application.

Overview of the Digital Trunk Link Configuration Screens

This section briefly explains the functions and relationships of the screens used for Digital Trunk Link Configuration. Figure 29-1 shows the hierarchy of these screens. (For instructions on how to access these screens, see 'Accessing the T1 Configuration Menu', later in this part.)

Figure 29-1
Hierarchy of Digital Trunk Link Configuration Screens



The Digital Trunk Link Configuration screens are:

- **The Node Selection screen.** On this screen you designate the Digital Trunk Link SRU whose parameter values you want to specify. (There can be up to 16 Digital Trunk Link SRUs in a system.)
- **The T1 Configuration Menu.** This screen appears after you designate an SRU on the Node Selection screen. On the T1 Configuration Menu you choose an option to indicate the type of parameters that you want to specify. Depending on the option that you choose, the system displays one of the lower-level screens.
- **The Call Processing screen.** This screen appears if you choose the Call Processing option on the T1 Configuration Menu.
- **The Maintenance screen.** This screen appears if you choose the Maintenance option on the T1 Configuration Menu.
- **The Channel Selection screen.** This screen appears if you choose the Trunk Signalling option on the T1 Configuration Menu. On the Channel Selection screen, you select the DS-0 channel whose trunk signalling parameters you want to specify.
- **The Trunk Signalling screen.** This screen appears after you choose a DS-0 channel on the Channel Selection screen.
- **The Trunk ID Mapping screen.** This screen appears after you select the Trunk ID Mapping option on the T1 Configuration Menu.

Note: The Trunk ID Mapping option and the Trunk ID Mapping screen are available only if your system is running the TOPS/VSN application.

Accessing the T1 Configuration Menu

This procedure explains how to access the T1 Configuration Menu. The menu structure for this procedure is shown in Figure 29-2. To access the menu, take the following steps:

- (1) Sign on as a system administrator.

The main menu appears.

- (2) Select SYSTEM ADMINISTRATIVE SERVICES and then press ENTER.

The system displays the System Administrative Services - Main Menu.

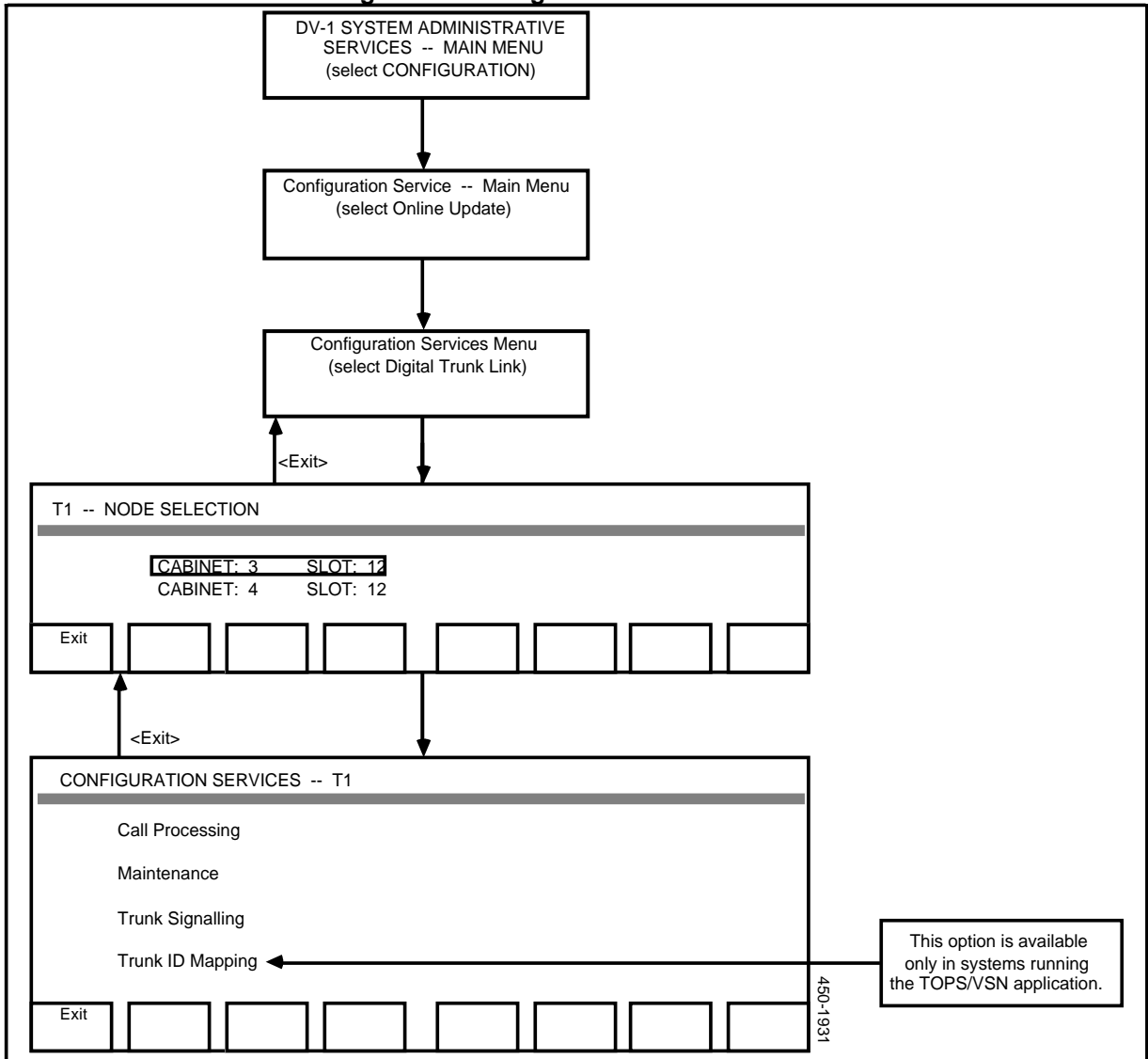
- (3) Select CONFIGURATION and then press ENTER.

The system displays the Configuration Service - Main Menu.

- (4) Select Online Update and press ENTER.

The Configuration Services Menu appears.

Figure 29-2
Menu Structure for Accessing the T1 Configuration Menu



- (5) Select Digital Trunk Link and then press ENTER.

The system displays the Node Selection screen, which lists the Digital Trunk Link SRUs that have been configured in the system map. (There can be up to 16 Digital Trunk Link SRUs in the system.) Each SRU is identified by its address, which consists of cabinet and slot numbers.

- (6) Using the arrow keys, select the address that identifies the SRU whose parameters you want to configure, and then press ENTER.

The T1 Configuration Menu appears. This menu lists the following options:

- Call Processing
- Maintenance
- Trunk Signalling.
- Trunk ID Mapping.

Note: The Trunk ID Mapping option appears only if your system is running the TOPS/VSN option.

- (7) To exit from the T1 Configuration Menu, press the <Exit> softkeys until you arrive at the main menu.

Configuring Call Processing Parameters

Call processing parameters fall into three categories: wink time limits, digit detection timers, and miscellaneous timers.

A wink is an offhook flash received from the far end when the Digital Trunk Link SRU is originating a call. The far end uses the wink to indicate that it is ready to receive digits. A Digital Trunk Link SRU can also generate a wink when it is receiving a call. The wink indicates to the far end that the Digital Trunk Link SRU is ready to receive digits.

The parameters for digit detection and generation control the detection of incoming digits and the timing and duration of outgoing digits.

To configure call processing parameters for a Digital Trunk Link SRU, proceed as follows:

- (1) Access the T1 Configuration Menu.
- (2) On the T1 Configuration Menu, use the arrow keys to select Call Processing and then press ENTER

The system displays the Call Processing screen, which lists the call processing parameters. Default values are preconfigured for all the parameters. This screen is shown in Figure 29-3.

Figure 29-3
The Call Processing Screen

Type in the T1 characteristics you want & Exit							
T1 -- CALL PROCESSING							
<hr/>							
Wink Time Limits							
Maximum Time (ms)	600						
Minimum Time (ms)	100						
On Time (ms)	150						
<hr/>							
Digit Detection Timers							
Incoming Interdigit (ms)	300						
Incoming Onhook (ms)	30			Incoming Offhook (ms)	30		
Outgoing Interdigit (ms)	600						
Outgoing Onhook (ms)	60			Outgoing Offhook (ms)	40		
<hr/>							
Miscellaneous Timers							
Pause Time (ms)	1000						
Response Time (ms)	5000						
Release Time (ms)	1500						
Recall (Flash) Duration							
Flash 1: 300	Flash 2: 700	Flash 3: 1000	Flash 4: 1600				
Exit							

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- (3) On this screen, use the arrow keys to move from field to field, and type in any nondefault parameter values you require. The parameters are:
- Maximum Time.** This is a wink-detection parameter. This parameter specifies the maximum time the far end may remain offhook (in response to a call origination) for a valid wink to be detected. If the maximum time is exceeded, the Digital Trunk Link SRU considers the wink to be invalid, and declares a glare condition on the trunk. The default value is 600 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
 - Minimum Time** This is a wink-detection parameter. This parameter specifies the minimum time the far end must remain offhook for the Digital Trunk Link SRU to consider the wink to be valid. In addition, this parameter is used by the SRU when it is configured as a Delay Dial trunk and is to output a wink (incoming call). The SRU waits this amount of time before starting the wink. The default value is 100 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
 - On Time.** This is a wink-generation parameter. This parameter specifies the length of the wink sent by the Digital Trunk Link SRU. The default value is 150 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)

- **Incoming Interdigit.** This is a digit-detection parameter. This parameter specifies the minimum offhook time necessary between valid digits from the far end. The default value is 300 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
- **Incoming Onhook.** This is a digit-detection parameter. This parameter specifies the minimum amount of time for an onhook (make) before it is considered part of a valid digit. The default value is 30 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
- **Incoming Offhook.** This is a digit-detection parameter. This parameter specifies the minimum amount of time for an offhook (break) before it is considered part of a valid digit. The default value is 30 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
- **Outgoing Interdigit.** This is a digit-generation parameter. This parameter specifies the length of the pause between digits when outpulsing. The default value is 600 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
- **Outgoing Onhook.** This is a digit-generation parameter. This parameter specifies the length of the onhook (make) signal that is sent when outpulsing. The default value is 60 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
- **Outgoing Offhook.** This is a digit-generation parameter. This parameter specifies the length of the offhook (break) signal that is sent when outpulsing. The default value is 40 milliseconds. This parameter has a resolution of ten milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of ten.)
- **Pause Time.** This is a miscellaneous-timer parameter. This parameter specifies the length of a requested dialing pause used by the Digital Trunk Link SRU when outpulsing. The default value is 1000 milliseconds. This parameter has a resolution of ten milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of ten.)
- **Response Time.** This is a miscellaneous-timer parameter. This parameter specifies the maximum time allowed for the far end to return a wink before the Digital Trunk Link SRU considers the far end to be inoperative. The default value is 5000 milliseconds. This parameter has a resolution of five milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of five.)
- **Release Time.** This is a miscellaneous-timer parameter. This parameter specifies the length of time the far end must be onhook before the line is considered released. The default value is 1500 milliseconds. This parameter has a resolution of ten milliseconds. (Therefore, if you specify a nondefault value for the parameter, you should use a multiple of ten.)
- **Recall (Flash) Duration.** This is a miscellaneous-timer parameter. It specifies the length of a requested flash (momentary onhook) sent by the Digital Trunk Link SRU. The default values for flashes 1, 2, 3, and 4 are 300, 700, 1000, and 1500 milliseconds, respectively. This parameter has a

resolution of five milliseconds. (Therefore, if you specify a nondefault value, you should use a multiple of five.)

- (4) After entering any required nondefault parameter values, press <Exit>.

New softkeys appear: <Save and Ignore> and <Save and Exit>.

- (5) Press <Save and Exit>.

The system stores the newly entered parameter values. The T1 Configuration Menu reappears.

Note: You must exit at least as far as the System Administrative Services - Main Menu to cause the newly configured parameters to be sent to the Digital Trunk Link SRU. They take effect when they are sent to the SRU.

Configuring Maintenance Parameters

The maintenance parameters specify maintenance limits and out-of-service limits for various types of errors. The maintenance limit is the threshold at which a certain type of error causes the system to issue a log message. The out-of-service limit is the threshold at which a certain type of error causes the system to take the Digital Trunk Link SRU out of service.

The maintenance parameters refer to the following types of errors:

- bipolar violations
- frame slips
- converter unlocks
- frame losses
- red alarm conditions
- yellow alarm conditions.

To configure the maintenance parameters, proceed as follows:

- (1) Access the T1 Configuration Menu.
- (2) On the T1 Configuration Menu, use the arrow keys to select Maintenance and then press ENTER.

The system displays the first page of the Maintenance screen, which lists maintenance parameters. Default values are preconfigured for the maintenance parameters. This screen is shown in Figure 29-4.

Figure 29-4
The Maintenance Screen

Type in the T1 Maintenance characteristics & press Next Page or Exit

T1 -- MAINTENANCE

Bipolar Violations (BPV)			
Maintenance Limit Selection	4		
Out-of-Service Limit Selection	3		

Check Point 1 (sec)	5	Error Limit at Check Point 1	480
Check Point 2 (sec)	15	Error Limit at Check Point 2	144
Check Point 3 (sec)	15	Error Limit at Check Point 3	14
Check Point 4 (sec)	150	Error Limit at Check Point 4	14
Check Point 5 (sec)	1500	Error Limit at Check Point 5	14

Slippage Count	
Maintenance Limit (per hour)	4
Out-of-Service Limit (per hour)	255

Converter Unlock Filter Time (ms) 2000

Exit

Next Page

<Previous Page>

↑ ↓

Type in the T1 characteristics you want & Exit

T1 -- MAINTENANCE

Frame Loss / Red Alarm	
Maintenance Limit (per day)	17
Out-of-Service Limit (per day)	511
In Red Alarm Filter (ms)	2500
Out of Red Alarm Filter (ms)	15000

Yellow Alarm Conditions	
In Yellow Alarm Filter (ms)	500
Out of Yellow Alarm Filter (ms)	500

Exit

Previous Page

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- (3) On this screen, use the arrow keys to move from field to field, and type in any nondefault parameter values you require. The first page of the screen lists the following parameters:
- **Maintenance Limit Selection (for bipolar violations).** This is a number in the range 1 to 5 that identifies one of the check points shown on the screen. The check point specifies the error rate that is to be used. If errors occur at the specified rate, a log message is issued. The default value is 4, which refers to a default rate of 14 errors in 150 seconds.
 - **Out-of-Service Limit Selection (for bipolar violations).** This is a number in the range 1 to 5 that identifies one of the check points shown on the screen. The check point specifies the error rate that is to be used. If errors occur at the specified rate, the Digital Trunk Link SRU is taken out of service. The default value is 3, which refers to a default rate of 14 errors in 15 seconds.

Note: If the default error rates associated with the check points do not suit your needs, you can specify rates of your choosing. For example, to set the check-point-4 error rate, use the arrow keys to move the cursor to the line showing check point 4, type in the desired number of seconds, then press the TAB key to move the cursor to the Error Limit at Check Point 4 field, and type in the number of errors.

- **Maintenance Limit (for frame slips).** This parameter specifies the number of frame slips per hour to be tolerated. If errors occur at the specified rate, a log message is issued. The default value is 4 per hour.
 - **Out-of-service Limit (for frame slips).** This parameter specifies the number of frame slips per hour to be tolerated. If errors occur at the specified rate, the Digital Trunk Link SRU is taken out of service. The default value is 255.
 - **Converter Unlock Filter Time.** A converter unlock count error is logged when the Digital Trunk Link SRU's internal frequency converter has been out of lock for the specified number of milliseconds. The error is cleared when the condition has not been detected for the same amount of time. The default value is 2000 milliseconds.
- (4) Press <Next Page> to advance to the second page of this screen. The second page of the screen lists the following parameters:
- **Maintenance Limit (for frame losses).** This parameter specifies the number of momentary frame losses per day to be tolerated. When the specified number of frame losses has occurred in a single day, a log message is issued. The default value is 17 per day.
 - **Out-of Service Limit (for frame losses).** This parameter specifies number of momentary frame losses per day to be tolerated. When the specified number of frame losses have occurred in a single day, the Digital Trunk Link SRU is taken out of service. The default value is 511.
 - **In Red Alarm Filter.** This parameter specifies the number of milliseconds of continuous frame loss that will cause the Digital Trunk Link SRU to enter the red alarm state. The default value is 2500 milliseconds (2.5 seconds).
 - **Out of Red Alarm Filter.** This parameter specifies the number of consecutive milliseconds without a frame loss that will cause the Digital

Trunk Link SRU to leave the red alarm state. The default value is 15000 milliseconds (15 seconds).

- **In Yellow Alarm Filter.** This parameter specifies the number of milliseconds required to detect and set a yellow alarm condition on failure indication from the far end. The default value is 500 milliseconds.
- **Out of Yellow Alarm Filter.** This parameter specifies the length of time required for the Digital Trunk Link SRU to clear a yellow alarm condition. The SRU clears the yellow alarm condition if it receives no failure indication from the far end for the specified length of time. The default value is 500 milliseconds.

- (5) After specifying any required nondefault values for the maintenance parameters, press <Exit>.

New softkeys appear: <Save and Ignore> and <Save and Exit>.

- (6) Press <Save and Exit>.

The system stores the newly entered parameter values. The T1 Configuration Menu reappears.

Note: You must exit at least as far as the System Administrative Services - Main Menu to cause the newly configured parameters to be sent to the Digital Trunk Link SRU. They take effect when they are sent to the SRU.

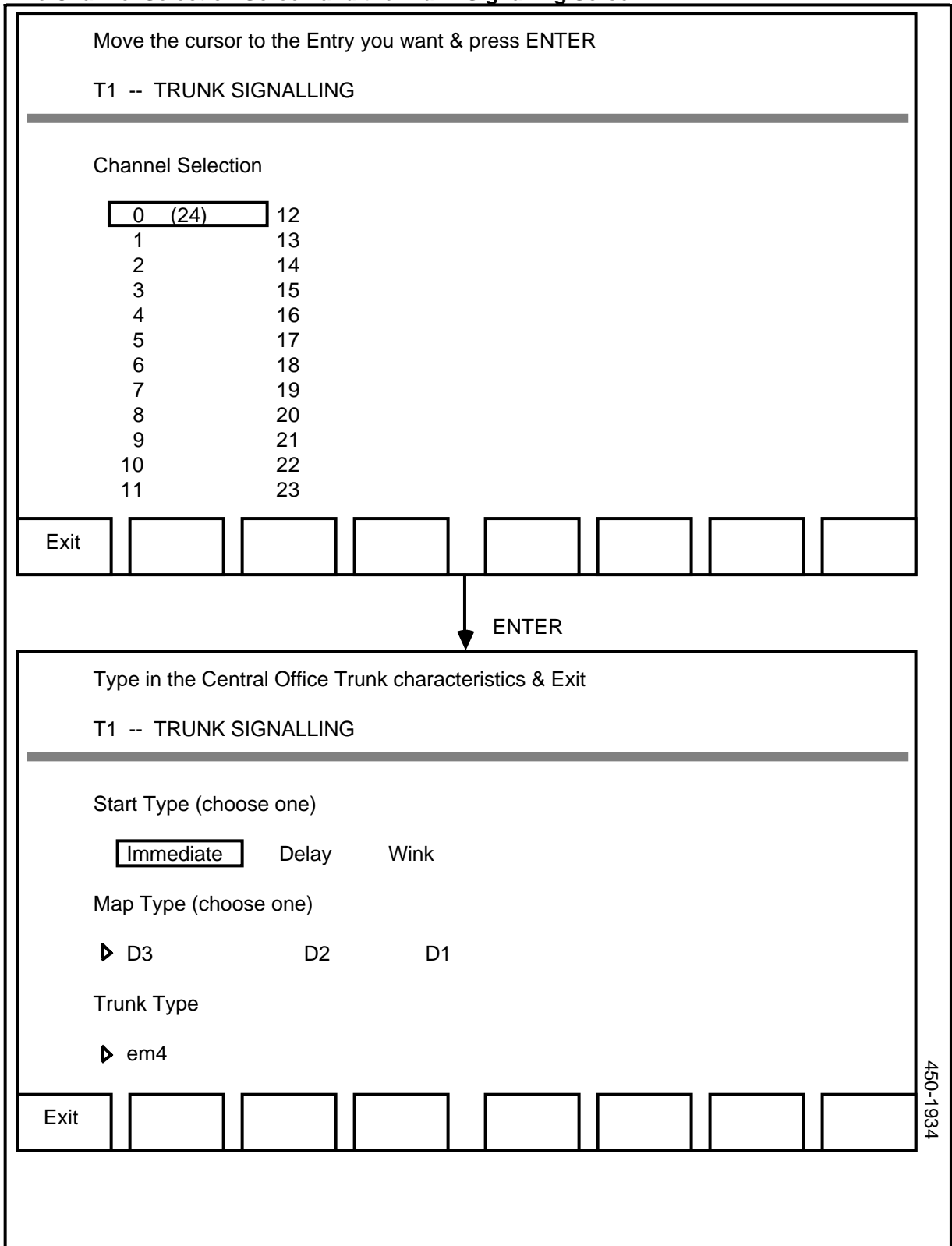
Configuring Trunk Signalling Parameters

To configure trunk signalling parameters for a Digital Trunk Link SRU, proceed as follows:

- (1) Access the T1 Configuration Menu.
- (2) On the T1 Configuration Menu, use the arrow keys to select Trunk Signalling, and then press ENTER.

The system displays the Channel Selection screen, listing the channels. This screen is shown in Figure 29-5.

Figure 29-5
The Channel Selection Screen and the Trunk Signalling Screen



- (3) Use the arrow keys to select the channel whose parameters you want to specify, and then press ENTER.

The system displays the Trunk Signalling screen, which lists the signalling parameters for the channel. This screen is shown in Figure 29-5.

- (4) To move from one field to another on this screen, use the arrow keys. On this screen there are fields for the following parameters:
 - **Start Type.** You can specify immediate start, delay dial, or wink start. Press the TAB key to move the cursor to the desired start type. The default is wink start.

Note: If your system is running the TOPS/VSN application, you must set all channels to immediate start.

- **Map Type.** You can specify D3, D2, or D1. Press the TAB key to move the cursor to the desired map type. The default is D3.

- CAUTION -

If you change the specified map type, the new map type applies to every channel of the Digital Trunk Link SRU.

- **Trunk Type.** This is a display field, because em4 is the only trunk type. (This field was placed on the screen to accommodate future enhancements.)
- (5) After specifying the trunk signalling parameters, press <Exit>.

New softkeys appear: <Save and Ignore> and <Save and Exit>.

- (6) Press <Save and Exit>.

The system stores the newly entered parameters. The T1 Configuration Menu reappears.

Note: You must exit at least as far as the System Administrative Services - Main Menu to cause the newly configured parameters to be sent to the Digital Trunk Link SRU. They take effect when they are sent to the SRU.

Configuring Trunk ID Mapping Parameters.

If your system is running the TOPS/VSN application, the screen interface for Digital Trunk Link Configuration includes a screen on which you can specify the numbers that identify the DS-0 channels linking the Digital Trunk SRU and the host DMS. Each such DS-0 channel must have a trunk identifier, which is an identifying number in the range 0000 to 9999. Each trunk identifier must be unique among channels connected to a given DMS. To specify the trunk identifiers, proceed as follows:

- (1) Access the T1 Configuration Menu.
- (2) On the T1 Configuration Menu, use the arrow keys to select Trunk ID Mapping.

The Trunk ID Mapping screen appears. This screen is shown in Figure 29-6.

Figure 29-6
The Trunk ID Mapping Screen

Type in the T1 characteristics desired and then press Exit

T1 -- TRUNK ID MAPPING

DMS CLLI:	DMS-RTP	Link Status:	Inservice
-----------	---------	--------------	-----------

Chan Num.	Trunk Ident.	Status	Chan Num.	Trunk Ident.	Status
01	0001	InService	13	0013	InService
02	0002	InService	14	0014	InService
03	0003	InService	15	0015	InService
04	0004	InService	16	0016	InService
05	0005	InService	17	0017	InService
06	0006	InService	18	0018	InService
07	0007	InService	19	0019	InService
08	0008	InService	20	0020	InService
09	0009	InService	21	0021	InService
10	0010	InService	22	0022	InService
11	0011	InService	23	0023	InService
12	0012	InService	24	0024	InService

Exit

450-1935

- (3) In the DMS CLLI field, type in the Common Language Location Identifier (CLLI) of the Digital Multiplex Switch (DMS) to which the Digital Trunk Link SRU is connected. This must be the same CLLI that was entered for the corresponding DMS in the SDM table titled Datalink_Config. Datafill for that table is discussed in 450-1301-310. For information on how to use SDM tables, see Part 28 of this manual.
- (4) Use the arrow keys to move the cursor to the Trunk Ident. field for channel 1, and type in the trunk identifier for the DS-0 channel. The number can be in the range 0000 to 9999. Each trunk identifier must be unique among DS-0 channels connected to a single DMS. For each trunk, the value entered as the trunk identifier must correspond to the value assigned to the trunk in the EXTRKNM field in the DMS table titled TRKMEM. For further information about this DMS table, see NTP 297-1001-100.
- (5) Enter the trunk identifiers for all the DS-0 channels. Ensure that all trunk identifiers correspond to the values specified in the DMS table TRKMEM.
- (6) After entering the DMS CLLI and the trunk identifiers, press <Exit>.

New softkeys appear: <Save and Ignore> and <Save and Exit>.

- (7) Press <Save and Exit>.

The system stores the newly entered parameters. The T1 Configuration Menu reappears.

Note: You must exit at least as far as the System Administrative Services - Main Menu to cause the newly configured parameters to be sent to the Digital Trunk Link SRU. They take effect when they are sent to the SRU.

30. Checking the XSRU Software Initialization Files

This part describes how the system administrator can ensure that the initialization files used by the XSRU software contain the appropriate data.

The XSRU software makes it possible to place additional options on the main menu. For example, you can have a main-menu option that enables user to use the Helix Command Interpreter. (Otherwise, the Helix Command Interpreter appears as an option only on the Utilities Service - Main Menu, a menu that only the superuser can access.)

Configuration Requirements

Options configured by means of the XSRU software are called X-system applications. (An X-system application is defined as one that requires a console Helix environment.) If the X-system applications are to run on the system, then the XSRU Application Agent (XSRUAA) PRU and the XSRU Boss Task PRU must be configured. One instance of the XSRU Application Agent is required for the entire system; one instance of the XSRU Boss Task is required on each SRU that is to be capable of running X-system applications.

Two initialization files contain configuration data for the XSRU Application Agent: The two initialization files are:

- the subservice file, :LOCAL:PRU:XSRU:SS.TEXT
- the processor file, :LOCAL:PRU:XSRU:PC.TEXT

The subservice file assigns subservice numbers to the X-system applications that are to run on the system. The subservice numbers are used in the processor file, which designates which X-system applications are to be eligible to run on each SRU.

If the information contained in the initialization is correct, then users can successfully access X-system applications such as the Helix Command Interpreter from the main menu. If the configuration data in these files is incorrect or incomplete, the system administrator must add the appropriate data.

The Subservice File

The subservice file contains one record for each X-system application that is to be capable of running on the system. The application's record specifies the subservice number of that application. Each record contains four mandatory fields:

SUBSERVICE, VTERMS, APPLICATION, and ARGUMENTS. In addition, each record may contain the optional COMMENT field. Each field contains a keyword and a value.

The following paragraphs describe the keywords and parameters of these fields.

The SUBSERVICE field contains the number that identifies the X-system application.

The VTERMS field specifies the number of virtual terminals that the application requires. The number of virtual terminals must not be a negative number, and must not exceed 8.

The APPLICATION field contains the pathname of the application.

The ARGUMENT field contains the parameters of the application.

Note: If a value in the APPLICATION or ARGUMENT field contains a space, the entire value must be enclosed in single quotation marks (‘’).

The COMMENT field is used to enter comments in the record.

The COMMENT field can occur at any point within a record. The other fields must occur in the following sequence: SUBSERVICE, VTERMS, APPLICATION, ARGUMENTS.

The Processor File

The processor file contains one record for each SRU that is to be capable of running an X-system application (that is, each SRU on which an instance of the XSRU Boss Task PRU has been configured). Each record in this file specifies the address of the SRU and the application or applications that can run on the SRU. Each record contains five mandatory fields: CABINET, SLOT, LINE, MAXUSERS, and SUBSERVICE. In addition, each record may contain the optional COMMENT field.

The following paragraphs describe the keywords and the parameters of these fields:

The CABINET, SLOT, and LINE fields specify the address of the SRU. (The value in the LINE field is always zero.)

The MAXUSERS field contains a decimal number representing the maximum number of users allowed to use the subservice at the same time (that is, the maximum number of concurrent instances of the application). The maximum value of this field is eight. This is also the default value.

The SUBSERVICE field contains a subservice number indicating which application or applications will be eligible to run on the SRU. The default value is -1, which means that any X-system application can run on the SRU. If you specify a subservice number in this field, then the application with that subservice number is the only X-system application eligible to run on the SRU.

The COMMENT field is an optional field that can be used to enter comments in the record.

The COMMENT field can occur at any point within a record. The other fields must occur in the following sequence: CABINET, SLOT, LINE, MAXUSERS, SUBSERVICE.

Initialization Parameters for the XSRU Command Interpreter

For the correct configuration of the XSRU Command Interpreter option, the application's record in the subservice file (:LOCAL:PRU:XSRU:SS.TEXT) must have the following contents:

```
SUBSERVICE 2
VTERMS 2
APPLICATION ':LOCAL:CI:CODE'
ARGUMENTS 'EXEC PROFILE'
```

and the SRU's record in the processor file (:LOCAL:PRU:XSRU:PC.TEXT) must have the following contents:

```
CABINET cc
SLOT ss
LINE 0
MAXUSERS 5
SUBSERVICE 2
```

where cc and ss indicate the SRU's cabinet and slot, respectively.

Configuring the Initialization Files

This procedure describes how the superuser can access and configure the two initialization files. (Only the superuser can access the Utilities Service - Main Menu as required by this procedure.) Proceed as follows to ensure that the initialization files have the correct contents:

- (1) Sign on as the superuser.
- (2) Select System Administrative Services and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

- (4) Select Helix Command Interpreter and press ENTER.

The system prompt appears. (It is usually '>'.)

- (5) To start the editor, type in the following command on the Helix command line:

```
ED name
```

where name is the name of one of the two initialization files. Then press enter.

Note 1: The names of the two initialization files are:

:LOCAL:PRU:XSRU:SS.TEXT

and

:LOCAL:PRU:XSRU:PC.TEXT

Note 2: If you are familiar with the editor and the file system, you can proceed to make a copy of the file and edit the copy. Otherwise, follow the subsequent steps exactly.

- (6) Edit the copy of the original file using the XMS editor.
- (7) To save the file press the RESET key, then press Q, and then type in S
- (8) Exit from the editor by typing in E.

You exit to the Helix Command Interpreter. The system prompt reappears.

- (9) To exit from the Helix Command Interpreter, type in EXIT and then press ENTER.

The Utilities Service - Main Menu reappears.

- (10) Press the <Exit> softkeys until you arrive at the main menu.

After you have changed the contents of either initialization file, you must reinitialize the XSRU Application Agent PRU to make the PRU use the new parameter values. To reinitialize the PRU, remove it from service and then put it back into service, as explained 'Maintenance for Program Resource Units', in Part 25.

31. How to Print Initialization Files

This part describes how to print the initialization files associated with various Program Resource Units (PRUs) running in the DNC system.

An initialization file contains parameter values that govern the operation of a PRU. The system reads the PRU's initialization file whenever the PRU goes into service, that is, at system start-up time, and any other occasion when the PRU is reinitialized.

The feature has a menu-driven interface that allows you to select the initialization files to be printed, and to designate the printer queue to be used.

Printing Multiple Files

In a single session you can print up to 48 initialization files if you suppress the printing of banner pages (as explained in 'Printing Initialization Files', later in this part.) If you do not suppress banner pages, you can print up to 24 initialization files at one time.

When you select an initialization file to be printed, the Queue Manager PRU adds the pathname of the file to a list. The list is contained in a profile file, which can contain up to 48 entries. If you do not suppress the printing of banner pages, then the system prints a banner page for each initialization file, and each banner page takes up one of the 48 available positions in the profile file. Therefore, if you want to print more than 24 initialization files at one time, you must suppress banner pages.

Screen Interface for Printing Initialization Files

If you want to print out initialization files using the Initialization File Printing facility, you will use the following screens:

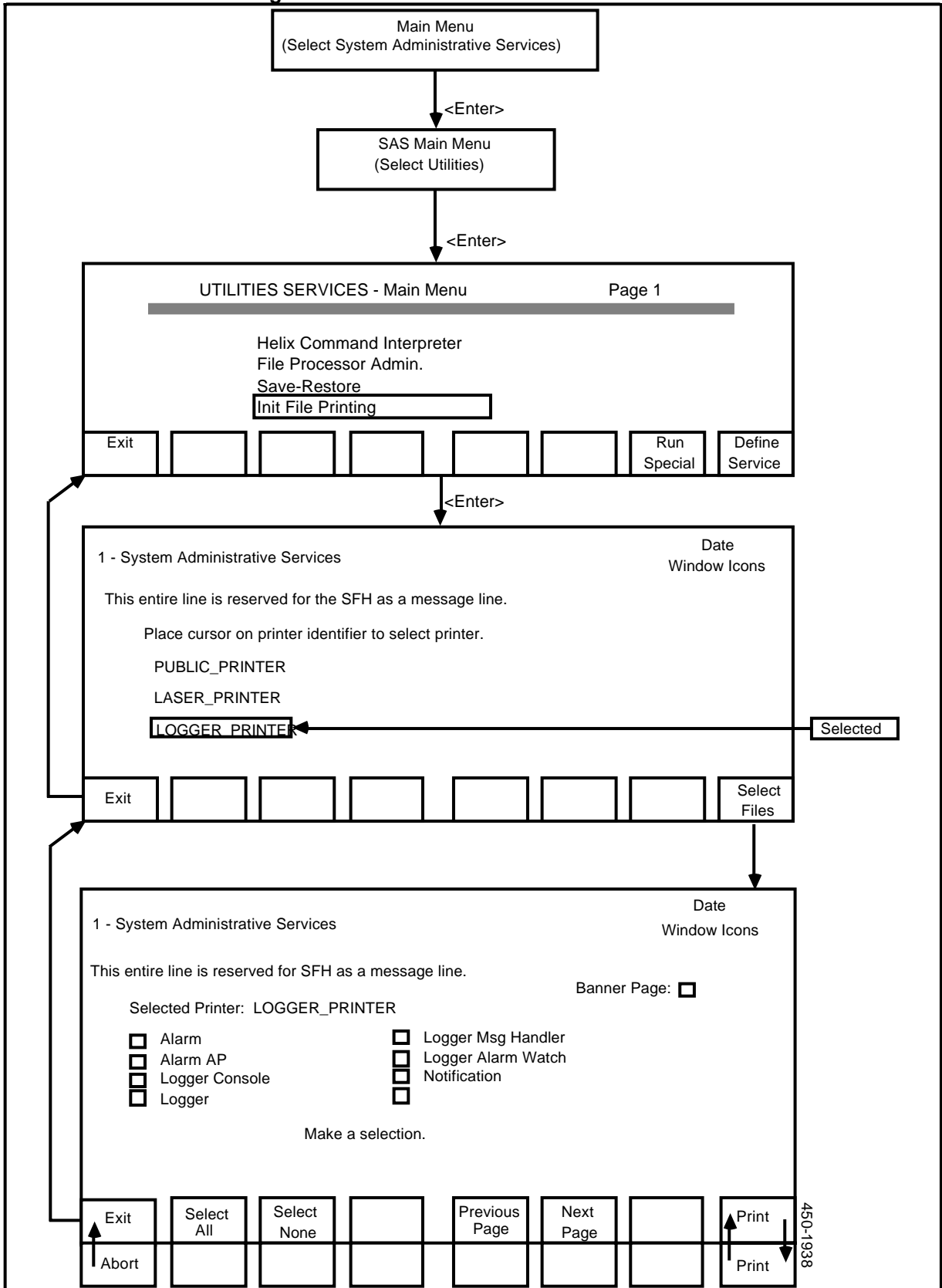
The Init-File Printing - Main Menu. On this screen, you select the printer queues on which you want the initialization files printed. This screen can display up to 36 printer queues for selection.

The Init-File Printing - Print Menu. On this screen you select and print initialization files. Each screen can display up to 20 initialization files for printing.

Printing Initialization Files

You access the Initialization File Printing feature from the SAS Utilities Service - Main Menu. Only the superuser can print out initialization files, because only the superuser can access the Utilities Service - Main Menu. Figure 31-1 shows the menu structure for this procedure.

Figure 31-1
Menu Structure for Printing Initialization Files



To print out the initialization files associated with one or more PRUs in the DNC system, take the following steps:

- (1) Sign on as the superuser.
- (2) Select System Administrative Services, and press ENTER.

The System Administrative Services - Main Menu appears.

- (3) Select Utilities and press ENTER.

The Utilities Service - Main Menu appears.

- (4) Select Init-File Printing, and press ENTER.

The Init-File Printing - Main Menu appears, listing the printer queues on which the initialization files can be printed.

- (5) Select the printer queue on which you want the initialization files printed, and press <Select Files>.

The Init-File Printing - Print Menu appears, listing the PRUs whose initialization files are available for printing.

- (6) If you want to increase the number of initialization files that you can print out, you must suppress the printing of the banner page associated with each file. Using the arrow keys, select the Banner Page field in the top right corner of the screen, and press the space bar.

A checkmark appears in the box beside the Banner Page field. (An ASCII terminal displays an x within square brackets instead of a checkmark.) If you do not want to suppress the printing of banner pages, press the space bar again to make the mark disappear.

- (7) Using the <Previous Page> and <Next Page> softkeys, locate the screen that has the PRU whose initialization files you wish to print. Select the desired PRU, and press the space bar.

A check mark will appear in the box beside the PRU that you have selected. (An ASCII terminal displays an x within square brackets instead of a checkmark.)

Note: You can select all of the PRUs on the Init-File Printing - Print Menu by pressing <Select All>. You can cancel all of your previous selections by pressing <Select None>.

- (8) When you have selected the files that you want to print, press <Print>.

The screen refreshes and new softkeys appear. The system prompts you to confirm your selection.

- (9) If you do not want to print the files that you selected, press <Abort>.

The previous softkeys reappear.

(10) To confirm your selections, press <Print>.

The previous softkeys reappear.

(11) To exit, press the <Exit> softkeys until you reach the System Administrative Services - Main Menu.

32. Generic Tape Generator

The Generic Tape Generator feature enables the DNC to read and write magnetic tapes that have either ANSI Level-2 standard tape labels or IBM standard tape labels. This makes it possible to transfer information between the DNC and an external system that uses standard tape labels.

The Generic Tape Generator feature runs on a Nine-track Tape Unit attached to a SCSI bus. The Tape Unit must be capable of running at 6250 b/s. When creating an ANSI or IBM standard tape, the unit writes at 6250 b/s.

A tape label is identifying information that is written on a magnetic tape. A tape label contains information about the tape itself (referred to as the volume), as well as information about the files on the tape. The ANSI and IBM standards are conventions that describe tape-label formats.

The ANSI standard defines four levels of tape labels. The Generic Tape Generator feature supports only Level 2 of the ANSI standard. This provides for multifile and multivolume file sets, four types of standard tape labels, and a flexible blocking structure. If a DNC application needs to read or write tapes that use Level 3 or Level 4, then the application itself must include the necessary logic.

The IBM standard does not contain any concept of levels. The Generic Tape Generator feature supports all of the IBM standard labels. If an application requires variable or spanned blocking formats, the application itself must implement them, because the feature does not look at the data at the record level.

Overview of the Generic Tape Generator Feature

To use the Generic Tape Generator feature, you select an option displayed on the main menu. You then enter a system of interactive screens on which you can specify the operations that you want. (Complete instructions on entering and using the interface are found later in this part.) You can carry out the following operations:

- list the files contained on an existing tape
- copy one or more files from tape to disk
- copy one or more files from disk to tape
- change the tape position, by advancing or rewinding.

Accessing the Tape File Information Screen

To carry out any operation allowed by the Generic Tape Generator feature, you start by accessing the Tape File Information screen.

The Menu structure for this procedure is shown in Figure 32-1.

To access the Tape File Information screen, take the following steps:

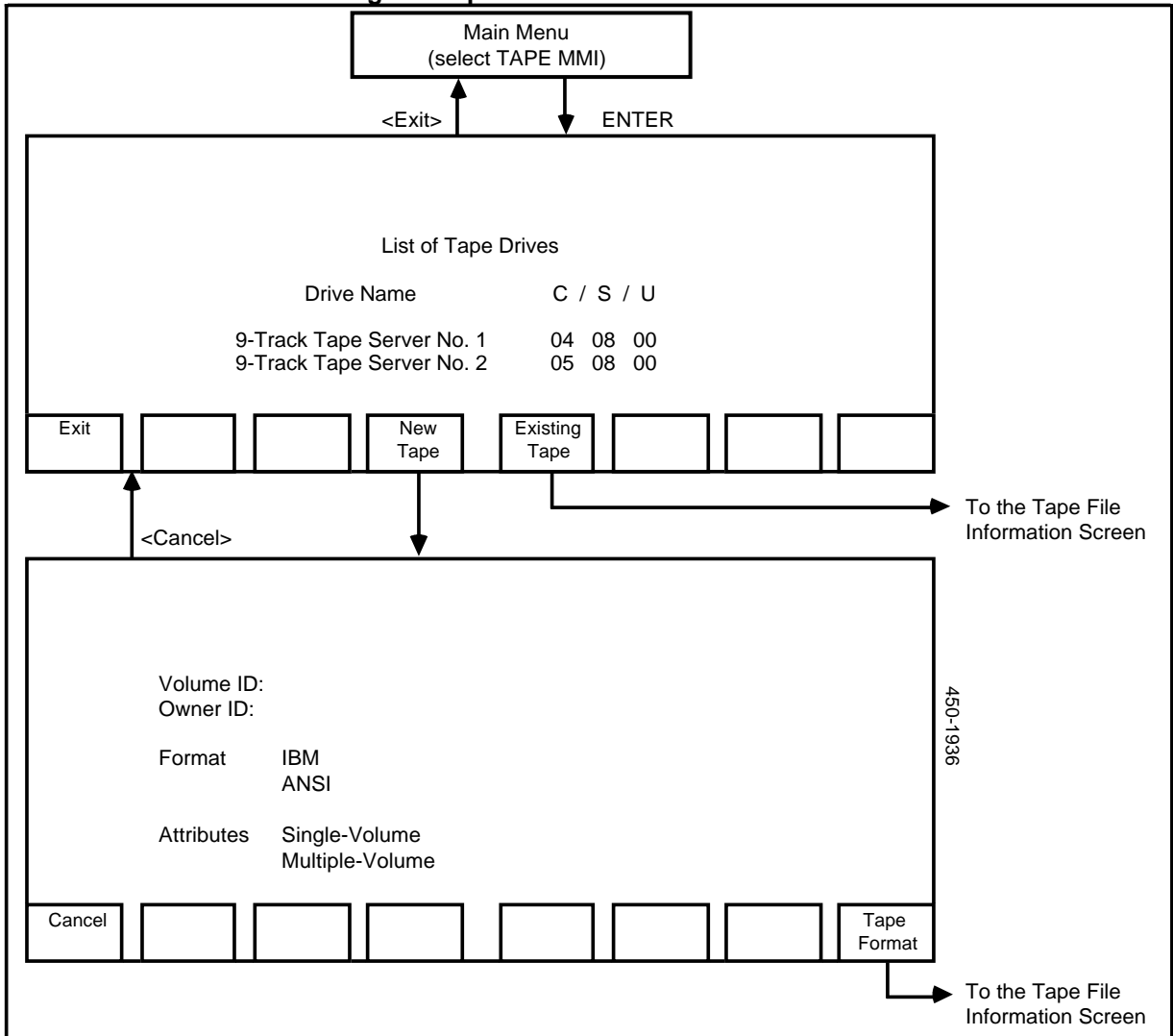
- (1) Sign on.

The main menu appears.

- (2) Select Tape MMI and press ENTER.

The system displays a screen listing all the Nine-track Tape Units in the system. The screen lists the name and address of each tape unit. The address is shown as a cabinet number, slot number, and unit number. The cabinet and slot numbers are those of the SRU that controls the SCSI bus to which the tape unit is connected. That SRU can be either a File Processor SRU or the Primary Processor SRU. The unit number is the tape unit's address on the SCSI bus.

Figure 32-1
Menu Structure for Accessing the Tape File Information Screen



- (3) Use the arrow keys to select the tape unit that is to be used.
- (4) If you have not already done so, ensure that a tape is loaded on the tape unit.
- (5) If you are using a tape that has already been formatted, press **<Existing Tape>**. The system then displays the Volume ID field. Type in the volume id and press **ENTER**.

The system displays the Tape File Information screen.

- (6) If you are using a new tape, or one that you want to reformat, press **<New Tape>**.

The system displays a screen on which you can specify the tape labels to be used.

On this screen, press **ENTER** to move from field to field. Specify the the tape volume id and the owner id in the fields provided. In the Format field, use the

arrow keys to select either IBM or ANSI tape labels. In the Attributes field, use the arrow keys to select single-volume tape format or multiple-volume tape format. (With multiple-volume format, a data file can span more than one tape.) After supplying the required information, press <Tape Format>.

The system formats the tape.

Note: Any information that was on the tape before formatting is inaccessible following the reformatting process.

The Tape File Information screen appears.

Setting the Helix Working Directory

When you use the Generic Tape Generator feature to copy files to or from the DNC, the feature accesses the Helix directory specified in the Helix Directory field on the Tape File Information screen. To specify the proper Helix directory, take the following steps:

- (1) Access the Tape File Information screen, as described earlier in this part.
- (2) Press <Set Directory>.

The system displays a screen on which it prompts you to enter the directory name.

- (3) Type in the directory name and press ENTER.

The previous screen reappears. The name of the specified directory is displayed in the Helix Directory field.

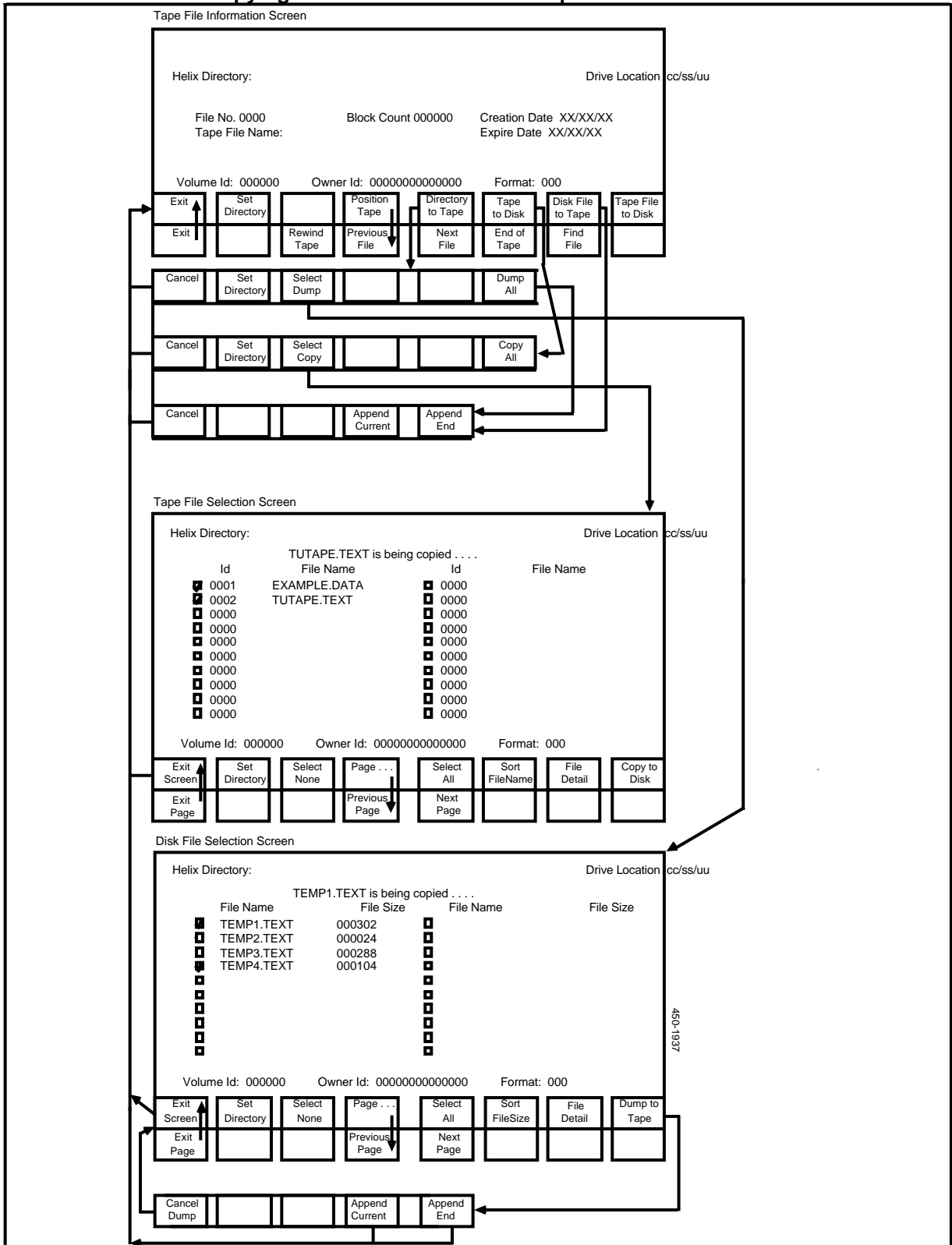
The <Set Directory> softkey is available on other screens in the Generic Tape Generator feature's screen interface, and it functions the same way on those screens.

Copying Files from a Disk Directory to Tape

In a single operation, you can copy to tape one or more of the files from the Helix working directory.

The menu structure for this procedure is shown in Figure 32-2.

Figure 32-2
Menu Structure for Copying Files between Disk and Tape



To copy one or more files from disk to tape, take the following steps:

- (1) Access the Tape File Information screen.
- (2) If necessary, set the Helix working directory.
- (3) Press <Directory to Tape>.

New softkeys appear.

- (4) Press <Select Dump>.

The system displays the Disk File Selection screen, which lists the files in the Helix working directory. The files are sequenced in ascending order by file name.

Note 1: To sort the files in ascending order by file size, press <Sort FileSize>.

Note 2: If the list of files extends beyond a single screen, you can press <Page...> to display the <Next Page> and <Previous Page> softkeys, which allow you to page through the list of files.

- (5) Select the files that are to be copied to tape. To select a file, page through the list until the screen displays the file name, then use the RETURN key to select the file name, and press the space bar. To select all the files in the directory, just press <Select All>.

To indicate that a file has been selected, the system displays a check mark in the box beside the file name. (An ASCII terminal displays an x in square brackets instead of a check mark.)

- (6) To deselect a file, use the arrow keys to select the file name and press the space bar. To deselect all currently selected files, press <Select none>.

When you deselect a file, the system removes the check mark (or the x) from beside the file name.

- (7) When you have selected the file or files that are to be copied to tape, press <Dump to Tape>.

New softkeys appear.

- (8) Indicate the point on the tape at which the tape unit is to begin writing the information. To specify that the new information should be written following any files that are already on the tape, press <Append End>. If you want to write the information at a specific place on the tape, you must position the tape and then press <Append Current>. (For information on positioning the tape, see 'Positioning the Tape', later in this part.)

After you press <Append End> or <Append Current>, the original softkeys reappear. The system copies the file or files, and displays messages indicating which file is currently being copied.

- (9) When the copying is finished, press <Exit Screen>.

The system redisplay the Tape File Information screen.

Positioning the Tape

Positioning the tape means making the tape unit advance or rewind to a certain point on the tape. When you are preparing to copy files from disk to tape, you use tape positioning to control the point on the tape at which the tape unit begins writing the information.

The menu structure for this procedure is shown in Figure 32-2.

To position a tape, take the following steps:

- (1) Access the Tape File Information screen.
- (2) If necessary, set the Helix working directory.
- (3) Press <Position Tape>.

New softkeys appear.

- (4) Position the tape by pressing one of the tape-positioning softkeys:
 - <Rewind Tape> rewinds the tape to the beginning.
 - <End of Tape> advances the tape to the logical end of the tape, that is, to the end of any files that are currently on the tape.
 - <Next File> advances the tape to the beginning of the next file following the current position.
 - <Previous File> rewinds the tape to the beginning of the file preceding the current tape position.
 - <Find File> results in a prompt for a file name. You type in the name of a file on the tape, and press ENTER. The system then positions the tape at the beginning of that file. The file name is displayed in the Tape File Name field.
- (5) After positioning the tape, press <Exit>.

The previous softkeys reappear.

Copying Files from a Tape to Disk

In a single operation, you can copy to disk one or more of the files on a tape.

The menu structure for this procedure is shown in Figure 32-2.

To copy one or more files from tape to disk, take the following steps:

- (1) Access the Tape File Information screen.
- (2) If necessary, set the Helix working directory.
- (3) Press <Tape to Disk>.

New Softkeys appear

- (4) Press <Select Copy>.

The system displays the Tape File Selection screen, which lists the files on the tape. The files are listed in the sequence in which they occur on the tape.

Note 1: To sort the files by file name, press <Sort Filename>. The system sorts the files by file name, and changes the softkey to <Sort File ID>.

Note 2: If the list of files extends beyond a single screen, you can press <Page...> to display the <Next Page> and <Previous Page> softkeys, which allow you to page through the list of files.

- (5) Select the files that are to be copied to disk. To select a file, page through the list until the screen displays the file name, then use the arrow keys to select the file name, and press the space bar. To select all the files on the tape, just press <Select All>.

To indicate that a file has been selected, the system displays a check mark in the box beside the file name. (An ASCII terminal displays an x in square brackets instead of a check mark.)

- (6) To deselect a file, use the RETURN key to select the file name and press the space bar. To deselect all currently selected files, press <Select none>.

When you deselect a file, the system removes the check mark (or the x) from beside the file name.

- (7) When you have selected the file or files that are to be copied to disk, press <Copy to Disk>.

New softkeys appear.

- (8) Press <Copy Confirm>.

The system copies the file or files, and displays messages indicating which file is currently being copied.

- (9) When the copying is finished, press <Exit Screen>.

The system redisplay the Tape File Information screen.

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