NCR

System Administration

D1-0396-C
August, 1986

16-bit Release 3.01
32-bit Release 1.02

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UPDATE NOTIFICATION

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REASON FOR UPDATE:

New backup/restore features and new software installation instructions plus previous document corrections.

UPDATE INSTRUCTIONS:

If you are installing (updating to) Release 3.01 on the 16-bit Systems or Release 1.02 on the 32-bit Systems, replace your current System Administration book, in its entirety, with this document.

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System Administration

Contents

Overview

Release

The information in this *System Administration* book applies to Release 3.01 of the 16-bit and Release 1.02 of the 32-bit operating systems based on UNIX.

Audience

The audience for this book is the System Administrator, the person charged with the day to day maintenance and operation of the system. As a system administrator, you should be knowledgeable in the business and office procedures of your company or department. Computer experience and programming knowledge are not required.

As a system administrator, you are responsible for the following jobs; the operating system provides menu screens and help screens to lead you through these jobs. The System Administration help screens are contained in the System Documentation module. Note that the system administration menus can not be performed on an uppercase only terminal.

Install and update the system software

The system software, often referred to as the operating system, is delivered to you on either floppy disk, streaming tape, or already installed on the hard disk.

Installing and updating the system software is accomplished by inserting the media so that the software can be copied to the hard disks in your Main Unit, Mass Storage Expansion Unit, or Small Computer System Interface (SCSI) Unit. Your terminal screen displays the instructions to follow to do the copy and questions you must answer about your system.

Install and update the application packages

The application packages are also delivered to you on floppy disks or streaming tape. Instructions for

installing and updating these application packages are displayed on your terminal screen. Application packages which personnel in your organization have created and which reside on the hard disk can also be installed using the menus and help screens. Application packages that you have purchased from another source can be created so that they are installed using these same instructions or installation instructions should be delivered to you with the application packages.

Configure and reconfigure the system

Configuring the system requires answering questions displayed on the screen about the devices, terminals, and printers you have. Initial configuration of the system is done during the "Completing Installation" step of the system software installation process.

Start up and shut down the system

Starting up the system permits you to set the date and time in the system and prepare messages for users. Setting the date and time is only necessary after the system is turned off. After the date and time are set, the system automatically keeps track of the date/time and outputs them in various displays and reports. Preparing messages for users permits you to notify users of any information you want them to know. When any user logs on the system, your message is automatically displayed on the user's terminal. Messages can advise users of scheduled shut downs, new system features, etc.

Shutting down the system brings all operations to an orderly halt.

Control the system printers

The system automatically schedules print jobs on a continuous basis. Controlling the system printers permits you to start, stop, and delete printing jobs. It also permits you to control the print job where a special form is needed to be installed in a printer (for example, payroll checks).

Assign the user accesses to the system

Each person who is to use the system must be added as a user. Depending on the job requirements of the user, you can assign the user permissions to only those programs and files needed.

Back up system files periodically

Backing up system files means to copy the files from the hard disks to removable media, either floppy disk or streaming tape. You must periodically do a back up and store the floppy disks or streaming tape in a safe place. If a problem occurs, you use these back up copies to restore files on the hard disks.

Recover and repair files

Recovering files means to copy the back up files to the hard disks. Repairing files may be possible if the problem is not serious. You can run the repair program at any time; the program can automatically repair a variety of file problems. The check and repair program runs automatically when you go multi-user on the system to check the integrity of all files.

Operate system diagnostics

Diagnostics are programs you can run to check parts of the system; for example, a communication line. You may be asked by the system support person to run diagnostic programs and report the results.

Content

This book provides you with general information about the operating system and a description of each job. This book is to be used in conjunction with the System Administrator help screens.

The chapters behind the *General Information* tab explain the basics of the system and of the operating system; general information about the system, file system, and printer spooler system. Read these chapters before you install your operating system software. The information is essential in understanding many of your jobs.

The chapter behind the *Software Installation* tab describes how to install your system software.

After the system software is installed, you perform your system administration jobs for completing installation and maintaining the system using an interactive menu selection process. The rest of this book describes how to run the menus and perform your jobs. The individual job descriptions are found in the appropriate chapter that corresponds to the placement of the job in the System

Administrator Selections menu. The *System Administration Quick Reference* card lists the descriptive name of each job and its item entry selection numbers. The item entry selection numbers are the numbers entered to select a job.

System Information

Overview

This chapter describes several different topics with the same theme; how to effectively perform your job as system administrator.

In order to effectively perform your job as system administrator you must be able to identify and locate different features concerning your system. Knowing where to locate these features and knowing what you are looking for speeds up the process of performing your jobs. The following is a list of these features:

- System Control Panels
- System Back Panels
- System Configuration Sticker
- System Media Report
- System Logs and Reports

System Control Panels

Your operator interface for the TOWER, TOWER 32, or MiniTOWER Main Unit and the optional TOWER Mass Storage Expansion Unit (Figures 1, 2, and 3) consists of a single On/Off switch and status indicators. All of the operator interface elements are conveniently located on the front of each unit. The On/Off switch is typically used for daily start up procedures and to remove operating voltages from the units when they are not in use. The status indicators provide hardware integrity information and hardware activity information. Keep in mind that the primary interaction with the system is through a terminal.

Main Unit

The following information identifies the functions of the Main Unit control panel elements.

On/Off Switch

- On — Enables the operation of the Main Unit and the optional Mass Storage Expansion Unit by putting the power system in each unit in an on state. In addition, moving the switch from Off to On causes the Main Unit logic elements to perform a predefined start up sequence consisting of basic integrity testing, loading system software into memory if it is installed and has not previously been loaded, and enabling system software.
- Off — Disables the operation of the Main Unit and the optional Mass Storage Expansion Unit by putting the power system in each unit in an off state. With the switch in the off position, the memory support system remains enabled which preserves the contents of system memory and keeps the system time-of-day clock current.

On/Off Indicator (Two color indicator — red and green)

- Green — Identifies that the power system logic operating voltages, including the memory support system voltages, are enabled and operating within their specified range. This is the normal operating mode.
- Red — Identifies that a power system logic operating voltage, including the memory support system voltage, is not within its specified operating range. The system is not operational if this condition exists.
- Off — Identifies the off condition for the unit power system excluding the memory support system.

Disk Indicator

- On — A Main Unit Winchester disk is selected and performing an operation. Depending on the duration of the disk activity, the indication may appear as only a flicker.
- Off — Identifies the absence of Main Unit Winchester disk activity.

Communication Indicator

- On — One or more of the unit's remote communication channels is requesting a line connection.

- Off — A remote communication channel in the unit removed its request for a line connection.

Fault Indicator

- On — A critical system failure exists. The system is not operational when this indicator is turned on.
- Off — The system is operational.

Battery Indicator

- On — A fault exists in the memory support system. The fault conditions can either be a blown fuse, a disconnected battery, a bad battery or a fully discharged battery. A fully discharged good battery is charged as long as AC power is present; however, the battery indicator remains on until the system is reset.
- Flashing — The battery is being charged. The battery may or may not preserve the contents of memory if AC power is lost.
- Off — The battery is fully charged and capable of preserving the contents of memory during an AC power failure. The battery trickle charges after the indicator goes off.

Floppy Disk Indicator

If your system has two floppy disk drives, each drive has an indicator.

- On — The floppy disk drive is selected and ready for disk activity; or the drive is selected and a disk operation is in progress.
- Off — Identifies the absence of floppy disk activity.

Streaming Tape Indicator

If your system has one or more streaming tape drives, each drive has an indicator

- On — The streaming tape drive is selected and ready for tape activity; or the drive is selected and a tape operation is in progress.
- Off — Identifies the absence of streaming tape activity.

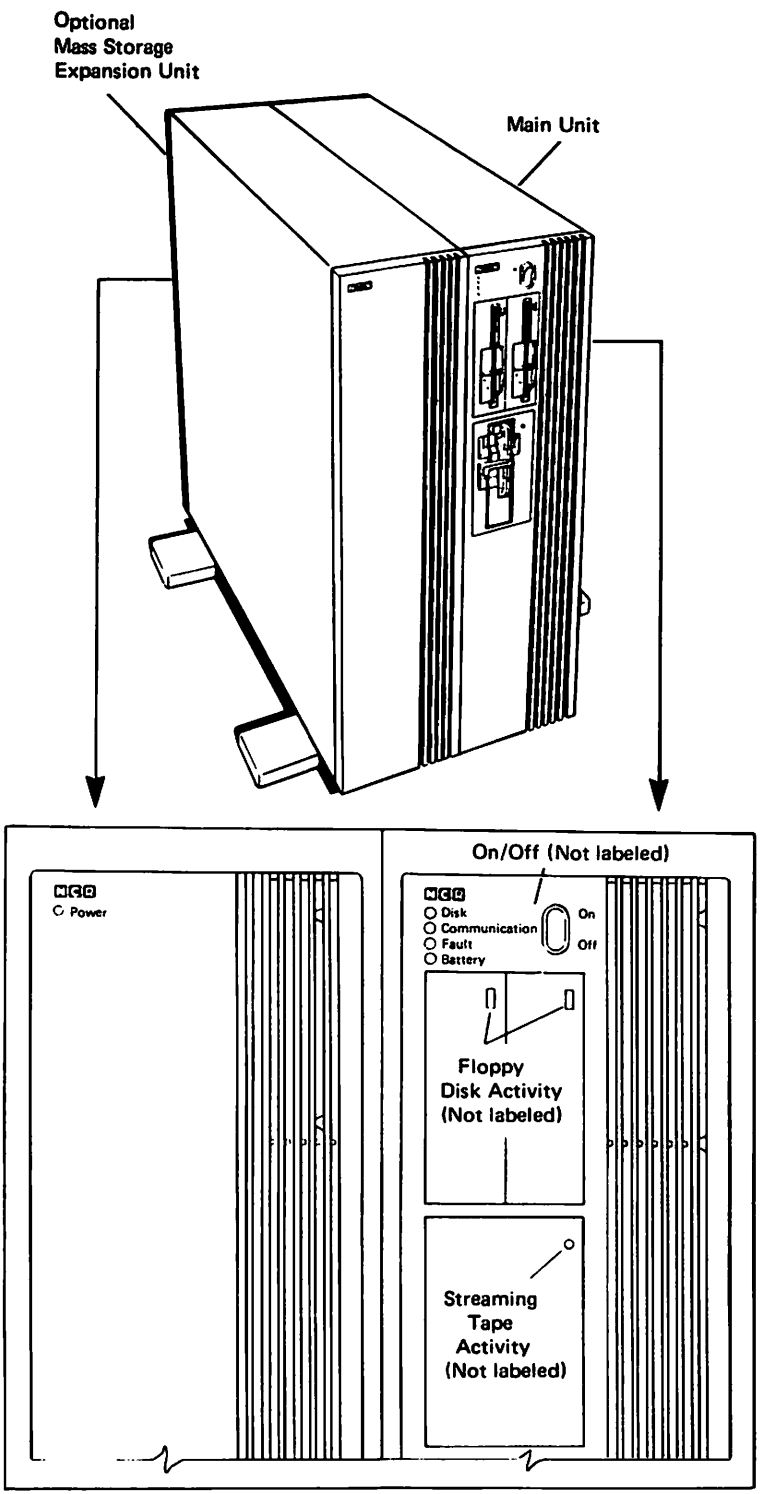

Figure 1 TOWER control panels

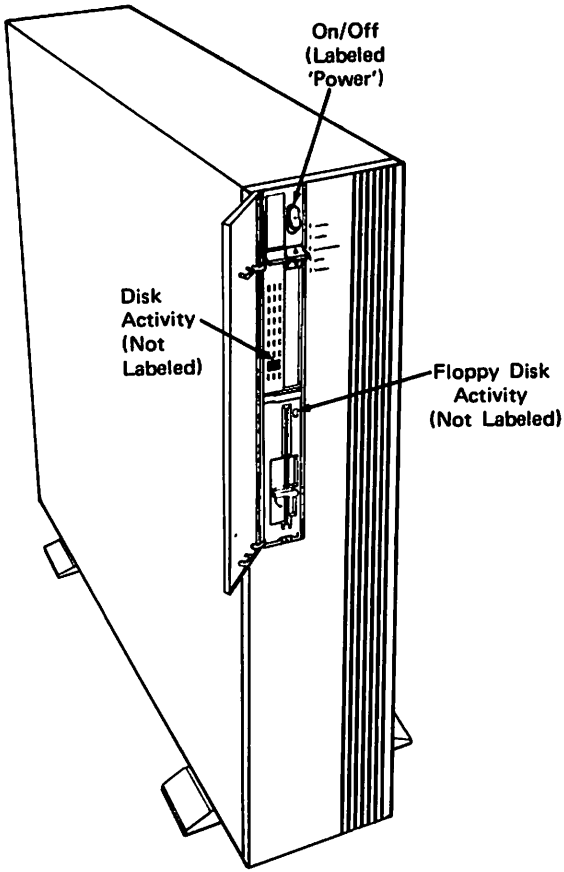

Figure 2 TOWER 32 control panel

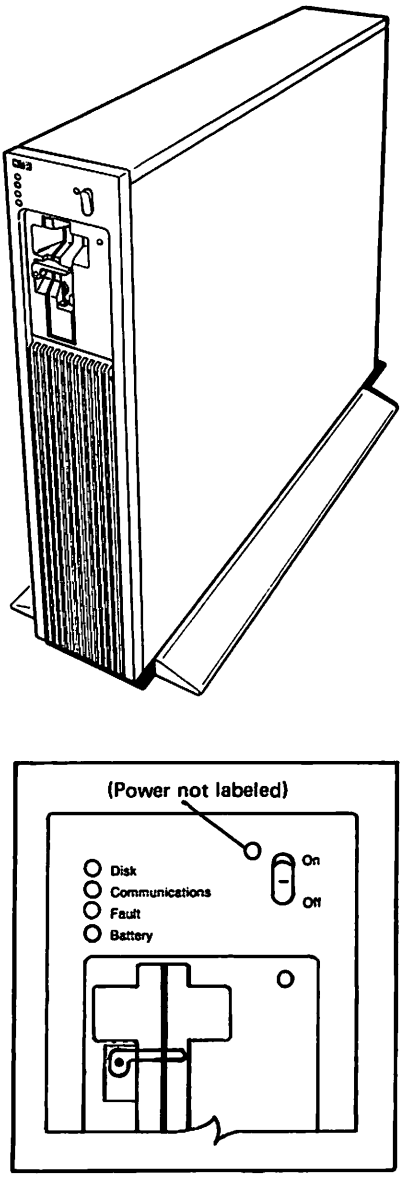

Figure 3 MiniTOWER control panel

Mass Storage Expansion Unit

The single indicator on the Mass Storage Expansion Unit provides the following information.

Power Indicator (Two color indicator — red and green)

- Green — The power system logic operating voltages are enabled and operating within their specified range. This is the normal operating mode.
- Red — A logic operating voltage is not within its specified range. The unit is not operational.
- Off — The unit power system is in an off condition.

System Back Panels

The back panel (Figures 4, 5, and 6) is where the ports available for adding terminals, parallel and serial printers, and the memory power switch for the Main Unit are located. This information is needed when configuring the system.

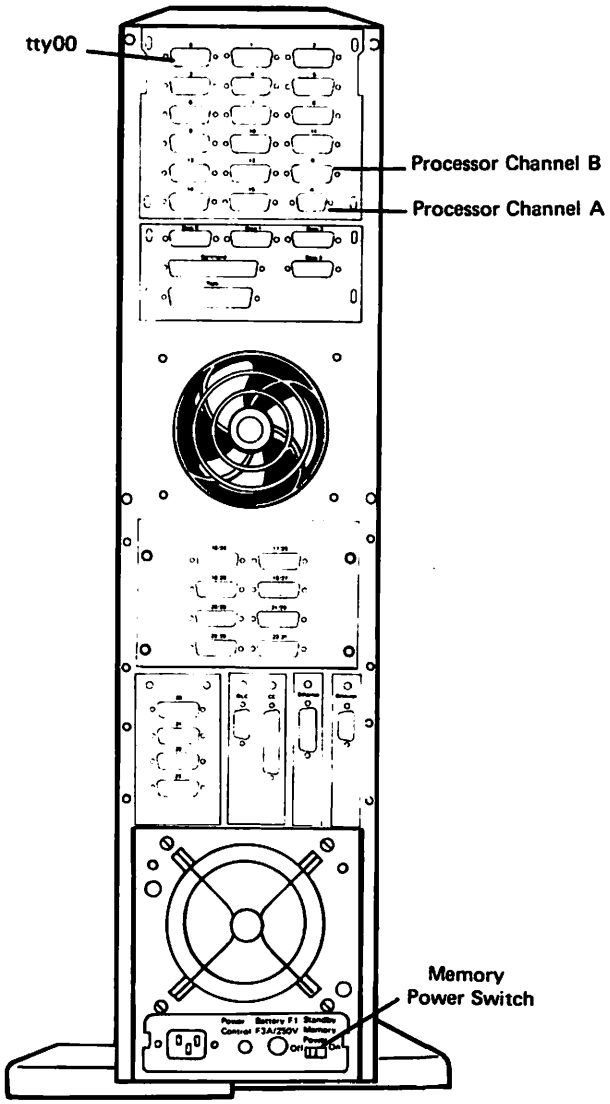

Figure 4 Rear view of TOWER

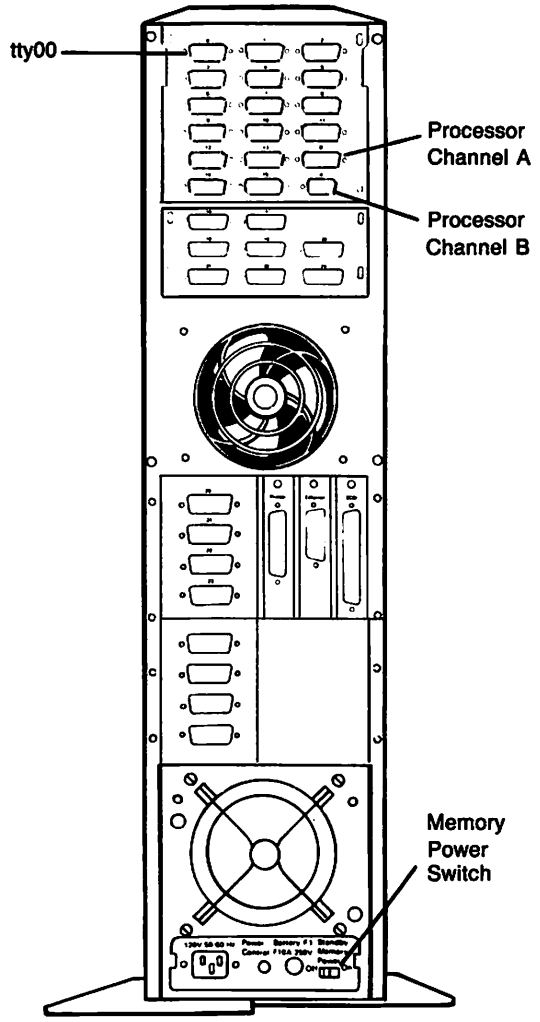

Figure 5 Rear view of TOWER 32

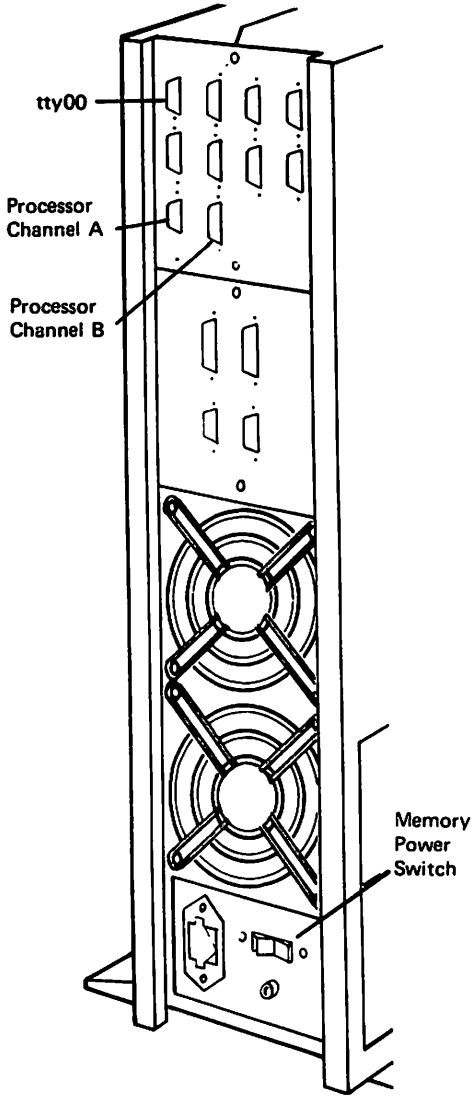

Figure 6 Rear view of MiniTOWER

System Configuration Sticker

The system configuration sticker (Figure 7) has the special information of how your system was configured at the factory. All of the following information is given:

- Type(s) of hard disk(s)
- Type(s) of I/O Controllers and where they are located
- If a floppy disk drive(s) is present
- Maximum number of terminals and printers that can be added
- If any communication line interface module(s) (LIM) are present
- If an Expansion Unit is present
  - How many 8 inch hard disks are present in the Expansion Unit
- If any tape drives are present

This information is valuable when configuring your system after the initial operating system software installation. There is space available to include any devices that have been added to the system by a Field Service Representative. It is recommended to keep the information on this sticker current.

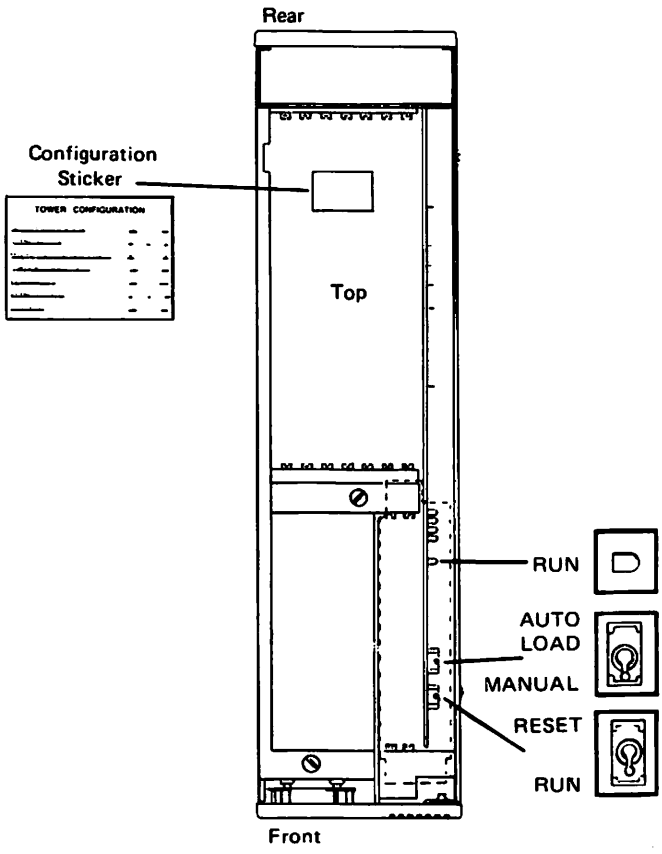

Figure 7 Inside the Main Unit

System Media Report and System Error Log

The information listed on the system media report and the system error log are needed when you format a hard disk.

System Media Report

The system media report (Figure 8) is shipped with the unit from the factory. This report contains the bad block information for the unit's hard disk. This information is needed when formatting the hard disk. Note that the hard disk is formatted when it is shipped, so if the operating

system software is being installed for the first time, you do not need to format. Keep this system media report in a safe place; its information is needed if the hard disk ever needs to be reformatted.

**** MEDIA DEFECT LIST ****

CUSTOMER: DATE:

MODEL:B03B-4595-B002A DE SERIAL NO:020430 SERIAL NO:2C030

NO	CYLINDER	HEAD	POS/BYTES	LEN/BITS	SCT	PAGE- 1
1	0012(18)	06(6)	3E74(15988)	0004(4)		1
2	00BA(186)	01(1)	2B22(11042)	0008(8)		12
3	00C3(195)	04(4)	1B59(7001)	002A(42)		4
4	00DA(218)	05(5)	0A1F(2591)	0004(4)		1
5	00E7(231)	05(5)	365B(13915)	0004(4)		1
6	0100(256)	06(6)	0109(265)	0003(3)		1
7	0133(307)	06(6)	4322(17186)	0002(2)		1
8	0147(327)	06(6)	4747(18279)	0003(3)		1
9	019C(412)	03(3)	4C25(19493)	001E(30)		4
10	01B2(434)	06(6)	3298(12952)	0003(3)		1
11	01BF(447)	06(6)	0398(920)	0001(1)		1
12	01C4(452)	06(6)	4B1C(19229)	0119(281)		12
13	01C6(454)	06(6)	09BF(2495)	0001(1)		1
14	01C8(456)	00(0)	1D5A(7509)	0001(1)		2
15	01DC(476)	06(6)	12A0(4768)	0001(1)		1
16	0205(517)	01(1)	2B11(11025)	0003(3)		1
17	0220(544)	04(4)	305B(12379)	0002(2)		1
18	023F(575)	06(6)	1D90(7568)	0002(2)		12
19	0240(576)	06(6)	1DD3(7635)	0002(2)		1
20	0242(578)	06(6)	3643(13891)	0001(1)		2
21	0246(582)	06(6)	3180(12684)	0003(3)		1
22	0247(583)	02(2)	132E(4910)	0002(2)		1
23	024A(586)	06(6)	19LE(6606)	0002(2)		1
24						
25						

Figure 8 Example of a System Media report

System Error Log

The system error log (Figure 9) is a report of all system errors that have occurred during the operation of the system. Refer to the "Inspect the System Error Log" section in the *System Reconfiguration* chapter in this book for information on obtaining a copy of the log.

Unrecovered read errors are one type of error that is listed in this report. When unrecovered read errors have occurred, the block numbers of the bad blocks are listed on this report. Unrecovered read errors mean that the data on the specified block of the disk is unreadable, therefore new

data should not be written to this block.

If several unrecovered read errors have occurred; you should reformat the disk. You must enter the bad block numbers from this system error log report and the information from the system media report when requested. Alternate blocks are assigned by the system. It is recommended to perform a full system backup before reformatting, then restore the system to its original state.

```
System Error Report - Selected Items  Prepared on Jan 23 16:23  Page 1

Date/Time of 5 1/4 Hard or Flex Disk Incident: Mon Jan 23 13:41:12 1984
        Incident Sequence Number          0000
        Subsystem/Module                  hnnn
        Function                          04, Read Blocks Command
        Hardware Status                   0d, Data Address Mark Not Found Error
        Sense Status Bytes                0151
        Logical Block                     0000008613
        Cylinder = 95, Header = 3, Sector = 9
        Retry Count                       0
        Error Diagnosis                   Recovered
        Transfer Size in Bytes            512
        Simultaneous Bus Activity         None
        Statistics on Device to date:
                No. of R/W Operations                 369783
                No. of Other Operations                    0
                No. of Unrecorded Errors                   0
```

Figure 9 Example of a System Error Log report

System Logs and Reports

The system generates a number of different logs and reports which are useful in managing and maintaining the integrity and control of your system. It is recommended that you become familiar with the contents of each log and report. For example, if a print job has not started to print after being placed on the spool queue, you can determine the status of the job by looking at the spooler status log. For a second example, if your system performance is degrading, you can look at the system error log to determine if an error

is continuously occurring.

System Logs

The system logs that are generated are:

- application log
- application control log
- application hierarchy log
- spooler status log
- system error log
- system software log
- user login accounting log
- system console log

Application Log

The application log contains a record of all the progress messages and the system activity during the performance of any one of the following application jobs.

- Create an Application Menu Level
- Install Application Manually
- Install Applications (from Floppy Disk or Streaming Tape Media)
- Move an Application Menu
- Move an Application Package
- Remove an Application
- Remove an Application Menu Level

The application log is created separately for each job when it is performed; however, you must specify that the log is to be saved.

For further information on a specific application log, refer to the corresponding section in the *System Reconfiguration* chapter in this book.

Application Control Log

The application control log provides a summary report of all operations that have been performed which effects the status of any application contained in the application hierarchy. This log provides the following information:

- type of operation performed

- time and date when the operation was performed
- name of the application

The application control log file grows dynamically and must be periodically cleared.

For further information on the application control log, refer to the "List Application Control Log" section in the *System Reconfiguration* chapter in this book.

Application Hierarchy Log

The application hierarchy log describes each type of application category and the application installed under each category. The log also provides the parent directory name and the directory name of the application. Each directory name is enclosed within parentheses.

For further information on the application hierarchy log, refer to the "List All Installed Applications" section in the *System Reconfiguration* chapter in this book.

Spooler Status Log

The spooler status log contains information necessary to control the files on the spool queue. The following information is displayed for each spool queue file.

- internal spool file id
- spool queue file name
- terminal number where spool queue file was created
- user or login name of who created spool queue file
- destination print device name
- number of copies of spool queue file to be printed
- number of pages contained in the spool queue file
- number of lines per vertical inch
- special forms name
- priority spool queue number
- current status of spool queue file

For further information on the spool status log, refer to the "Display Spooler Status" section in the *System Services*

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chapter in this book.

System Error Log

The system error log collects errors logged by the operating system. The system error log may record the following activity:

- time of the earliest and latest errors
- total number of errors of one or more types
- total number of recovered errors
- total number of unrecovered errors
- I/O operations on the system devices
- miscellaneous software type errors
- miscellaneous hardware type errors

The system error log file grows dynamically and must be periodically cleared.

For further information on the system error log, refer to the "Inspect the System Error Log" section in the *Start-of-Day* chapter or the *System Reconfiguration* chapter in this book.

System Software Log

The system software log contains a record of each step, the data entries, and any error condition that may occur during either the initial system software installation process or the operating system update process.

For further information on the system software log, refer to the "Inspect the System Software Log" section in the *System Reconfiguration* chapter in this book.

User Login Accounting Log

The user login accounting log provides a system logic accounting report of the following information:

- who has logged on the system
- what terminals are being used
- how long a user stays logged on the system
- when the system was booted
- when a system crash occurs and other system activity

From the above information, three separate reports may be generated specifying the system login accounting of all users that have logged on the system, the login activity of a specific terminal, and the login activity of a specific user. On each of these reports it specifies the user name, the terminal name, the login date and time, and the total time on the system.

The user login accounting log must be enabled before any system login activity is generated. Once the log is enabled, it grows dynamically and must be periodically cleared.

For further information on the user login accounting log, refer to the "Perform User Login Accounting" section in the *User Accounts* chapter in this book.

System Console Log

The system console log is only on systems which have been updated to include the optional unattended operating system feature. The log contains a record of messages produced while the system is entering multi-user mode.

For further information on the system software log, refer to the "Inspect the System Console Log" section in the *System Reconfiguration* chapter in this book.

System Reports

The system reports that are generated are as follows:

- active processes report
- active users report
- file system size report
- system log sizes report
- user accounts report

Active Processes Report

The active processes report lists all the processes which are currently being performed on the system. Each process in the report contains the following information:

- process identification number
- terminal name
- central processing unit (CPU) time
- program name

This report may be displayed to the terminal or listed on the printer.

For further information on the active processes report, refer to the "Display All Active Processes" section in the *System Services* chapter in this book.

Active Users Report

The active users report lists all the users who are currently logged on the system. Each user in the report contains the following information:

- user name
- terminal name
- date and time logged on

This report may be displayed to the terminal or listed on the printer.

For further information on the active users report, refer to the "Display All Active Users" section in the *System Services* chapter in this book.

File System Layout Report

The file system layout report lists the configuration of your system as distributed during the system software installation or the operating system update. The following information may be displayed to the terminal, listed on the printer, or displayed and listed at the same time.

- disk — specifies the logical device name of the Winchester disk
- slice — specifies how the file systems are set up according to your system disk capacity
- size — specifies the number of sectors of each slice
- directory — specifies the directory name of the file system
- disk description — specifies the type of disk

For further information on the file system layout report, refer to the "Display File System Layout" section in the

System Reconfiguration chapter in this book.

File System Size Report

The file system size report lists the number of disk blocks being used by a specific directory. Also, a free space check report may be requested to list the parent directory name, the system name, the number of free disk blocks, and the free entries for a directory.

The information in both reports is helpful in determining if a user area or directory is growing too large and needs to be stored off line or removed, and to determine if a file or directory fits on a floppy disk or another media device. Both of these reports may be displayed to the terminal or listed on the printer.

For further information on either the file system size report or the free space check report, refer to the "Display File System Size" section in the *Maintenance and Diagnostics* chapter in this book.

User Accounts Report

The user accounts report lists each account in the system by the user name, the user identification number, the group identification number, and the user directory. Also, a user group report may be requested to list the group name and the group identification number. These reports may be either displayed to the terminal or listed on the printer.

For further information on either the user accounts report or the user group report, refer to the "List All User Accounts" section in the *User Accounts* chapter in this book.

File System

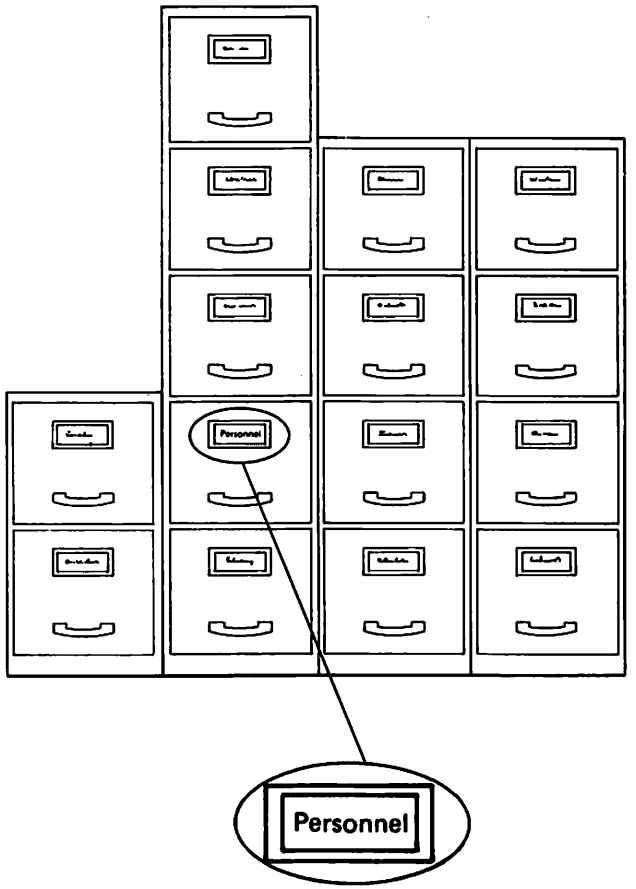
Definition

The system is called an electronic filing cabinet because many of the papers you formally filed in cabinets are filed electronically on disks.

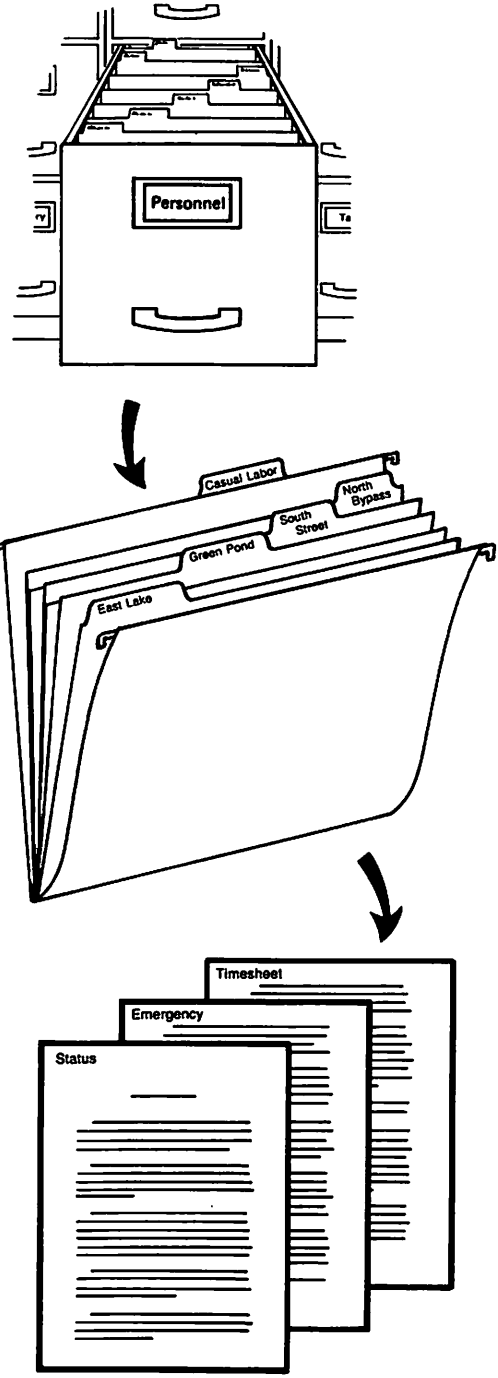
File Room

The electronic file system is analogous to a business file room. Typically a business file room contains a variety of different filing cabinets. Some filing cabinets contain hanging folders, some contain manila folders, some contain both, and some contain neither. A tray labeled "To Be Filed" is usually overflowing. The electronic filing system has the same characteristics, except everything is always filed. There is no "To Be Filed" tray.

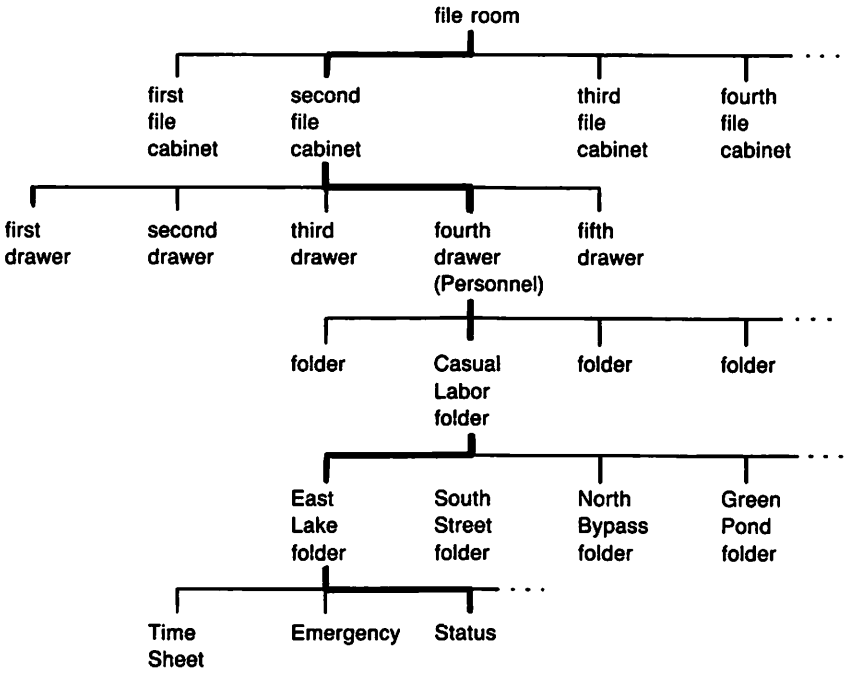
Consider a file room which has a number of filing cabinets. Labels on the filing cabinet drawers specify the contents of the drawers.



A number of hanging folders may be in a drawer, and each hanging folder may contain several manila file folders. In each manila folder are several records.


Personnel
Casual Labor
North Bypass
South Street
Green Pond
East Lake
Timesheet
Emergency
Status

To describe the location of a particular report, you might say, "In the file room, look in the second file cabinet in the drawer labeled *Personnel*, in the hanging folder labeled *Casual Labor*, in the manila folder labeled *East Lake* to find the *Status* report." A diagram of the location of the Status report might look like this where the path to the Status report is shown by a dark line.



In the electronic file system, the path to the Status report is similar. However, expressions like "the second filing cabinet" are long. To make it easier, each component of the file system is given a meaningful name. The file room itself, which is the complete file system, is called root because the path diagram resembles an inverted tree with root as the beginning. You can assign any name to the other components of your file system. Assume that the assigned names are:

root — the name of the file room

employee — the name of the second filing cabinet
personnel — the name of the fourth drawer
casual — the name of the hanging folder
eastlake — the name of the manila folder
status — the name of the report

In specifying the path to the Status report, a slash symbol (/) specifies root. A slash symbol is also used to separate the file system component names. The Status report location is specified as:

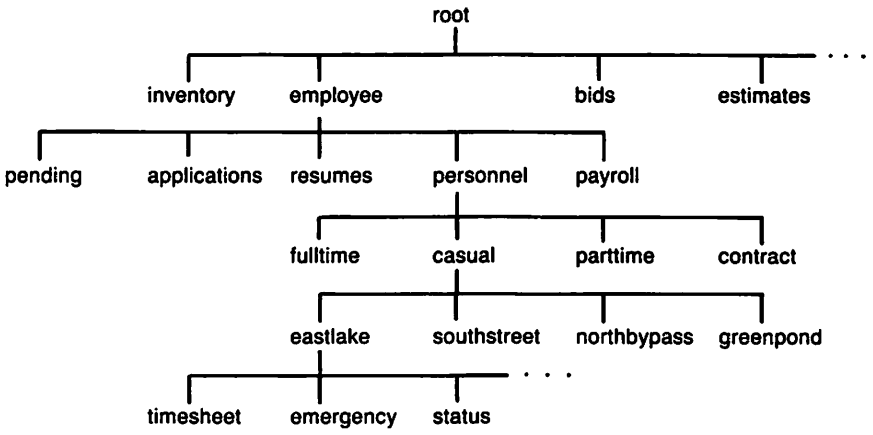
/employee/personnel/casual/eastlake/status

This specification is called the full pathname of the Status report. Sometimes full pathnames are required; often they are not. More information about the pathname requirements is given later in this chapter.

The file room, cabinet drawers, and folders function as separators and holders of information. In themselves, they do not provide information. They may even be empty. The papers in these holders, however, do provide information. The Status report, for example, contains status information about the casual labor employed at East Lake.

In the electronic file system, because the Status report contains information, the Status report is a file. The file contains all the characters, numbers, and spaces which make up the report. This file is assigned the file name of status. (A file may also be empty which is like filing a blank sheet of paper.) The holders of information are directories, and each directory has a directory name. For example, root, employee, personnel, casual, and eastlake are directory names. Sometimes directories are referred to as subdirectories. For example, the eastlake directory is a subdirectory of the casual directory. Because all directories are subdirectories of the root directory, generally holders of information are referred to simply as directories.

A diagram of the file system may look like this.



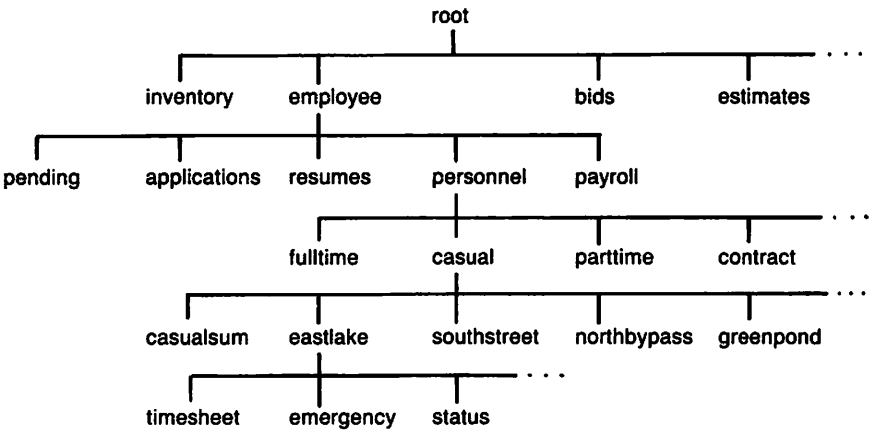
The full pathname of the emergency file for East Lake is:

/employee/personnel/casual/eastlake/emergency

The full pathname of the contract directory is:

/employee/personnel/contract

In a filing cabinet, all reports do not need to be in folders, and manila folders do not need to be in hanging folders. This is also true for your electronic file system. Consider a Status report which is a summary of the Status reports for East Lake, South Street, North Bypass, Green Pond, etc. This summary report, named casualsum, may be filed in the casual directory. The diagram is:



The full pathname of the summary report is:

/employee/personnel/casual/casualsum

The casual directory contains one file (casualsum) and several directories (eastlake, southstreet, northbypass, greenpond, etc.). Any directory in your file system may contain:

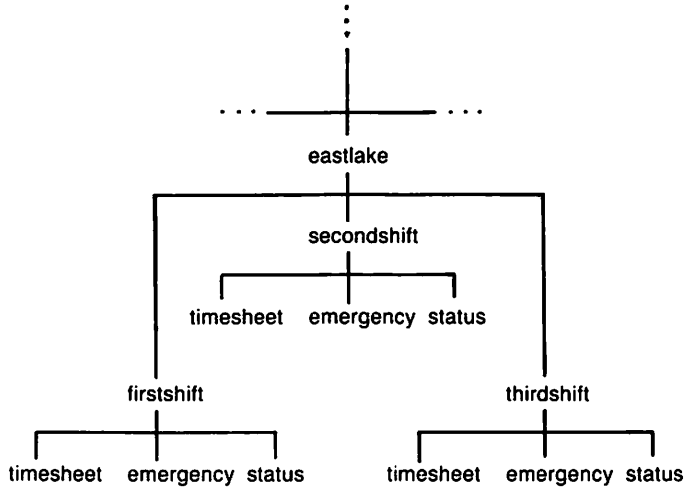
- files
- directories
- files and directories
- nothing (the directory is empty)

In a filing cabinet, you can:

- put reports in a drawer
- put reports in a manila folder in a drawer
- put reports in a hanging folder in a drawer
- put reports in a manila folder in a hanging folder in a drawer

Further divisions of the holders of information require techniques such as tabs or color coded labels. In your file system, you can have as many levels of directories as you

need. The number of directory levels and the number of files which can be in your file system are limited only by the amount of disk space. Consider, for example, the need to divide the East Lake reports into work shifts. You might put three directories in the eastlake directory — firstshift, secondshift, and thirdshift — and file reports in these directories. The East Lake part of your file system then looks like this:



The full pathnames to the Status reports are:

/employee/personnel/casual/eastlake/firstshift/status
/employee/personnel/casual/eastlake/secondshift/status
/employee/personnel/casual/eastlake/thirdshift/status

Remember, you do not usually need to specify full pathnames to find a report (file) in your electronic filing cabinet. You do need to know exactly how your file room (root) is organized to effectively use all of your electronic filing cabinet features. Two of these features are transfer files and locked files.

Transfer Files

When a business file room or a particular filing cabinet drawer is full, or the information is not current enough for

frequent reference, files are discarded or moved to transfer files in a storage area.

Files can be discarded from your file system by removing them. Removing a file deletes the file from the file system. A removed file cannot be recovered.

Files can be transferred from your file system by first copying the files to a floppy disk or streaming tape, and then removing the files. The floppy disks or streaming tapes which contain the transferred files should be stored in a safe place. If any transferred file is needed again, the file can be copied back to your file system.

Locked Files

In a business file room, some filing cabinets have locks. When the filing cabinet is locked, all drawers are locked. Files within the locked cabinet are accessible only to persons who have keys or combinations.

In your file system, you may lock any drawer, folder, or report. You can then issue keys to only authorized persons. The keys in your file system not only restrict access, they restrict the types of access.

The access permission to any directory or file may be set to permit access by the owner, a group, or everyone.

- owner — The owner of a directory or file is the user who created the directory or file. After a directory or file is created, the ownership may be changed only by the current owner or the system administrator.
- group — The group of a directory or file is a group name of a number of users who can access the directory or file. Any directory or file can have one group name associated with it. Any number of users may be assigned to the group. Any user may be assigned to a number of groups.
- everyone — Everyone is all users on the system.

The owner, group, or everyone may be restricted to certain types of directory or file access: read, write, and execute access.

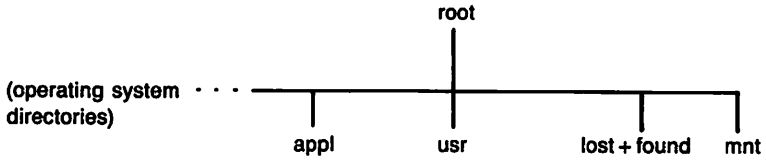
- read — Read access permits the owner, group, or everyone to read the directory or files. Read access

permits a user to display, print, and copy a directory or file. The user may also run programs which read the directory or file.

- write — Write access permits the owner, group, or everyone to write the directory or file. Write access for a file is different from write access for a directory. Write access for a file permits a user to copy to the file and to run programs which write to the file. Write access to a directory permits a user to copy files into the directory, create files in the directory, and remove (delete) files from the directory.
- execute — Execute access for a file which is a program is different than execute access for a text file (report, letter, etc.) or directory. Execute access for a program file permits a user to run the program. Execute access for a text file or directory permits a user to search for a specific item in the file or directory. The search permission is limited to specific items. No metacharacters are allowed in the search. Metacharacters, commonly called wildcards, are defined later in this chapter.

Root File System

Your root file system is a structure of directories and files which permits you to access the files and devices in the system. When your system is installed, the root file system is created. The root file system looks like this:



/appl — application directory
/usr — user accounts directory
/lost+found — lost and found directory
/mnt — mount directory

The operating system directories contain the directories, files, and programs of the operating system itself. You see some of these listed in reports produced on the system. Never remove these directories or any files in these directories; they are required to run the system. The following list provides a description of these operating system directories.

/bin, /kernel, /unix, /sys, /etc
: These directories and files contain the basic operating system files.

/ncrm
: /ncrm (NCR maintenance) provides the system support and maintenance personnel access to the system and diagnostic programs.

/menu
: /menu provides you access to the menu screens and help screens which lead you through your job.

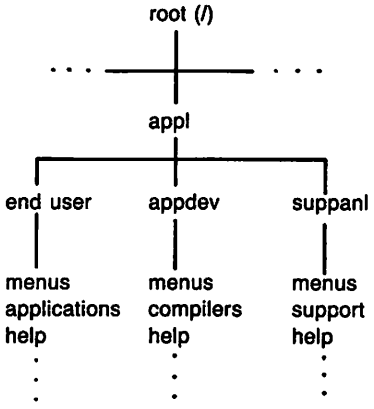
/lib
: /lib (library) contains library files for your system programmers.

/tmp
: /tmp (temporary) is a directory used to store temporary files. The operating system automatically creates and removes temporary files as it runs.

/dev
: /dev (device) contains the access to the system devices: terminals, printers, disks, tapes, and communication lines.

/appl — Application Directory

The application directory, /appl, is for the applications you install in the system.



Applications are installed according to the type of user. The installation process automatically creates the menu screens and help screens. The correct pathname for installation is included with the application software.

end user

End user applications such as Multiplan, payroll, inventory, etc. should create the menus and help screens used to run the applications. The end user who runs these programs uses interactive menu selection to run a job.

appdev (application developer)

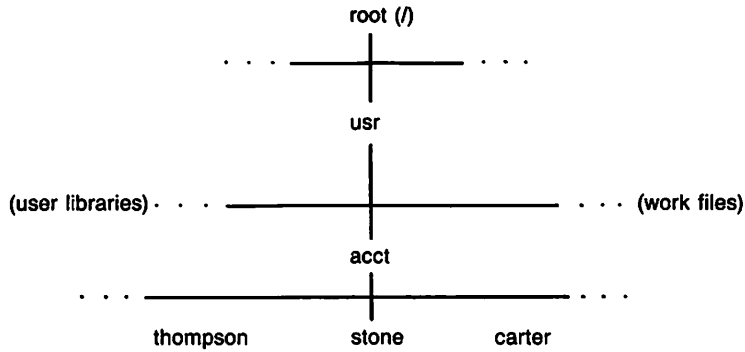
Applications for developers such as COBOL, BASIC, and C are installed in the /appl/appdev directory. The C language compiler is included in the base system. Additional languages, such as COBOL and BASIC, are optional.

suppanl (support analyst)

Applications for system support analysts are installed in the /appl/suppanl directory.

/usr — User Directory

The user directory, /usr, is for the users you permit to access the system.



Each user you add to the system has a directory for files. The name of the directory is the user name. The above diagram shows three user account directories.

/usr/acct/thompson
/usr/acct/stone
/usr/acct/carter

/lost+found — Lost and Found Directory

The lost and found directory, /lost+found, is used by the operating system if problems occur. The operating system automatically checks the file system when the system goes multi-user. If any problem is found, a file system repair program can be run. The repair program resolves many file system problems. If the repair program finds a file or directory which is not linked into a directory in the file system, the repair program puts the file or directory in the /lost+found directory.

You should periodically display the entries in the /lost+found directory. If any files or directories are there, you need to copy them to the correct directory and remove them from /lost+found.

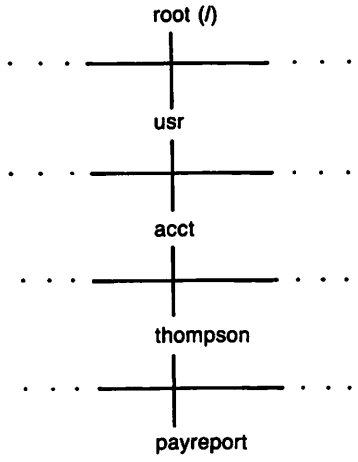
/mnt — Mount Directory

The mount directory, /mnt, is used to mount file systems. Mounting a file system permits you to extend your root file system to floppy disks and unused Winchester disks which are not automatically mounted at system start up.

NOTE: A streaming tape cannot contain a file system and cannot be mounted.

In the operating system, floppy disks or streaming tape are used to distribute and install operating system software and application software. During the installation process, the software is copied from the system media to the root file system on the Winchester disks in the Main Unit and, if you have one, the Mass Storage Expansion Unit. As users run programs and perform jobs, files are created on the Winchester disks increasing the root file system. Periodically, files are copied to system media for transfer file storage or as a backup copy of the root file system. Files are copied between the system media and the root file system as needed to maintain the file system. However, when a file is copied to the system media, the file on the floppy disk cannot be accessed directly through the file system. The file can only be accessed by copying it back to the root file system.

Assume that a user, thompson, creates a file named payreport.



The full pathname of the payreport file is:

/usr/acct/thompson/payreport

If the payreport file is copied to a floppy disk, thompson can access the payreport file in the root file system by its pathname:

/usr/acct/thompson/payreport

The copy of payreport on the floppy disk, however, cannot be accessed directly. If payreport is removed (deleted) from the root file system, payreport cannot be accessed. To access payreport, it must be copied back to the root file system.

Making a file system on a floppy disk and mounting the floppy disk file system permits files in the floppy disk file system to be accessed directly. Mounted file systems are discussed later in this chapter.

Pathnames

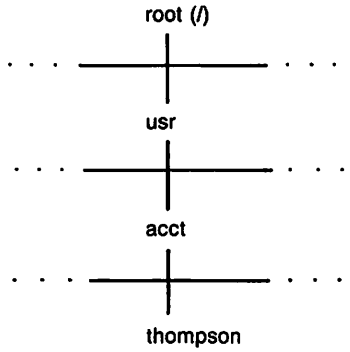
The pathnames in your system specify the locations of directories and files. The name of a directory or file is a string of 14 or less characters. The string can contain any characters except a space character. For example, payreport, Payreport, PayReport, and PAYREPORT are valid names. Pay Report is not a valid name because a space character is contained in the name between Pay and Report. Typically, names are in lowercase letters, digits, and symbols. Uppercase letters are valid, but using uppercase letters requires more keystrokes.

The names should describe the contents of the directory or file. Names like file1, file2, etc. are not very helpful. Names like payreport1, payreport2, etc. might be used for the payreport files for January, February, etc. Sometimes using symbols helps readability. For example, the January and June payreport file names might be any of the following:

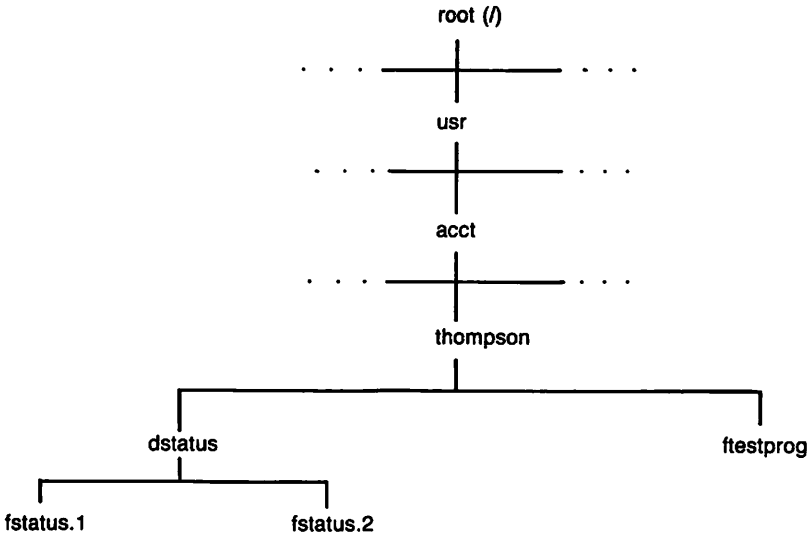
payreport.1	payreport.6
payreport_1	payreport_6
payreport-1	payreport-6
payreport.ja	payreport.jn

Directories and Files

The full pathname given to a directory or file depends on how the directory or file is created. Each user given access to the system has a directory which has the same name as the user name. When a user logs in to the system, this directory is the user's current working directory. For example, thompson is the current working directory when the user name thompson is used to log in.



Assume that the thompson directory contains the following directories and files. A name beginning with the letter d is a directory. A name beginning with the letter f is a file.



When thompson is the current working directory, any subdirectory or file can be accessed without the full pathname. For example, the full pathname of the ftestprog file is:

/usr/acct/thompson/ftestprog

The file can be accessed by:

ftestprog

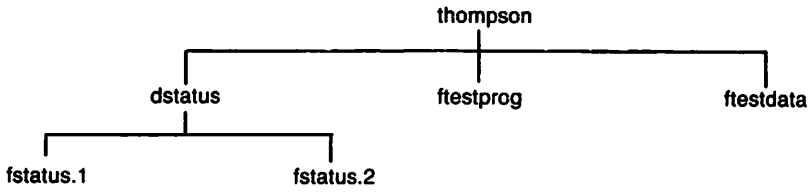
The fstatus.1 file can be accessed by:

dstatus/fstatus.1

If a new directory or file is created by specifying only a name, the directory or file is automatically put in the thompson directory. Creating a new file specified as

ftestdata

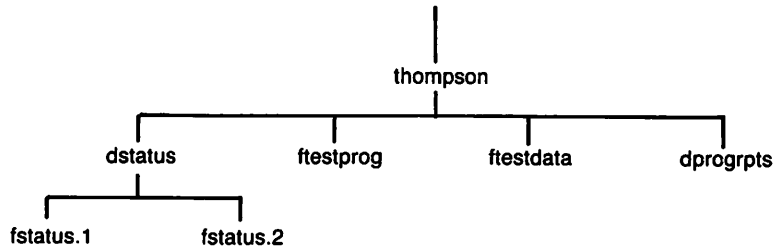
puts ftestdata in the thompson directory.



Creating a new directory specified as

```
dprogrpts
```

puts dprogrpts in the thompson directory.



Creating a new file named ffile in a new directory named ddirectory by:

```
ddirectory/ffiles
```

cannot be done in one step. First, ddirectory must be created; then, ffile can be put in ddirectory.

The current working directory can be changed. Assume a number of files need to be created in the dprogrpts directory: fprogrpt.1, fprogrpt.2, etc. These files can be created by specifying:

```
dprogrpts/fprogrpt.1
dprogrpts/fprogrpt.2
```

If the current working directory is changed to dprogrpt, then these files can be created by specifying:

fprogrpt.1
fprogrpt.2

While dprogrpts is the current working directory, other directories and files in the thompson directory may be accessed by full pathnames. For example, the fstatus.1 file is accessed by:

/usr/acct/thompson/dstatus/fstatus.1

If the current working directory is changed back to thompson, fstatus.1 is accessed by:

dstatus/fstatus.1

A number of directories or files can be accessed by one entry by using metacharacters which are commonly called wildcards. The metacharacters are asterisks (*), question marks (?) and brackets ([\|]).

* — An * specifies any number of characters.
? — A ? specifies a single character.
[ ] — Brackets enclose a list of characters.

The entry of

ftest*

specifies ftestprog and ftestdata. The * specifies any number of characters which follow the ftest characters.

The entry of

dstatus/fstatus.?

specifies dstatus/fstatus.1 and dstatus/fstatus.2. The ? specifies a single character which follows the dstatus/fstatus. characters.

The entry of

[d-f]*

specifies all files whose names begin with the letter d, e, or

f.

The entry of

f[a-b]*

specifies all files whose names begin with fa and fb.

The entry of

[df]*

specifies all files whose names being with d or f. Files whose names begin with e are not included.

The entry of

f[ac]*

specifies all files whose names begin with fa or fc.

Devices

The pathnames of the system devices permit access to the devices just as pathnames permit access to files. The devices are accessed through the /dev directory. The following chart lists the operating system device names. The device names in this release of the operating system are linked to the device names used in Release 2.00 and Release 2.01. Either device name can be used when specifying a device.

Main Unit			
Device Description	**Operating System Names**		**Diagnostic Name**
	Block Mode Access	**Character Mode Access**	
Fast Floating Point	NA	NA	fp00
Terminals			
Processor Memory Controller ports	NA	ttya-ttyb	pt0a-pt0b
First 8-Channel I/O Controller ports	NA	tty00-tty07	tt00-tt07
Second 8-Channel I/O Controller ports	NA	tty08-tty15	tt08-tt15
Serial Printers			
Any 8-Channel I/O Controller ports (Numbered 0 through 15)	NA	lp00-lp15	tt00-tt15
Parallel Printer			
Any High Performance 8-Channel I/O Controller Parallel Printer port (Numbered 0 through 1)	NA	lp00-lp15	lp00-lp01
Floppy Disks			
Left, top, or only drive			
Physical disk	fdsk/0s0	rfdsk/0s0	f501
File system	fdsk/0s1	rfdsk/0s1	NA
Right or bottom drive			
Physical disk	fdsk/1s0	rfdsk/1s0	f502
File system	fdsk/1s1	rfdsk/1s1	NA
Hard Disks			
First through second 5.25 inch			
Physical disk	dsk/0s0-1s0	rdsk/0s0-1s0	h501-h502
File system	dsk/0s1-1s1	rdsk/0s1-1s1	NA
Streaming Tapes			
First through second tape drive			
See Note 1	NA	rstp/0yy-1yy	st01,st02
See Note 2	NA	rstp/0yn-1yn	NA
See Note 3	NA	rstp/0ny-1ny	NA
See Note 4	NA	rstp/0nn-1nn	NA
Note 1 Rewind on open; rewind on close Note 2 Rewind on open; no rewind on close Note 3 No Rewind on open; rewind on close Note 4 No rewind on open; no rewind on close			
Communication Lines			
Binary synchronous ports	NA	bt00-bt03	bt00-bt03
HDLC Common Carrier port	NA	hd00-hd03	hd00-hd03
BSC 3270	NA	bm10-bm1w	bm10-bm1w
	NA	bm20-bm2w	bm20-bm2w
	NA	bm30-bm3w	bm30-bm3w
ETHERNET Controller			
First Controller	NA	et00	et00
Second Controller	NA	et10	et10
OMNINET Controller			
First Controller	NA	om00	om00
Second Controller	NA	om10	om10

Expansion Unit			
Device Description	Operating System Names		Diagnostic Name
	Block Mode Access	Character Mode Access	
First through Fourth 8 inch			
Physical disk	dsk/2s0-5s0	rdsk/2s0-5s0	h801-h805
File system	dsk/2s1-5s1	rdsk/2s1-5s1	NA

SCSI Unit			
Device Description	Operating System Names		Diagnostic Name
	Block Mode Access	Character Mode Access	
Hard Disks			
First through sixteenth drive			
Physical disk	dsk/6s0-21s6	rdsk/6s0-21s6	sd01-sd34*
File system	dsk/6s0-21s6	rdsk/6s0-21s6	NA
* First number identifies SCSI unit (0-3), second number identifies drive (1-4)			
Magnetic Tapes			
First through third drive		See Note 5	
See Note 1	NA	rmt/0xyy-2xyy	ss61,ss51,ss41
See Note 2	NA	rmt/0xyn-2xyn	NA
See Note 3	NA	rmt/0xny-2xny	NA
See Note 4	NA	rmt/0xnn-2xnn	NA
Note 1 Rewind on open; rewind on close Note 2 Rewind on open; no rewind on close Note 3 No Rewind on open; rewind on close Note 4 No rewind on open; no rewind on close Note 5 The x in the character mode field represents either m, which specifies low density, or h, which specifies high density.			

The pathname for any device is /dev/devicename. For example, the pathname of the left, top, or only floppy disk device is one of the following.

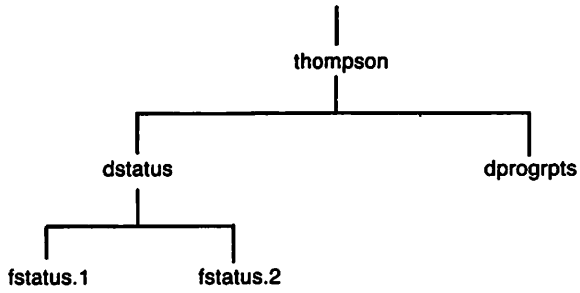
/dev/fdsk/0s1 — block mode name
/dev/rfdsk/0s1 —character mode name

Mounted File Systems

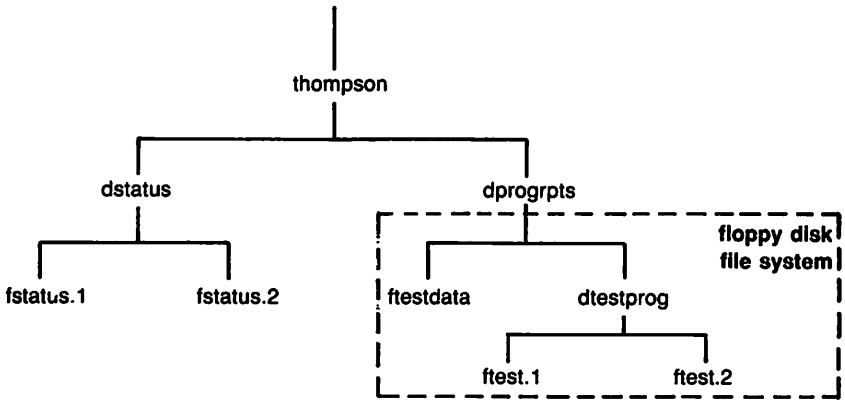
Generally, directories and files created by a user or a program are put on the hard disks which are automatically mounted by the operating system at system start up and unmounted at system shut down. Files may be put on other unused hard disks and on a floppy disk by making a file system on a disk and mounting the disk. In making the file system and mounting it, the device name of the disk is specified as the block mode name, for example:

/dev/fdsk/0s1

The floppy disk file system may be mounted at any directory node. For example, assume the thompson directory looks like this.



A floppy disk file system may be mounted at the dprogrpts directory node. Any directories and files created in the dprogrpts directory while the file system is mounted are put in the floppy disk file system. Assume the following directories and files are created in dprogrpts.



These directories and files have pathnames just like any other pathnames. For example, the pathname of ftest.1 from the current working directory thompson is:

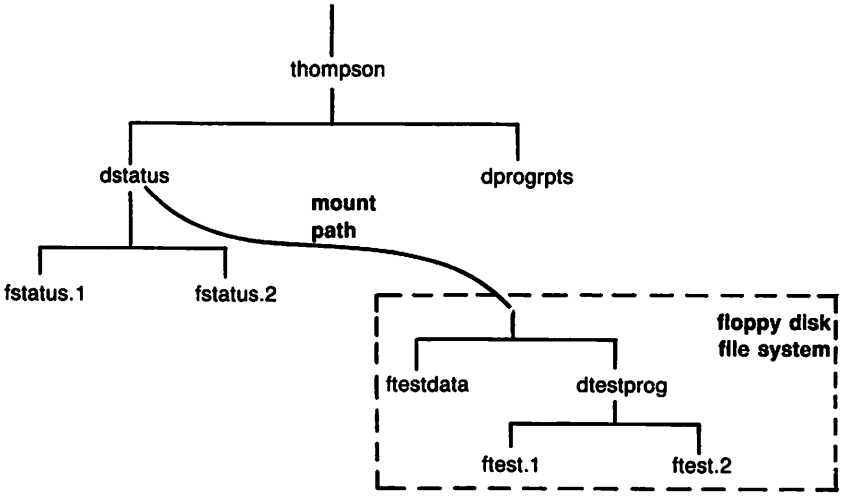
dprogrpts/dtestprog/ftest.1

When the floppy disk file system is unmounted, the directories and files in the file system cannot be accessed.

The file system on the floppy disk can be mounted again, and it may be mounted at any directory node. If a directory contains files and directories, and a file system is mounted at that directory node, the files and directories cannot be accessed until the file system is unmounted. For example, usually fstatus.1 can be accessed from the thompson current working directory by entering:

dstatus/fstatus.1

If a file system is mounted at the dstatus directory node, fstatus.1 (and fstatus.2) cannot be accessed. Directories and files in the mounted file system can be accessed.



For example, ftest.1 is accessed from the thompson current working directory by entering:

dstatus/dtestprog/ftest.1

When the floppy disk file system is unmounted, fstatus.1 and fstatus.2 may be accessed again.

The file system has two standard directories provided to mount file systems. Using these standard mount directories eliminates the possibility of inadvertently making directories and files inaccessible. The full pathnames of the standard mount directories are:

/mnt/fd70 — top, left, or only floppy disk device
mnt/fd71 — bottom or right floppy disk device

Summary

In describing your file system, jobs such as copying files, adding users, and mounting file systems are discussed. How to perform these jobs is described in later chapters in this book.

Printer Spooler System

A printer in the multi-user system is a resource which must be managed to prevent several users from attempting to print their reports at the same time. The obvious result of printing several reports simultaneously would be a single report which is essentially useless.

The Printer Spooler System is used to control when a report is presented to a printer and to permit only one report to be printed at a time on any printer. In addition, the spooler permits a user to specify a special type of report to be printed by giving the report a special name. This report name is commonly referred to as the forms name and is used to prevent a special report, paychecks for example, from being printed on the wrong type of paper.

Typically, a user would print a report and specify a forms name if the report required a special print form. This report would be spooled, that is, copied into a spooler file, and stored until the user changed the forms name associated with the destination printer. The user would then issue a printer start command to begin printing the special forms report. The printer forms name would have to be changed back to the standard forms name before normal reports could be printed.

In addition, the printer user can specify that multiple copies of a report are to be printed and that the report is to be sent to an alternate printer rather than use the standard default printer routing. Normally, the printer routing is specified for a given terminal by the system administrator and is not modified except under system administrator control.

After a report is entered into the spooling system, the user may wish to place the report on hold to prevent it from being printed until some undetermined later time. The hold function is invoked by specifying the spool identification, the owner of the spooled files user name, the printer device, or the terminal name. Except for the currently printing file,

all files that meet any of one of the above options are placed on hold.

NOTE: Multiple files may be placed on hold by using any one of these options; the owner of the spooled files user name, the printer device, or the terminal name.

Also, functions exist to permit the user to delete a file from the spooler system (purge), release a file which has previously been placed on hold, change the copies, forms name, and the routing of a file which is already in the spooler system, query the contents of the spooler system, look at the contents of a spooled file, start printing on a selected printer, stop printing on a selected printer, and restart printing of a report at the beginning of the report or any specified page in the report.

The Printer Spooler System is controlled through your interactive lead-through menu operations.

System Software Installation

Overview

Installing the system software for your computer is a menu-driven procedure with successive self-explanatory lead-through prompts. The system software installation process is performed in the following steps:

- defining the system disk
- installing the install file system
- installing the root file system
- installing the base system files
- installing the optional system files
- installing the system files
- defining the terminal used in installation

The system software installation package is the Business Base Module (bbase). This module contains the basic operating system utilities and the facilities needed to perform the system administration jobs. It does not contain the help screens for the system administration menus, they are contained in the System Documentation Module (man) and should be installed.

The optional system files on the Business Base Module contains the Release Definition of the system. The Release Definition contains a listing of all the individual modules. After printing the Release Definition it is recommended that you remove the release difinition files from the system.

Immediately after the installation of the system software you must configure your system, adding users, devices, peripherals, etc. to the system to make it fully functional. You may also wish to update the operating system to include other Operating System Modules:

- Extentions Module (exten) — contains non-essential operating system utilities such as vi, spell, and csh that may be useful to some users.
- Miscellaneous Module (misc) — contains games and

other non-essential operating system utilities such as the UNIX line printer spooler facility.

- Communications Module (comm) — system to system tty communications facilities and the utilities required to configure and maintain the facility.
- System Documentation Module (man) — includes all the on-line manual pages, related utilites, and the system administration help files.
- System Accounting Module (acct) — provides the complete system accounting facility: methods to collect per-process resource utilization data, record connect sessions, monitor disk utilization, and charge fees to specific logins.
- Software Development Module (devel) — includes the facilities for software development. This includes cc, as, ld, f77, and the Source Code Control System (SCCS) facility.
- 68010 Compiler Module (compile) — includes the 16-bit C compiler and its associated libraries and routines. This module is only on 32-bit systems; on 16-bit systems, this software is in the devel module.
- System Encryption Module (crypt) — includes the encryption program. This module is available only in the United States.
- Graphics Module (graph) — includes all UNIX graphics facilities as unsupported software.

It is assumed that the system software installation process is being performed by the system administrator. During the system software installation process, five users are automatically added to the system: system administrator (sa), automatic multi-user mode (startup), system shutdown operator (shutdown), superuser (root), and maintenance support person (ncrm). No passwords are assigned during system software installation. To assure the security of your system, it is recommended that you set these passwords or have the users set their own passwords immediately after system software installation.

During the installation process, it is very important to answer the user response messages correctly to assure that the system software is installed properly. After each entry for a user response message, press the newline key (NEW LINE) or return key (RETURN) to terminate the entry. When the entry is terminated the cursor is automatically

positioned at the next user response message or the next step in the software installation process is performed. If you enter an incorrect entry and wish to backspace and re-enter the entry; use the control h (while pressing the control key, press the h key) as the backspace key.

When an error occurs at any time during the system software installation, refer to the *Diagnostic Error Codes* chapter in the *Hardware Service* book.

The file system maintenance function is included with the INSTALL tape and with the floppy disk installation package. File system maintenance is used for the check and repair of the root file system. File system maintenance and its use is discussed in the *Superuser Guide* book.

The system software media is also used in the Restore Selected Files process, when doing a restore of a full system backup. Refer to the "Restore Selected Files" section in the *Maintenance and Diagnostics* chapter in this book for further information.

It is extremely important to store this media in a secure and safe place.

Where to Start Installation

If your system was delivered with the operating system (bbase) already installed on the hard disk, when the system is first brought up, a login prompt is displayed prompting you to login as setterm. Refer to the "Turning on the System" section in this chapter for information on how to bring up the system. Continue the system software installation by defining the system console terminal. Note that the system console must be connected to Processor Channel B on the back of the Main Unit in order to complete the system software installation and must not be an uppercase only terminal.

If you have a new system which does not display the setterm login message because the system does not have any software installed on it, follow the instructions beginning at the "Distributed System Software" section of this chapter.

If the system software installation process has been previously performed for the 16-bit system Release 3.01.xx or the 32-bit system Release 1.02.xx and you are updating the system software to a new patch level, such as Release 3.01.yy or 1.02.yy, where yy is greater than xx, then you do

not have to perform this process again. Refer to the "Update Operating System Software" section in the *System Reconfiguration* chapter of this book.

If the system software installation process has been previously performed for a 16-bit system release earlier than Release 3.01.00 (Release 3.00.xx or any version of Releases 1 or 2) or a 32-bit system release earlier than Release 1.02.00 (Release 1.00.xx) and you are updating the system software to a new release level, such as Release 3.01.yy or 1.02.yy, refer to the Release Definition for information on updating the system software.

Distributed System Software

System software installation is provided on either streaming tape, floppy disks, or already installed on the hard disk. The basic installation process for streaming tape and floppy disk is the same; with the only difference being the type of media involved. Follow the installation instructions according to the type of load media involved.

Streaming Tape Media

The complete system software is distributed on streaming tape. Use only the streaming tape distributed with your system.

NCR TOWER	Release n.nn.nn
category:	INSTALL
basename:	operating system
name:	Business Module

Release 3.01.nn or Release 1.02.nn
: The release specifies the version of the software; the nn entry is a decimal number specifying the release level.

category
: The category is the title of the streaming tape contents; for example, INSTALL.

basename
: The basename is operating system for the operating system files or the name of an application such as cobol or multiplan.

name

The name is the contents of the streaming tape; for example, Business Module.

It is very important that the streaming tape is inserted and removed when requested. The streaming tape is inserted in the top, or only, drive. The streaming tape cartridge has a write-protect hole in the right side of the back edge. Before inserting the cartridge in the streaming tape drive check that the arrow is pointing away from the embossed SAFE indicator.

Floppy Disk Media

The complete system software is distributed on floppy disk. Use only the floppy disks distributed with your system. During the system software installation process, you are requested to insert specifically labeled floppy disks. The floppy disks are labeled in the following format:

TOWER	Release n.nn.nn
category:	volume a of b
basename:	operating system
name:	Business Module

Release 3.01.nn or Release 1.02.nn

The release specifies the version of the software; the nn entry is a decimal number specifying the release level.

category

The category is the title of the contents; for example, INSTALL.

Volume a of b

The volume entry specifies the volume number and number of volumes in any category floppy disk set; for example, 1 of 3, 2 of 3, and 3 of 3.

basename

The basename is operating system for the operating system files or the name of an application such as cobol or multiplan.

name

The name is the directory or directories contained on the floppy disk for example; Business Module.

It is very important that the floppy disks are inserted and removed when requested. All floppy disks are inserted either in the left, or only, drive.

Inserting and Removing the Load Media

Inserting and Removing a Streaming Tape

Use the following procedure to install a data cartridge in a tape drive with a quarter turn lever.

1. Turn the lever clockwise 1 quarter turn to unblock the drive unit slot (Figure 1).
2. Pull the cartridge guide to the front.
3. Remove the data cartridge from its container and close the container.
4. With the top edge up and the aluminum plate to your left, slide the cartridge into the drive, keeping the top edge of the data cartridge up against the top guide of the cartridge guide, until it stops; the cartridge guide moves into the drive.
5. Turn the lever counterclockwise 1 quarter turn until it clicks into position; make sure the lever clicks into position.

To remove the data cartridge, turn the lever 1 quarter turn clockwise. Pull the cartridge out and return it to its container and store in a safe and secure place.

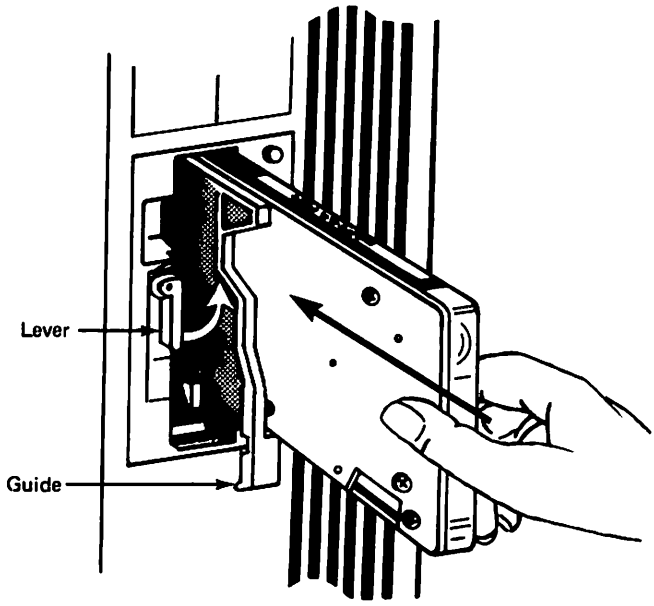


Figure 1 Inserting a streaming tape cartridge

Figure 2 shows another model of tape drive. Use the following procedure to install a data cartridge in the drive.

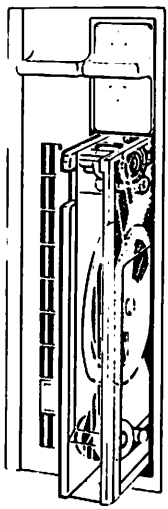


Figure 2 Inserting a streaming tape cartridge

1. Open the door on the front of the unit (if the Main Unit has a door).
2. Remove the data cartridge from its container and close the container.
3. With the aluminum plate to your left side and with the notches in the aluminum plate toward the top edge, slide the cartridge into the drive until it stops.
4. Without releasing the pressure on the data cartridge, move the cartridge to the left with your finger as shown in Figure 3. The data cartridge should click into place. Remove your finger from the data cartridge.
5. Push the lock slide at the top of the tape drive opening down until it clicks into position. The data cartridge is now locked into the drive and is ready to use.

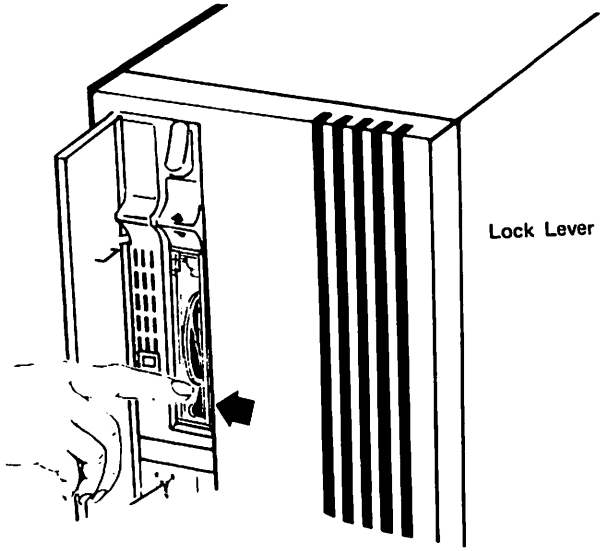


Figure 3 Removing streaming tape cartridge

To remove the data cartridge, pull the lock slide up until it stops. The data cartridge will then partially slide out of the tape drive. Remove the data cartridge and return it to its container.

Inserting and Removing a Floppy Disk

Use the following procedures to install and remove a floppy disk in the drive (Figure 4).

1. Make sure the Main Unit is turned on. Do not install a floppy disk in the drive when the Main Unit is turned off.
2. Open the drive access slot by turning the lever counterclockwise 1 quarter turn to unblock the drive unit slot.
3. Remove the floppy disk from its envelope; do not touch the recording surface.
4. With the label facing the right and the write inhibit slot upward, carefully push the floppy disk into the drive until it clicks into position.
5. Turn the lever clockwise 1 quarter turn to block the drive access slot.
6. Do not turn the lever until the floppy disk is removed.
7. Protect the storage envelope from dirt, liquid, and metal.
8. Do not remove the floppy disk until the floppy disk indicator stops flashing. Turn the lever counterclockwise 1 quarter turn to unblock the drive unit slot.
9. Remove the floppy disk from the drive unit slot and put it in the envelope. Be sure to touch only the jacket and not the recording surface.
10. Put the floppy disk in its original package and store in a safe and secure place.

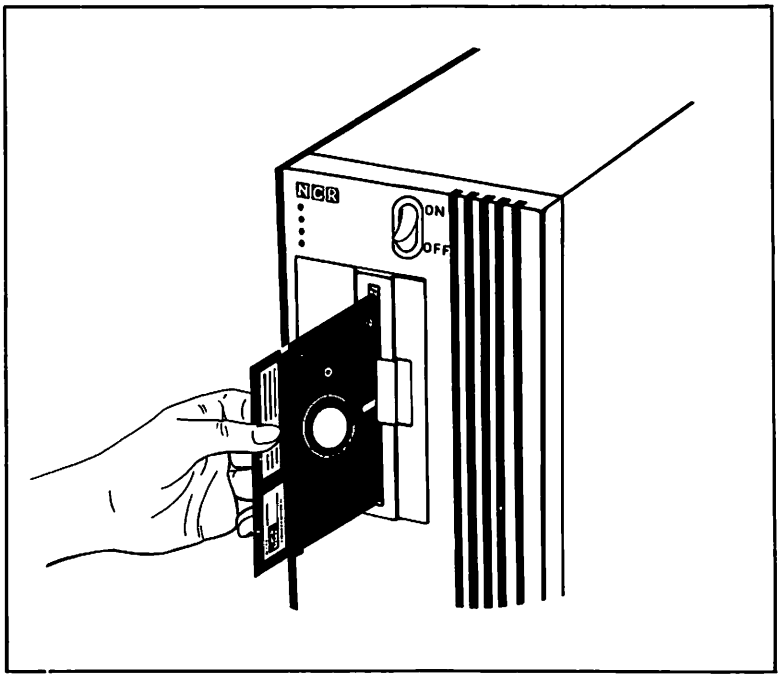


Figure 3 Inserting the floopy disk in the left, or only, drive

Turning On the System

To turn on the system:

1. Turn on the terminal that is connected to Processor Channel B. System software installation is performed from the system console which is the terminal connected to Processor Channel B.
2. Remove the top cover of the Main Unit by lifting it up.
3. Move the MANUAL/AUTO LOAD toggle switch to the correct position.

- If you are installing the system software on a new system, the MANUAL/AUTO LOAD toggle switch should be in the AUTO LOAD position. If the toggle switch is in the MANUAL position, move it to the AUTO LOAD position.
- If you are installing the system software on a system which has an earlier version of system software on it, the MANUAL/AUTO LOAD toggle switch should be in the MANUAL position. If the toggle switch is in the AUTO LOAD position, move it to the MANUAL position.

4. Move the On/Off switch on the Main Unit to the ON position. When the power is applied to the Main Unit, the terminal that is turned on and connected to Processor Channel B displays the basic hardware initialization information and then:

   - If the Main Unit was delivered with the operating system already installed then a login prompt requesting you to login as setterm is displayed. If this occurs, log in as setterm and continue with step 4 of the System Software Installation — Phase 3.
   - If the operating system was not installed at the factory or you are updating to a new release, a message that the loading of the operating system software has failed is displayed. To continue to the Select Startup menu, press the space bar.

     If any other type of message is displayed other than the Select Startup Function menu, refer to the *Start-Up Diagnostics* chapter in the *Hardware Service* book. When the Select Startup Function menu is displayed, continue the system software installation procedures using the Install System section of this book.

5. If the MANUAL/AUTO LOAD toggle switch is in the MANUAL position, move it to the AUTO LOAD position before continuing.

Install System

Description

The install system function permits the initial installation of the system software.

The system software installation must be performed from the system console, the terminal that is connected to Processor Channel B, located on the back panel of the Main Unit.

Procedures

1. From the Select Startup Function menu:

   - If you are installing from either floppy disk or streaming tape:
     - Select item 2 INSTALL SYSTEM.
   - If you are booting from floppy disk, but installing from streaming tape:
     - Select item 3 LOAD.

2. ENTER DEVICE NAME

   - If you are installing the system software from streaming tape:
     - Enter st01 for the device name and press the new line or return key.
   - If you are installing the system software from floppy disk:
     - Enter f501 for device name and press the new line or return key.
   - If you are booting from floppy disk, but installing from streaming tape:
     - Enter f501 for the device name and press the new line or return key.

3. ENTER PATHNAME

   - If you are installing from either floppy disk or streaming tape, the pathname /install is the default; you are not prompted for a pathname.
   - If you are booting from floppy disk, but installing the software from streaming tape:
     - Enter the pathname /install.

4. INSERT SYSTEM MEDIA

- If you are installing from streaming tape:
  - Insert the streaming tape labeled INSTALL into the top, or left streaming tape drive of the Main Unit and press the space bar.
- If you are installing from floppy disk:
  - Insert the floppy disk labeled INSTALL into the top or left floppy disk drive and press the space bar.
- If you are booting from floppy disk, but installing the software from streaming tape:
  - Insert both the floppy disk and the streaming tape labeled INSTALL, in their respective top, left, or only, drives; press the space bar to continue.

5. Terminating INSTALL phase.

- If you are installing from streaming tape:
  - You are prompted to either retension the tape or not retension the tape. It is recommended that you retension the system software installation tape.
- If you are installing from floppy disk:
  - When the LOAD COMPLETE message is displayed, you are prompted to remove the floppy disk labeled INSTALL from the floppy disk drive. Remove the floppy disk. Then, continue as prompted by the terminal display.

System Software Installation — Phase 1

Description

At the beginning of this phase you are asked to check if the installation tape is inserted properly in the tape drive, this assures proper reading of the tape.

Phase 1 of the system software displays 3 steps:

- Step 1 determines the system root device
  - Disk format performed if necessary
- Step 2 creates INSTALL file system
- Step 3 terminates Phase 1

Procedures

Step 1: Determine the System Root Device

The disk device nnnn specifies which device is the root device. The root device is the disk which contains the required operating system files.

- If your system contains a SCSI Unit or an Expansion Unit, then nnnn is the first hard disk in the SCSI or Expansion Unit.
  - Entering the letter y continues the installation process with the specified disk as the root device.
  - Entering the letter n deselects the specified hard disk. The system then selects the first 5.25 inch hard disk, h501, as the root device. If a 5.25 inch hard disk does not exist on the system, then the process terminates. Moving the Reset/Run switch to reset returns you to the Select Startup Function menu.
- If nnnn is h501 then the first 5.25 inch hard disk has been specified as the root device.
  - Entering the letter y continues the installation process with the specified disk as the root device.
  - Entering the letter n terminates the process. Moving the Reset/Run switch to reset returns you to the Select Startup Function menu.

After the determining system disk process, the install file system is created on the disk specified.

Before the install file system is created, the system checks the disk for a valid format.

- If the root disk device is formatted to the system specifications then the message, Disk device is formatted, is displayed and you are prompted Do you wish to reformat?
  - Enter n to continue with the system software installation. The system also recognizes what type of hard disk is being used as the root disk device.
  - Enter y to reformat the disk. Continue with the system software installation after the disk has been reformatted. Refer to the "Formatting Disk Device" section in this chapter.
- If the root disk device is found by the system not to be

formatted; you are prompted Do you wish to format? You should format the disk, in order to avoid possible future problems.

- Enter y to format the disk. The system may detect an invalid disk format because of any one of the following:
  - The disk device was cleared, thus no boot block is present.
  - A new unformatted hard disk was installed.
  - An electrical disturbance destroyed the integrity of the file system.

  Continue the system software installation process at the "Formatting Disk Device" section in this chapter. After the completion of the formatting disk device process, return back to this section and continue with Step 2.
- Enter n to continue without formatting the disk. Continue with the system software installation with Step 2 of Phase 1.

If during the installation process an error occurs where the file system can not be made, then the hard disk must be reformatted. Moving the Reset/run switch to reset returns you to the Select Startup Function menu.

Step 2: Creating Install File System

This process takes approximately 10 minutes to complete.

- If you are installing from streaming tape no operator action is required for Step 2 Creating Install File System.
- During step 2, if you are installing from floppy disks, you are requested to insert and remove the floppy disks. It is important that the floppy disks are inserted and removed when requested, either in the top, left, or only, drive.

  Insert the first floppy disk of multiple volumes of the floppy disks labeled INSTALLATION FILE SYSTEM into the floppy disk drive and press the new line or return key.

  The system prompts you to remove and insert the floppy disks labeled INSTALLATION FILE SYSTEM as needed.

NOTE: It is important to install all the floppy disks labeled INSTALLATION FILE SYSTEM at this time.

After all the INSTALLATION FILE SYSTEM floppy disks have been copied; you are prompted to insert the CHECKSUM FLEX; this floppy disk checks the system to be certain that all the INSTALLATION FILE SYSTEM files have been correctly copied to the hard disk.

Step 3: Termination of Phase 1

After all the INSTALLATION FILE SYSTEM files have been installed, the system displays progress messages which verify that they have been installed. Continue with the System Software Installation — Phase 2.

System Software Installation — Phase 2

Description

Phase 2 of the system software installation displays two steps:

- Step 1 determines system disk from Phase 1, and starts creation of file system.
- Step 2 successfully terminates Phase 2 and reloads the operating system.

Procedures

When the screen with the title SYSTEM INSTALLATION / RESTORE / MAINTENANCE is displayed, then:

- Enter the value 1 Perform System Installation and press the newline or return key to continue with System Software Installation — Phase 2.
- It is also possible at this time to enter either of the other selections, but as you wish to continue with the system software installation enter item 1.
  - Enter item 2 Perform System Restore and press the new line or return key to perform a system restore. Refer to the "Restore Selected Files" section in the *Maintenance and Diagnostics* chapter in this book.
  - Enter item 3 Perform File System Maintenance and

press the newline or return key to access the install file system. Refer to the *Superuser Guide* book for information on file system maintenance.

Step 1: Determining System Disk from Phase 1

The terminal displays progress messages during the determining system disk process. The file system is created on the system disk. This process takes approximately 12 minutes and requires no operator action.

Step 2: Successfully Terminates Phase 2

Phase 2 has been successfully installed. Continue the system software installation process with System Software Installation — Phase 3.

System Software Installation — Phase 3

Description

Phase 3 of the system software installation displays four steps:

- Step 1 copies the base system files.
- Step 2 installs the optional system files. The optional system files are the Release Definition. These files may be removed after printing them.
- Step 3 sets up system files.
- After the system files are set up the system automattically reloads the software, and display a login prompt. You must login as setterm to continue with the system software installation. After you log in as setterm you set the Termcap data base for the terminal being used to install the system software if the terminal being used is any one of the following:

NCR 7900 Model 1	NCR 7901
NCR 7930	NCR Decision Mate V
NCR 796-101 (WorkSaver)	ADDS Viewpoint
ADDS Viewpoint 3A+	ADDS Viewpoint 78
DEC vt100	NCR 7910 (ANSI)
ADDS Viewpoint 90	ADDS Viewpoint 60
WYSE WY-50	IBM PC
DEC vt220	TeleVideo 925
WYSE 85/DEC vt200	

At the completion of Phase 3, your system is configured with only one Winchester disk and either one floppy disk drive or one streaming tape drive, depending on which media was used to install the system software.

If you wish to add other devices to your system (i.e., other Winchester disks, 8-Channel I/O Controller, High Performance 8-Channel I/O Controller, streaming tape drives) you must reconfigure your system at the end of Phase 3.

Procedures

With the terminal displaying the screen with the title, SYSTEM INSTALLATION / MAINTENANCE - PHASE 3:

- Enter item 1 Perform System Installation and press the new line or return key to continue System Software Installation — Phase 3.
- It is also possible to enter item 2 Perform File System Maintenance which permits you to access the install file system for file system maintenance. Refer to the *Superuser Guide* book for further information on file system maintenance.

Step 1: Install the BASE SYSTEM FILES

- If you are installing from streaming tape, no operator action is required to install the BASE SYSTEM FILES.
- The floppy disks labeled BASE SYSTEM FILES must now be installed. Follow the instructions displayed on your terminal to install all volumes of the BASE SYSTEM FILES floppy disks.

  During Phase 3 if you are installing from floppy disks, you are requested to insert and remove the floppy disks. It is very important that the floppy disks are inserted and removed when requested. Insert all the floppy disks when requested either in the top, left, or only, drive.

  When you need to install a floppy disk, the instructions displayed on your terminal include the category BASE SYSTEM FILES and the volume number. Check the label on the floppy disk to make sure you install the correct floppy disk. After you install the

correct floppy disk, follow the instructions by pressing the newline or return key.

Installing each floppy disk requires several minutes. For each floppy disk, the terminal displays the approximate number of minutes. When the system has completed the installation of a floppy disk, the terminal bell rings to let you know you can proceed with the next step. You are prompted when to remove a floppy disk.

The system requests you to respond y (for yes) if you have another volume of the category or n (for no) if you do not have another volume. The installation process begins with volume 1 of your BASE SYSTEM FILES floppy disks and ends with the last volume of your BASE SYSTEM FILES floppy disks.

Step 2: Install the Optional System Files

The optional system files are the Release Definition. After printing the Release Definition, these files may be removed.

- Enter y if the OPTIONAL SYSTEM FILES are to be installed.
  - The INSTALL streaming tape includes the OPTIONAL SYSTEM FILES.
  - The floppy disks labeled OPTIONAL SYSTEM FILES must now be installed. Follow the instructions displayed on your terminal to install all volumes of the OPTIONAL SYSTEM FILES floppy disks.
- Enter n if the OPTIONAL SYSTEM FILES are not to be installed.

Step 3: Set Up System Files

The system automatically sets up the system files. Progress messages are displayed verifying that the Administration Files are installed and that the lost and found directory has been created for file system check.

No operator action is required and the process takes approximately 5 minutes to complete.

Login as setterm

After the system files are set up, or if the operating system was installed at the factory, a login prompt is displayed. Login as setterm to continue with Set the Termcap Data Base for the system console.

- Enter the exact Termcap name from the Termcap definitions displayed for the terminal model you are using to install the system software. After the Termcap name is entered, the system automatically defines the Termcap conventions for that terminal.

  If you entered the exact Termcap terminal name, continue the system installation process by following the instructions given in the "Completing Installation" section of this chapter. The following message is displayed: Successful termination of defining your terminal. Your file system is now installed and operational.
- If a Termcap name for the terminal model you are using to install the system software is not listed in the Termcap definition, enter the Termcap name "unknown". The Termcap data base is not defined and must be defined after the system software installation process.

  If you entered "unknown" to specify that the Termcap name is not defined for your terminal model, continue the system installation process by defining the Termcap conventions for the terminal used to install the system software. Refer to the "Defining Terminals Through Root" section of this chapter. Then, continue with the "Completing Installation" section of this chapter.

Defining Terminals Through Root

Description

The login name root is reserved for the superuser, your system support person. The superuser performs commands through the control of the operating system. It is expected that the superuser has a thorough knowledge of the operating system and is familiar with:

- *User Reference Manual*
- *Programmer Reference Manual*
- *Superuser Reference Manual*

If your system has any terminals other than the terminals defined in the Termcap Definition call your superuser to define these terminals using the following procedure.

Procedures

1. With the terminal displaying the login prompt, enter the login name root.

   :login: **root**

2. After you are logged in as root, define the Termcap data base for any terminal in the system which is not defined in the Termcap Definition. Refer to termcap(5) in the *Programmer Reference Manual.*
3. If the terminal being used by the system administrator to install the system software is a terminal model you defined, add this terminal to the system by editing the /etc/inittab file. Refer to inittab(4) in the *Programmer Reference Manual.* If the terminal being used by the system administrator is listed in Termcap Definition, the terminal name is already in the /etc/inittab file.
4. Log off the terminal by holding down the control key (CONTROL) and pressing the d key, and permit the system administrator to complete the system software installation process. The next procedure is to complete installation.

Completing Installation

Description

Completing installation requires you to:

- Set password for the sa login name
- Set timezone
- Set date and time
- Add devices and distribute file system
- Add printers and terminals
- Update the Operating System Software (install operating system modules and other updates)
- Install applications
- Add users
- Perform full system backup
- Go multi-user

Although you need to do these jobs to complete installation, you may also need to do these jobs at any time during your administration of the system. You may later be required to add other terminals or printers to your system. You may install other applications. You may add other users as needed. All of these jobs are performed using the lead-through menu instructions provided in your system.

Logging in as sa gives you immediate access to your lead-through menu instructions. The rest of this book explains how to perform your system administration jobs. During this installation process, you have used menus to install the system software. With the login prompt displaying, enter the login name "sa".

```
:login:sa
```

Complete the installation of your system using the following procedures. Each procedure step refers you to the correct job description in this book. Follow the instructions displayed on your terminal. If you need help, select the help process from your menu. If you need more help, use the referenced parts of this book.

Procedures

1. Set your sa password.
   - Reference — "Set Password" section of the *System Services* chapter. Each time you login as sa, the password entry is required. This security prevents unauthorized use of your system administration menu operations.
2. Set timezone
   - Reference — "Set timezone" section of the *Start-of-Day* chapter. The timezone should only need to be set once, right after installation of the system software. This process permits you to change the timezone if the system is physically moved to a location in another timezone. The timezone must be set before the date and time is set. You should set the timezone; log off; log back on, then set the date and time this process assures that the date and time are for the correct timezone.
3. Set date and time
   - Reference — "Set date and time" section of the *Start-of-Day* chapter. Each time the system is

shutdown and then brought up the system date and time must be checked and corrected to insure that processes and error logs keep accurate records.

4. Add devices and distribute file system.
   - After completion of Software Installation, your system is configured with only one Winchester disk and one floppy disk drive, or with only one Winchester disk and one streaming tape drive. You must now add any devices that are featured with your system such as other Winchester disks, High Performance 8-Channel I/O Controllers, 8-Channel I/O Controllers, floppy disk drives, or streaming tape devices. This information is located on the Configuration Sticker(s) found on the inside top panel of the Main Unit and/or the Expansion Unit.
   - After adding disk devices, you are given the option of distributing the file system using the system administrator's default configuration or electing to use the "Move a Directory to an Unused Disk" selection in the *System Reconfiguration* chapter of this book.
   - Reference — "Add Devices" and "Move a Directory to an Unused Disk" sections of the *System Reconfiguration* chapter of this book.
5. Add terminals to your system.
   - Adding a terminal to your system permits the system software to access the terminal. Earlier, the terminal you used to install the system software was added through the Termcap definition. You now need to add all other terminals.
   - Reference — "Add a Terminal" section of the *System Reconfiguration* chapter.
6. Add printers to your system.
   - Adding a printer to your system permits the system software to access the printer. You now need to add all printers to your system. Printers may be either serial or parallel printers.
   - Reference — "Add a Printer" section of the *System Reconfiguration* chapter.
7. Install applications.
   - Install the applications; for example, system media labeled with a basename of mp (for Multiplan).
   - Reference — "Install Applications" section in the *System Reconfiguration* chapter.

8. Updating the operating system software.
   - Updating the operating system software; for example, system media with a basename of rbs (for Remote Batch System) or one or more of the operating system modules.
   - Reference — "Update the System Software" section in the *System Reconfiguration* chapter.
9. Add users to your system.
   - Adding a user to your system assigns the user a login name and establishes the jobs the user can perform on the system. You now need to add any users who are to use the computer.

     If you are to use the system for jobs other than your system administration jobs, add yourself as a user. You should only login as sa when you are performing system administration jobs.
   - Reference — "Add a User" section in the *User Accounts* chapter.
10. Perform a complete system backup.
    - Performing a complete system backup saves all of your system software on floppy disks or streaming tapes. The backup is a copy of all of the software you installed including terminals, printers, applications, and users. If a problem occurs which requires the system to be restored, you can use the backup copy. You do not need to do the installation process again.

      If your system has a streaming tape drive, backup to streaming tape. Otherwise, backup to floppy disk.
    - Reference — "Backup Selected Files" section in the *Maintenance and Diagnostics* chapter.
11. Go multi-user.
    - Reference — "Change to Multi-User Mode" in the *Start-of-Day* chapter.

Put each floppy disk or streaming tape used to install and backup the system in its storage package. It is extremely important to store all of the system media in a safe place.

Turn on all printers and all other terminals in your system. After each terminal is turned on, press its newline or return key. The login prompt displays if the terminal was added as a login terminal.

Your system is now fully operational. Continue system software installation with the "Securing the System" section of this chapter.

Securing the System

Description

Securing the system is required to prohibit unauthorized access to the system. The system software installation process has added five users to your system; that is, five valid login names. Each of these five users must login on the terminal you are using for installation and set their private passwords. After a password is set, access to the system is only permitted by the entry of a correct login name and its associated password.

Each password must have at least six characters, only the first eight characters are significant. Also, each password must contain at least two alphanumeric characters and at least one numeric or special character, except the control-d character. All users must remember their passwords. You cannot read the system passwords.

The five users added to your system are:

root
: The login name root is reserved for the superuser, your system support person. This person is expected to have a thorough knowledge of the operating system software based on UNIX.

ncrm
: The login name ncrm is reserved for the NCR-trained technician who services your system.

startup
: The login name startup is reserved for the people in your organization which are permitted to change the run level to multi-user mode without using the system administrator menus. You, the system administrator, can change the run level to multi user using the menus. However, you may not always be present when the system needs to be in the multi-user mode. The startup login permits you to assign the run level change responsibility to one or more other users (each must know the password) without giving the other users

access to your system administrator menus. The password for the login startup must be set by root.

shutdown

The login name shutdown is reserved for the people in your organization which are allowed to shutdown the system. You, the system administrator, can shutdown the system. However, you may not always be present when the system should be shutdown. The shutdown login allows you to assign the shutdown responsibility to one or more other users (each must know the password) without giving the other users access to your system administrator capabilities.

sa

The login name sa is reserved for you, the system administrator. This login allows you access to run the menus which lead you through your system administration jobs.

If the people assigned the login names of root, ncrm, startup, and shutdown cannot set their passwords now, set a password for each of them to secure your system. Each user has the capability of changing his password, and the passwords can be changed at a later time.

Procedures

1. With the terminal displaying the login prompt, have the assigned superuser enter the login name "root".

   :login: **root**

   - When the superuser prompt (#) displays, enter "passwd". When the system prompts with New password:, enter the password. The system prompts with Retype new password:; enter the same password for system verification. The system does not echo the entry for security reasons. If both entries are the same, the password is set to what ever was entered. Refer to passwd(1) in the *User Reference Manual* to set the password for the login startup.

     Logoff the system as the super-user (root) by holding down the control key (CONTROL) and pressing the d key.

2. With the system displaying the login prompt, have the

assigned NCR-trained technician enter the login name "ncrm".

:login: **ncrm**

- Enter n (for no) when asked if you would like to use the menus. When the system prompt ($) displays, enter "passwd". When the system prompts with New password:, enter the password. The system prompts with Retype new password:; enter the same password for system verification. The system does not echo the entry for security reasons. If both entries are the same the password is set to what ever was entered. Refer to passwd(1) in the *User Reference Manual.*

  Logoff the system as the NCR Maintenance Support person (ncrm). To logoff the system, hold down the control key (CONTROL) and press the d key.

3. With the system displaying the login prompt, enter the login name "shutdown".

:login: **shutdown**

- The terminal displays the Shut Down menu, select item 1 for the General User Services menu.
- From the General User Services menu, select item 1 to Set Password.
- When the system prompts with New password:; enter the password. The system prompts with Re-enter new password:; enter the same password for system verification. The system does not echo the entry for security reasons. If both entries are the same the password is set to what ever was entered.
- With the password set, return to the Shut Down menu and select item 5 to End the Computer Session.

After the passwords are set by root, ncrm, and shutdown the system is displaying the login prompt. You may now login and perform your system administrator jobs using the system administration menus.

Formatting Disk Device

Description

Formatting the disk device is a menu-driven process which performs the following functions:

- determines disk type
- formats and verifies the Winchester disks
- marks factory media defective areas
- marks unrecovered hard I/O errors of a logical block
- builds the bad block table

Before the disk device is formatted, the information on the Media Defect Report and the System Error Log is needed.

The Media Defect Report lists the defective areas on each of the hard disks. This report is in the print package sent with each system. Refer to the "Main Unit Unpacking" section of the *Main Unit and Mass Storage Expansion Unit Installation* chapter in the *Hardware Service* book. There is a separate report in the print package for each of the hard disks configured in your system.

The System Error Log report is a collection of the errors logged by the operating system. This report is only needed if your system has previously been in operation and was logging unrecovered I/O errors for a logical block. Refer to the "Inspect the System Error Log" section of the *Start-of-Day* chapter in this book.

Procedures

Group together the Media Defect Report and the System Error Log report by the same disk device name. The disk device names are defined in the Device Names Chart in the *File System* chapter in this book.

Media Defect Information

Use the information on the Media Defect Report sent with your system to answer the user response messages. The disk device name (hnnn) on the Media Defect Report and on this display must be exactly the same. Each user response message is displayed one at a time.

You are asked to enter the following:

- Head Number (0 to x)?

- Cylinder Number (0 to xxx)?
- Byte Number (0 to xxxxx)?

If the information for Bad Block Number n is correct, enter the letter y.

If the information entered is incorrect, enter n. Return and re-enter the bad block data.

Continue with the next bad block or enter the word end when all the information on the Media Defect Report is entered.

System Error Log Information

Use the information on the System Error Log report to answer the user response messages. Each user response message is displayed one at a time. Enter the following:

- Block Number (0 to xxxxxx)?

Enter the word end after all block numbers are entered or if this is the initial system software installation process for your system.

Disk Formatter

When the terminal displays the DISK FORMATTER, full format enabled screen, the following is displayed:

- Drive type:
- Isl to be written from: isl
- User supplied media defect information from: list

If one or more similar disks are in a disk parameter file; you are prompted to select the disk type that is being formatted at this time. This information can be found on the configuration sticker located on the inside top panel of the Main Unit.

After the disk format is successfully completed, the terminal displays progress messages indicating that the file system is being created. When the creating file system process is complete, return to the next step of the process that was being performed before the formatting disk device process was started.

Restart the Installation Process

If either a fatal error condition occurs or the RUBOUT key is pressed at during phase 2 or phase 3 of the system software installation process, the current process being performed is not successfully completed and must be restarted. If a fatal error occurs during phase 1 of the system software installation, you must begin again as if you had not started the installation process. This also is true if you were in the disk format stage.

- Do you wish to restart at this time (y/n)?
  - Enter y (for yes) if the system software installation process is to be automatically continued at the beginning of the Phase which was currently being installed. Refer to the "Automatic Restart Procedure" section of this chapter.
  - Enter n (for no) if the system software installation process is to be continued at a later time. Refer to the "Manual Restart Procedure" section in this chapter.

Automatic Restart Procedure

Use the following procedure to automatically restart the system software installation process at the beginning of the Phase n which was currently being installed, where n is the phase number.

- If n is Phase 1, refer to the "Installation - Phase 1" section of this chapter to continue the system software installation process.
- If n is Phase 2, refer to the "Installation - Phase 2" section of this chapter to continue the system software installation process.
- If n is Phase 3, refer to the "Installation - Phase 3" section of this chapter to continue the system software installation process.

Manual Restart Procedure

Before the installation process is terminated, the system automatically performs an orderly shut down. After the system is shut down, the following procedure to restart the installation process must be followed to insure proper software installation and integrity of your system.

1. Wait until the device indicator is off and remove any installation mdeia from the floppy disk or streaming tape drive.
2. Move the On/Off switch on the Main Unit to the OFF position.
3. Only the last successfully completed Phase was installed. To restart the installation process at the Phase which was currently being installed, use the following procedure for that phase.
   - If Phase 1 is to be restarted, refer to the "Phase 1 Restart" section of this chapter.
   - If Phase 2 is to be restarted, refer to the "Phase 2 Restart" section of this chapter.
   - If Phase 3 is to be restarted, refer to the "Phase 3 Restart" section of this chapter.

Phase 1 Restart

Use the following procedure to restart the system software installation process if Installation - Phase 1 was not successfully completed.

1. Restart the installation process as if Phase 1 were never performed.
2. Start the installation process with the procedures described in the "Turning On the System" section of this chapter.

Phase 2 Restart

Use the following procedure to restart the system software installation process if Installation - Phase 2 was not successfully completed.

1. Move the MANUAL/AUTO LOAD toggle switch to the MANUAL position
2. Move the On/Off switch on the Main Unit to the ON position.
3. The Select Startup Function menu is displayed.
   - Insert the installation media labeled INSTALL into the top, left or only drive.
   - From the Select Startup Function menu, select item 3 LOAD.
4. ENTER DEVICE NAME
   - If you are installing from streaming tape, enter device name st01 and press the new line or return key.

- If you are installing from floppy disk, enter the device name f501 and press the newline or return key.

5. ENTER PATHNAME The root file system is created on the disk with the largest capacity. Enter the pathname of the root directory according to the disk(s) configured on your system.
   - If your system has at least one disk in a SCSI Unit, enter the pathname /unix.sd0.10 and press the newline or return key.
   - If your system has at least one disk in an Expansion Unit, enter the pathname /unix.xl10 and press the newline or return key.
   - If your system has one or more 5.25 inch Winchester disks, enter the pathname /unix.at10 and press the newline or return key.
6. PRESS SPACE BAR TO EXECUTE - ANY OTHER KEY TO RETURN TO STARTUP MENU
   - Press the space bar to load the files. After the files are loaded, the login prompt is displayed.
7. Move the MANUAL/AUTO LOAD toggle switch back to the AUTO LOAD position.
8. With the login prompt displaying, start the installation process as if Phase 2 was never performed. Restart the installation process with the procedures described in the "Installation - Phase 2" section of this chapter.

Phase 3 Restart

Use the following procedure to restart the system software installation process if Installation - Phase 3 was not successfully completed.

1. Move the MANUAL/AUTO LOAD toggle switch to the MANUAL position.
2. Move the POWER switch on the Main Unit to the ON position.
3. The Select Startup Function menu is displayed.
4. From the Select Startup Function menu, select item 3 LOAD.
5. ENTER DEVICE NAME Press the newline or return key. The system automatically loads the assumed device name.
6. ENTER PATHNAME Press the newline or return key. The system automatically loads the assumed pathname of the root directory.

7. PRESS SPACE BAR TO EXECUTE - ANY OTHER KEY TO RETURN TO STARTUP MENU Press the space bar to load the files. After the files are loaded, the login prompt is displayed.
8. Move the MANUAL/AUTO LOAD toggle switch back to the AUTO LOAD position.
9. With the login prompt displaying, start the installation process as if Phase 3 was never performed. Restart the installation process with the procedures described in the "Installation - Phase 3" section of this chapter.

System Start Up

Overview

This chapter provides a reference for the system daily start up procedures. The daily start up procedures reference includes the interaction associated only with the Main Unit control panel and the start up messages associated with the system console. Detailed peripheral operation and set up information is found in the *System Operation* book within the Peripheral Operation tab.

At the time you begin a daily start up, it is assumed that the following system conditions have been met.

- The operating software is installed on a system Winchester disk(s). Refer to the *System Software Installation* chapter in this book.
- System operation was terminated by a shutdown process. Refer to the "Shut Down Immediately" section in the *Shut Down* chapter in this book.

Starting the System

Prepare the system peripherals for operation by turning them on, enabling the proper modes, installing and setting forms, and so on. For the system console, make sure that it is on and in the on line, roll screen, and no auto line feed modes. If your system includes any NCR 7900 Model 1 terminal, press any key on the keyboard, after enabling the proper modes, to enable its communications logic.

Move the Main Unit power switch from Off to On.

This action causes the system to perform its predefined process. The predefined process depends on whether the system is an attended system or is an unattended system. An unattended system is one on which the optional

unattended operating system feature is installed.

Attended Operating System

The start up process outputs progress messages to the system console. The time required for the start up process is approximately two minutes. When the start up process is complete, the login prompt is displayed on the system console and the system is in single user mode.

To put the system in multi-user mode use either the system administrator menus or the login startup.

If the system administrator menus are to be used, refer to the "Enter Multi-User Mode" section in the *Start-of-Day* chapter in this book or the "Change to Multi-User Mode" section in the *System Reconfiguration* chapter in this book.

If the login startup is used:

login: **startup**

The system automatically enters multi-user mode.

Unattended Operating System

The start up process outputs progress messages to the system console log file. The time required for the start up process is approximately two minutes. When the start up process is complete, the system automatically enters multi-user mode.

Completing Start Up

For both attended and unattended systems, a file system check is performed. After the system enters multi-user mode, the login: message is broadcast to all assigned login terminals, and the system is fully operational and ready for any user to login.

If start up fails, check the Memory Power Switch on the rear of the Main Unit. The Memory Power Switch should always be in the on position. If this switch is On, the content of memory is maintained when the control panel On/Off switch is turned off. If the Memory Power Switch is off, the content of memory is lost when the control panel On/Off switch is turned off. NOTE: The content of memory is maintained by the battery during a power failure regardless of the setting of Memory Power Switch.

Menu Operations

Overview

The operating system offers friendly menu lead-through interfaces which include the following features in the System Administrator menu.

- help information screens
- minimum number of key entries to perform a selected process
- automatic cursor positioning
- easy-to-read item selections
- data entry correction
- choice of two menu levels of return
  - main menu level
  - previous menu level
- automatic return to current menu level after selected process performance

How to Use the Menu

The System Administrator menu displays when you login as **sa** and enter the correct password.

login: **sa**

The System Administrator menu has four types of displays:

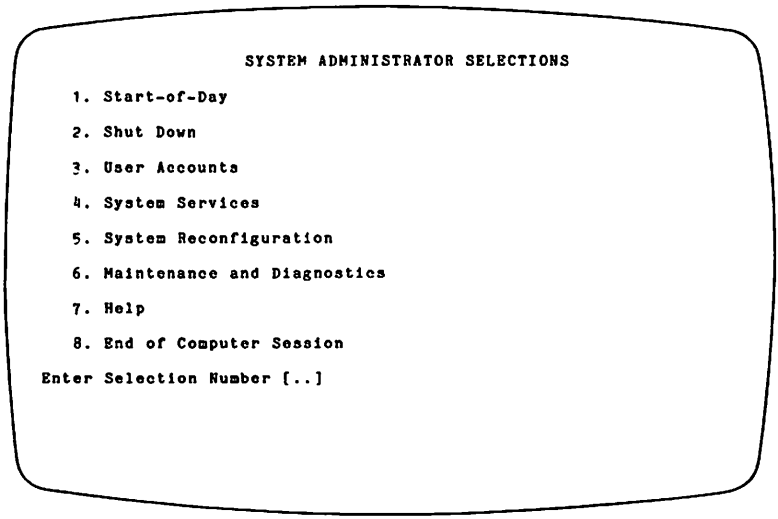
- item selection menu
- toggle selection menu
- data entry menu
- help information screens

Each type of menu display is identical in the way the selection of a process is entered. When any of the menus are first displayed, the cursor is automatically put at the first

required entry position in the entry field. The entry field is identified by one or more dots enclosed by an open bracket ([) and a closed bracket (]). The dots represent the maximum number of entry positions. If the maximum number of entry positions is used on any line, the operating system automatically terminates the line and either puts the cursor at the next menu entry position or the specific process is performed. If the maximum number of entry positions is not used, press the newline key (NEW LINE) to terminate the entry in the entry field. After the entry is terminated, the cursor is put at the next menu entry position or the specific process is performed. Any dots remaining in the entry field after the entry is terminated are ignored by the operating system.

Item Selection Menu

An item selection menu performs two types of functions when an item is selected. It either continues with the display of another menu or the selected process is performed. An example of an item selection menu is as follows.

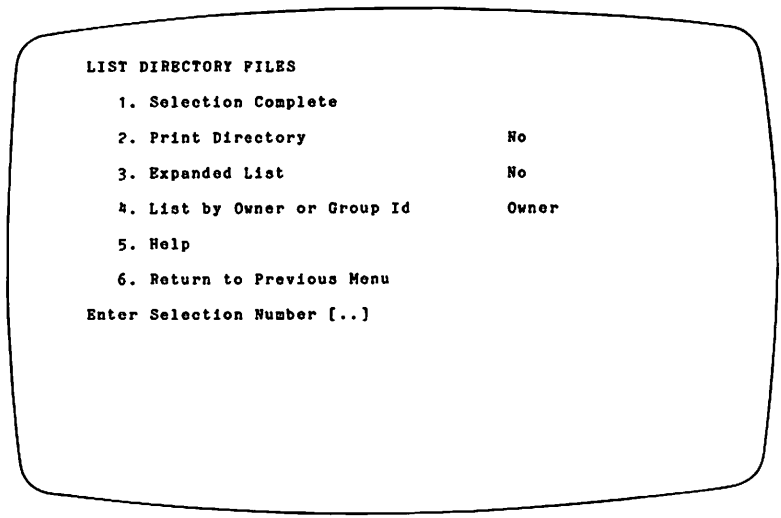


For an example, to select item 4 System Services, enter 4 in the entry field. After 4 is entered, the System Services menu is displayed.

Toggle Selection Menu

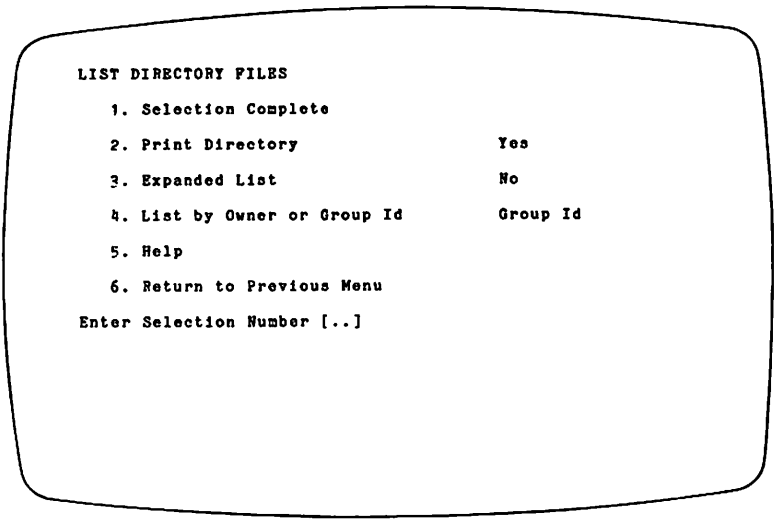
A toggle selection menu sets the values to be used for a selected process. To change any of the initial values of an item, enter the corresponding item number. After an item number is entered, the new set value is displayed. After a value is set, it may be changed back to the previous setting by entering the same item number.

Most of the values of the items are set to either Yes or No. If a value other than Yes or No can be set, then both of the values are identified in the description of the item. Only after the values are set, enter item 1 Selection Completion to continue the performance of the selection process. An example of a toggle selection menu is as follows.



For an example, to change the initial values of item 2 Print Directory and item 4 List by Owner or Group Id, enter 2 then enter 4 in the entry field. After both items are changed, the menu displays the new set values as follows. If the values are set the way you want them, enter item 1

Selection Complete to continue with the selection process.



Data Entry Menu

The data entry menu enables specific data entry fields of a process to be identified. The data entry fields, for example, may be file names, directory names, and messages. After the data entry fields are entered, the operating system gives you a choice to indicate if the entries are correct or if any entry needs to be corrected. If the entries in the data entry field are correct, entering y (for yes) continues the performance of the selected process. If any entry in any data entry field is to be corrected, entering n (for no) returns the cursor to the selection number in the data entry menu. With the cursor positioned at the selection number entry field, enter 3 Enter Data. Then, the newline key (NEW LINE) or return key (RETURN) may be pressed one or more times to position the cursor at the entry field that is to be corrected or the entries in the entry fields may be re-entered. When the newline or return key is pressed, the entry in that entry field is not changed. An example of a

data entry menu is as follows.

```
                        DELETE A FILE

    1 Help
    2 Cancel command and return
    3 Enter data
Enter selection number [.]

Enter name of the file to be deleted
[.............................................]

Is the above information correct? Enter "y" for yes or "n" for no [.]
```

For an example, the following data entry menu shows an entry in each of the entry fields.

```
                        DELETE A FILE

    1 Help
    2 Cancel command and return
    3 Enter data
Enter selection number [3]

Enter name of the file to be deleted
[dept/account/jones..........................]

Is the above information correct? Enter "y" for yes or "n" for no [y]
```

Help Information Screens

A help information screen is available in each of the System Administrator menus. All help information screens are selected by entering the item number with the item description of Help.

The help information screen displays an explanation of each process that may be selected from the current menu or each entry that may be entered in the current menu. Also any prerequisites that need to be completed before the process can be run are stated. After the help information screen displays, press the newline key (NEW LINE) or the return key (RETURN) to return to the current menu. If the help information screen contains more than one page the capability to move from one page to another page, backwards or forwards, is provided. Entering a control b (press the b key while pressing the control key) displays the previous page while entering a control f displays the next page. To terminate the listing enter the letter x. When the current menu is displayed again, the cursor is re-positioned at the first required entry position in the entry field. If the help information screen is selected after entries have been made in the entry field of the current menu, the entries are erased when the system returns to the current menu.

End Computer Session

Ending the computer session terminates the current computer session of the system administrator. This prevents unauthorized users from gaining access to the system. It is recommended for the security of your system and the integrity of the file systems to end each computer session after the system administrator procedures are completed.

Start-of-Day

Overview

The *Start-of-Day* chapter describes all the processes associated with the start-of-day selection from the System Administrator's main menu.

These selections include:

- Setting the current date and time, and setting the timezone
- Preparing the messages associated with the system
- Inspecting the system error log
- Mounting or unmounting additional file systems
- Specifying a time to execute processes during the day
- Changing the user mode to multiuser

The job descriptions in this chapter are in alphabetical order.

Job Descriptions

Enter Multi-User Mode

Entering the multi-user mode permits the system to return to a normal operating state after performing in the single user mode or when bringing up the system from a shutdown state.

The system performs a file system check and repair when entering the multi-user mode. You should refer to the "Check or Repair the File System" section in the *Maintenance and Diagnostics* chapter in this book for further information.

Execute Process at a Specified Time of Day

Performing execute a process at a specified time of day permits an executable file to be performed at a specific time on the current system day. The process performs without

any direct user intervention. When a process is performed, the output should be directed to a file for storage. The full pathname of the executable file should be entered when specified.

Inspect the System Error Log

Inspecting the system error log permits the collected errors logged by the operating system to be displayed to the terminal, listed on the printer, or displayed on the terminal and listed on the printer at the same time. The system error log may record the following activity:

- time of the earliest and latest errors
- total number of errors of one or more types
- total number of recovered errors
- total number of unrecovered errors
- I/O operations on the system devices
- miscellaneous software type errors
- miscellaneous hardware type errors

The system error log is a file which increases in size each time an error is logged. This file grows dynamically and should be cleared at least once a week.

Mount Additional File Systems

Mounting additional file systems makes the mounted file system an extension of the root file system (see the *File System* chapter in this book). The mount directory name chosen must be unique from those file systems which are automatically mounted at start-of-day, otherwise access to these start-of-day file systems is inhibited.

Device names are listed within the Device Names Chart in the *File System* chapter in this book.

NOTE: Remember to unmount any mounted file systems before shutting down the system.

Prepare the Login Banner

Preparing the login banner enables one line of text to be set. This banner is displayed each time a terminal displays the system login prompt. The login banner is used primarily to

specify your company or organization name.

Prepare the Message of the Day

Preparing the message of the day permits a specified message to be displayed to a terminal after a valid user has logged onto the system.

Prepare the Printer Message

Preparing the printer message enables a specified message to be displayed as the banner for each file spooled to the printer.

Set the Date and Time

Setting the date and time permits the current setting of the system date and time to be either checked or changed. The current setting of the month, day, hour, minute and year is displayed in each entry position when the data entry screen displays.

Set Timezone

Set timezone is usually performed once; after the initial installation of the operating system software during the "Completing Installation" phase.

The operating system uses a universal time base for its clock that is adjusted for your local timezone by a constant. The universal time base used is Greenwich, England time.

Unmount File Systems

Unmounting file systems logically removes the mounted file system from the root file system. Enter the device name used to mount the file system.

Shut Down

Overview

The *Shut Down* chapter describes the jobs (processes) related to shutting down the system in an orderly manner. Also described is changing the user mode of the system.

The job descriptions are in alphabetical order.

Job Descriptions

Broadcast Shut Down Message to all Users

Broadcasting a shut down message permits a message to be sent to all users currently logged on the system before the shut down procedure is performed. It is recommended to include in the message the exact time of shut down and the approximate time of system bring up.

Enter Multi-User Mode

Entering the multi-user mode permits the system to return to a normal operating state after performing in the single user mode or when bringing up the system from a shut down state.

The system performs a file system check and repair when entering the multi-user mode. You should refer to the "Check or Repair the File System" section in the *Maintenance and Diagnostics* chapter in this book for further information.

Enter Single User Mode

Going from multi-user mode to single user mode puts all terminals in an inactive state, except for the terminal on which the command was selected. It is recommended to go into the single user mode before single user procedures such as file system backup and file system repair are performed. When the system goes into a single user mode:

- any user login session is terminated
- all processes of the terminated user login session are terminated
- all other users are prevented from logging in on the system

It is recommended that you send a shut down message to all users before this procedure is performed.

Shut Down Immediately

Shutting down the system permits a controlled system shut down. When the system shut down procedure is selected, all other users are prevented from logging in on the system and the number of current users on the system is displayed. After the number of users display, the system administrator has a choice to immediately bring the system down or send a pre-set system shut down message to all users currently logged on the system. When the system is shut down, the system automatically:

- terminates any user login session
- cancels the active processes
- unmounts the file systems
- updates the file system

User Accounts

Overview

The *User Accounts* chapter describes the jobs you perform that are related to the user. Choosing user accounts permits you, as the system administrator, to do the following:

- Add users
- Delete users
- Update a user's application selections
- List a user's menus
- List all user accounts
- Perform user login accounting
- Remove a user's password
- Change a user login name

The job descriptions in this chapter are in alphabetical order.

Job Descriptions

Add a User

Adding a user permits the system administrator to define the access configuration for each user. Each user is added to the system by specifying a unique user name and the type of user. The types of users are the application user, the office procedures analyst, the system support analyst, and the application developer.

The application user and the office procedures analyst have menu-driven interfaces which include selected applications and system services. The applications are added to the user by either a selection menu where each specific application package is selected or by specifying the menus of an existing user. The selections are available only if the applications are installed on the system. The system

service functions are installed when the user is added.

The system support analyst directly interfaces with the operating system. The system support analyst uses data capture, program trace, and support tools to analyze and isolate problems.

The application developer also directly interfaces with the operating system. The application developer is a member of the programming staff who uses application generation tools and high level languages.

Change a User's Login Name

Changing the login name of a user changes the required login entry for that user to enter when logging on the system.

Delete a User

Deleting a user removes the specified user from further access on the system. When the user is removed, all directories and files associated with the user's account are also removed. It is recommended to backup the directories and the files before deleting a user.

List All User Accounts

Listing all the user accounts lists each account in the system in either a compact form or an expanded form. The compact form specifies for each user the user name and the identification number. The expanded form specifies for each user the user name, the user identification number, the group identification number, and the user directory. The listing of the user accounts may be displayed to the terminal, or displayed to the terminal and listed on the printer at the same time.

List a User's Menus

Listing a user's menus lists each menu assigned to the specified user. The user must be an application user or an office procedures analyst. The listing of the menus may be displayed to the terminal, or displayed to the terminal and

listed on the printer at the same time.

Perform User Login Accounting

Performing the user login accounting allows the system administrator to display to the terminal, list on the printer, or display and list at the same time a system login accounting report that contains the following information.

- who has logged in the system
- what terminals are being used
- how long a user stays logged in the system
- when the system was booted
- when a system crash occurs and other system activity

The user login accounting report specifies the user name, the terminal name, the login date and time, and total time on the system. Three different reports may be generated to display:

- system login accounting of all users
- system login accounting from a specific terminal
- system login activity from a specific user

This process displays the specified login activity from the last time the log was cleared to the current date and time. The user login accounting is kept in a file which increases in size each time any user logs in the system. This file grows dynamically and should be cleared at least once a week.

Remove a User's Password

Removing the password of a user removes his or her requirement of entering a password when logging on the system.

Update a User's Application Selections

Updating the application selections for a user permits application packages to be either added to or removed from an application user or an office procedures analyst. The application selection process may be either through a selection menu where each specific application package is selected or by specifying a menu-driven user where an exact

copy of the user's applications is automatically made. The application selections are available if the selections are installed on the system.

System Services

Overview

The *System Services* chapter describes the jobs related to the file system as a whole. It permits you to perform jobs concerning directories, files, general user services, process status and control, and printer status and control.

The job descriptions in this chapter are in alphabetical order.

Job Descriptions

Allow or Deny Message Reception

Allowing or denying message reception permits you to specify whether or not other system users have the write permission to send messages to your logged on terminal.

Backup Selected Files

Backing up selected files permits you to backup files while the system is in the multi-user mode. Backup selected files is used a precaution in case files or directories are lost or corrupted. Care should be taken that the directories or files being backed up are not in use. For example, if a /usr/acct directory is being backed up, that user should not be logged into the system. This menu selection item is not available for Release 1.02, refer to the "Maintenance and Diagnostics" chapter for more information on backing up selected files.

Cancel a Process

Canceling a process permits a specific process to be terminated by specifying the process identification number or all processes associated with a specific terminal by specifying the terminal name.

Change a Spooled File

Changing a spooled file permits the destination print device, the print priority, the number of copies, and the print form to be changed for a file in the spool queue. When a file is to be changed, the spool id of the file is specified, not the pathname of the file. Refer to the "Display Spooler Status" section in this chapter.

Change Directory Access Permissions

Setting the access permissions for a directory permits the read, write, and list files permissions to be set separately in each of the owner, group, and everyone levels. This process also permits the ownership of a directory to be changed to another user or group.

Change File Access Permissions

Setting the access permissions for a file permits the read, write, and execute access permissions to be set separately in each of the owner, group, and everyone levels. The process also permits the ownership of a file to be changed to another user or group.

Change Files Access Permissions

Setting the access permissions for a group of files permits the read, write, and execute access permissions to be set separately in each of the owner, group, and everyone levels. The process also permits the ownership of a group of files to be changed to another user or group.

The file name pattern may use metacharacters to represent a pattern of characters. The metacharacters are:

- * — the asterisk (*) matches any string of characters
- ? — the question mark (?) matches any single character
- [ ] — the set of characters [ ] matches any of the enclosed characters

If the files are outside the current directory, the full pathname of the file name pattern is required.

Change the Current Directory

Changing the current directory permits the current working directory to be changed to another working directory. If the directory is outside the current directory, the full pathname of the directory is required.

Check Size of System Log Files

Checking the size of system log files reports the disk block size of the following logs:

- Application Software Log
- System Error Log
- User Login Accounting Log

This report may be listed on the terminal or listed on the terminal and printer. The option to clear these logs is available after viewing the size.

Compare Two Files

Comparing two files permits the contents of one file to be compared against the contents of another file. If the contents in both files are the same, the system displays that the files are identical. If the contents are not the same, the system displays only the first occurrence where the contents are different.

Control Printer Device

Controlling the print device permits the current spool file being listed by a specific line printer to be stopped, started, or restarted at a specific starting page number. Refer to the "Display Spooler Status" section in this chapter.

Control Printing of Spooled Files

Controlling the printing of spooled files permits the files to be either put in a suspended state keeping them from being printed or taken out of the suspended state to be printed. The spool file that is to be controlled may be specified by the spool id of the file, the terminal where the file was spooled, the destination device where the file is to be printed, and the user name of the file. The spooled file is automatically removed from the spool queue after completion of the print sequence. Refer to the "Display Spooler Status" section in this chapter.

Copy a File

Copying a file copies a source file to a target file. After the source file is copied, the source file still exists. If the target file already exists, the contents of the target file are deleted before the contents of the source file are copied; the system prompts the user for permission to do this procedure. If the

target file does not exist, it is created and the contents of the source file are copied to the target file.

Copy Files to an ANSI Format Tape

Copying files to an ANSI format tape permits you to copy a file or directory from the UNIX file system to an ANSI format tape. This functions permits you to interchange data or source files between the UNIX operating system and other operating systems which conform to the ANSI standard. This menu selection item is not available for Release 1.02.

Copy Files to Another Directory

Copying files permits a specified group of files with the same file name pattern to be copied to another directory. The source files are not affected by the copy process and the files still reside in the original directory. If the files copied exist with the same file names in the target directory, the files in the target directory are overwritten; the system prompts the user for permission to do this procedure. If the files copied are created new in the target directory, the files are known by the same file names as in the original directory.

Groups of files may be specified by using metacharacters within a pathname to indicate a pattern of names to be matched. Valid metacharacters are:

- * — the asterisk (*) matches any string of characters
- ? — the question mark (?) matches any single character
- [ ] — the set of characters [ ] matches any of the enclosed characters

If the files are outside the current directory, the full pathname of the file name pattern is required. If the files are to be created outside the current directory, the full pathname of the directory is required.

Create a Directory

Creating a directory permits a directory to be created by specifying a directory name. Enter a unique directory name of the directory that is to be created. If the directory is outside the current directory, the full pathname of the directory is required.

Delete a File

Deleting a file removes a specified file from a directory. If the file is outside the current directory, the full pathname of the file is required.

Delete Files

Deleting files permits a specified group of files to be deleted from a directory.

Enter the file name pattern or directory name pattern that represents the group of files or directories that is to be removed. The file name pattern or directory name pattern may use metacharacters to represent a pattern of characters. The metacharacters are:

- * — the asterisk (*) matches any string of characters
- ? — the question mark (?) matches any single character
- [ ] — the set of characters [ ] matches any of the enclosed characters

If the file or directories are outside the current directory, the full pathname of the file name pattern or the directory name pattern are required.

Delete Spooled Files

Deleting files from the spooler may be performed by specifying the spool id of the file, the terminal where the file was spooled, the destination device where the file is to be printed, or the user name of the file. Refer to the "Display Spooler Status" section in this chapter.

Display a File

Displaying a file permits either a text file or an object file to be listed. For a text file, the contents are listed in character format. For an object file, the contents may be listed in hexadecimal format, octal format, or character format. The listing of a file may be displayed to the terminal, listed on the printer, or displayed and listed at the same time.

Display All Active Processes

Displaying all the active processes of the system permits the following to be displayed to the terminal, listed on the printer, or displayed and listed on the printer at the same time.

- process identification number
- terminal name
- central processing unit (CPU) time
- program name

Display All Active Users

Displaying all the active users on the system permits the following to be displayed to the terminal, listed on the printer, or displayed and listed on the printer at the same time.

- user name
- terminal name
- date and time logged on

Display a Spooled File

Displaying a spooled file enables the contents of a file in the spool queue to be displayed to the terminal. When a file is to be displayed, the spool id of the file is specified, not the pathname of the file. Refer to the "Display Spooler Status" section in this chapter.

Display Current Terminal Name

Displaying the current terminal name displays the name of the terminal you are currently using.

Display Date and Time

Displaying the date and the time permits the current system date and time to be displayed to the terminal.

Display File Information

Displaying information about a file permits the following to be displayed to the terminal or displayed and listed on the printer at the same time.

- type of file
- ownership of file
- access permission of file
- last update of file
- byte size of file

Display Spooler Status

Displaying the spooler status permits the following information about each file in the spool queue to be displayed:

SPL ID — internal spool file id consisting of randomly generated names
USER FILE — name of spooled file
WRK STN — terminal number from which the spooled file was created
WHO — user or login name under which the spooled file was created
DESPRT — destination device name where the spooled file is to be printed
COPIES — number of copies of the spooled file to be printed
PAGES — number of pages to be generated in each copy of the spooled file
LI — lines per inch
FORMS — special forms name selected by the user
PR — print priority of the spooled file
PRTSEQ — current location in the spool queue
STAT — current status of the spooled file. The status values are:

- hold — the spooled file is on hold and is not printed until released
- print — the spooled file is being printed
- wait — the spooled file is ready to print and waiting for the print device to become available

Display the Current Directory

Displaying the current directory permits the full pathname of the current working directory to be displayed.

Find a File by Name

Finding a file permits an expression to be used to locate a file with minimum effort. The file can be searched for by specifying one of the four search modes.

- file name
- owner name
- group name
- file size

The full pathname of each file found matching the specified expression of the search mode is displayed.

Find an Expression in a File

Finding an expression in a file permits an expression to be located in a file. Once the expression is found, the line containing the expression in the file is displayed.

Find an Expression in Files

Finding an expression permits an expression located in a group of files to be located with minimum effort. Once the expression is found in a file, the pathname of the file and the line containing the expression are displayed.

The file name pattern may use metacharacters to represent a pattern of characters. The metacharacters are:

- * — the asterisk (*) matches any string of characters
- ? — the question mark (?) matches any single character
- [ ] — the set of characters [ ] matches any of the enclosed characters

If the files are outside the current directory, the full pathname of the file name pattern is required.

Inspect the System Error Log

Inspecting the system error log permits the collected errors logged by the operating system to be displayed to the terminal, listed on the printer, or displayed to the terminal and listed on the printer at the same time. The system error log may record the following activity:

- time of the earliest and latest errors
- total number of errors of one or more types
- total number of recovered errors
- total number of unrecovered errors
- I/O operations on the system devices
- miscellaneous software type errors
- miscellaneous hardware type errors

The system error log is a file which increases in size each time an error is logged. This file grows dynamically and should be cleared at least once a week. The error groups are parity errors, interrupt errors, start up subsystem errors, unrecovered errors, and specify device errors.

Log sequence number

The log sequence number identifies the number of errors that were recorded before this error. This field is set to zero at start-up time and each error event increments the number by one.

Log error time

The log error time contains the date and time when the error was generated. If the error occurs before the Time-Of-Day clock is initialized, the error time is set to FF.

Process name/process identification

The process name identifies the process or task that generated the error record. The process identification contains a name and an ID value. The following are examples of names that are associated with specific software modules.

- SSxx — Read-only Memory (ROM) resident Start Up Subsystem routines
- xxx0 — ROM resident Start Up Diagnostic programs
- xxx1 — Media resident In-Service Diagnostic programs
- xxx2 — Media resident In-Service Diagnostic programs
- xxxV — Operating system software driver programs

In the previous examples, the x's represent alphanumeric characters that identify unique subroutines or programs within the specified level of software.

The process identification value permits the user to determine the difference between two tasks that have the same task or process name. The operating system assigns the identification value. Valid values are from 0 to 7530. Software modules that are not proper operating system processes are assigned an identification value of zero. All start-up subsystem diagnostic programs are assigned an identification value of zero.

Type of error

The type of error provides a general description of the type of error that is being reported.

- HARDWARE

- OPERATOR
- MEDIA
- SOFTWARE
- THRESHOLD
- NON-ERROR EVENT

The error type provides a general description of the error type being reported.

- Teletype (tty)
  - A channel on the 8-Channel I/O Controller failed
  - Framing errors on the 8-Channel I/O Controller port and the process or tty port
  - Input buffer overflow on 8-Channel I/O Controller port
  - Parity errors on the 8-Channel I/O Controller port and the processor tty port
  - Overrun errors on the 8-Channel I/O Controller port and the processor tty port
  - 8-Channel I/O Controller failure
- 5.25 Inch Disk
  - Board not available (i.e. I/O check fails)
  - Errors during controller initialization
  - Errors during disk drive unit initialization
  - Errors during formatting
  - Expiration of protective timers
  - Reach-after-write verification failures
  - Retries
  - Unrecovered read/write errors
- 8 Inch Disk
  - Bad block map read error
  - Boot block read failure
  - Disk sequence error
  - Drive reset failure
  - Drive faulted
  - Drive won't come ready
  - Format error
  - Hard ECC error
  - No board in system
  - Read seek error/header 2
  - Seek error/header 1
  - Soft ECC errors
- Operating System
  - Block device not in table

- Panic bus error in kernel space
- Panic call out array exhausted
- Panic can not read super block
- Panic canonical queue
- Panic double bit error
- Panic I/O error in swap
- Panic no device table
- Panic no file system
- Panic not enough memory for MPCA
- Panic not enough page maps for DMA
- Panic out of process table entries
- Panic out of swap space
- Panic running dead process
- Panic unexpected trap in kernel space

Error code 1

The error code 1 identifies the error. Each error code 1 value is generated by a start-up diagnostic program and has a unique value that is not repeated by any other diagnostic; however, error code 1 values that are generated by other software modules may not be unique. To know the meaning of any error code 1 value, be sure to know the process name that is associated with the error code 1 value.

Non-error events that are recorded in the error log use this field as the primary event code. Refer to the *Diagnostic Error Code* chapter in the *Hardware Service* book.

Error code 2

The error code 2 provides additional information about the error. The meaning of all error code 2 values is determined by the process name and error code 1 values in the error record.

The error code 2 field is set to zero if it has no specific meaning for this error. For a list of error codes, refer to the *Diagnostic Error Codes* chapter in the *Hardware Service* book.

Error severity/retry count

The error severity/retry count indicates how the error influenced the operation of the system. The error severity contains one of the three following values and the retry count identifies the number of times the software tried the failing operation.

- SOFT error
- HARD, DEGRADED error

- HARD, CRITICAL error

SOFT indicates that an error occurred, but the operation was successful after the software tried that operation one or more additional times. HARD indicates that the operation was not successful after some specified number of tries, or that because of the type of error, it was not useful to try the operation again. DEGRADED indicates that the system had an error, but that some function(s) can still be performed. CRITICAL indicates that the failure prevents the system from being used and that processing must stop.

Hardware name 1

The hardware name 1 identifies the ASCII name of the hardware element that is the most usual cause of the generated error. For media errors, it identifies the device on which the bad media is installed.

Hardware name 2

The hardware name 2 identifies the ASCII name of the hardware element that is the second most usual cause of the generated error.

Function code

The function code identifies the function that failed. For HARDWARE errors, this code is usually a hardware element function code or a firmware function code. For MEDIA and SOFTWARE errors, this code is usually a software instruction code, a directive code, or a select code.

Address 1

The address 1 (primary address) contains a memory, disk, or I/O address. This field is used to identify the start address of a range of addresses or the first of multiple error addresses.

Address 2

The address 2 (secondary address) contains a memory, disk, or I/O address. This field is used to identify the end address of a range of addresses or to identify the size of a range of addresses.

Primary/secondary status

The primary/secondary status contains a value that identifies the primary and secondary hardware element or software instruction status code.

Sense status bytes

The sense status bytes contain additional information returned by the hardware element. It is meaningful to the NCR representative.

Inspect the System Software Log

Inspecting the system software log can be used as a debugging and system tool. The system software log contains a record of the steps, the data entries, and any error condition that may occur during the initial system software installation and the operating system update process. The system software log may be displayed to the terminal, listed on the printer, or displayed and listed.

List Application Control Log

The application control log provides a summary report of all operations that have been performed which effects the status of any application contained in the application hierarchy. This log provides the following information:

- type of operation performed
- time and date when the operation was performed
- name of the application

The application control log file grows dynamically and must be periodically cleared. This log may be displayed to the terminal or listed on the printer.

List Directory Files

Listing the directory lists the files of a specified directory in alphabetical order. The listing may be either a list consisting of the file name of each file or an expanded list consisting of the permission code, the owner id, the byte size, the date and time of the last update, and the file name of each file. The listing may be displayed and printed.

List Directory of an ANSI Format Tape

Selecting this menu item permits you to display to the terminal screen the table of contents of an ANSI format tape. This menu selection item is not available for Release 1.02.

List Files

Listing files generates a list consisting of a group of files with the same file name pattern. The file name pattern may use metacharacters to represent a pattern of characters. The metacharacters are:

- * — the asterisk (*) matches any string of characters
- ? — the question mark (?) matches any single character
- [ ] — the set of characters [ ] matches any of the enclosed characters

If the files are outside the current directory, the full pathname of the file name pattern is required.

Merge Two Files

Merging permits one file to be appended to the end of another file, creating a file which consists of both files. If any of the files are located outside the current working directory, the full pathnames are required.

Move a File

Moving a file puts a specified file located in one directory into another directory. The file moved continues to be known by the same file name, but is located in a different directory. Once the file is moved to the new directory, the file is automatically removed from the original directory. If a file being moved already exists in the new directory by the same file name, the file is overwritten.

Move Files to Another Directory

Moving permits a group of files with the file name pattern to be moved from the original directory to another directory. Each file moved continues to be known by the same file name, but under a new directory. Once the file is moved to the new directory, the file is automatically removed from the original directory. If a file being moved already exists in the new directory by the same file name, the file is overwritten. The file name pattern may use metacharacters to represent a pattern of characters. The metacharacters are:

- * — the asterisk (*) matches any string of characters
- ? — the question mark (?) matches any single character
- [ ] — the set of characters [ ] matches any of the enclosed characters

If the files are outside the current directory, the full pathname of the file name pattern is required.

Print a File

Printing a file lists the contents of a file to the printer from the spool queue. The listing of the file may be controlled from the spool queue by specifying a print form name, the number of copies to be printed, a print priority number, and the number of print lines per inch. After the spooled file is printed, it is automatically removed from the spool queue. Refer to the "Display Spooler Status" section in this chapter.

Print Files

Printing permits the contents of a specified group of files to be listed to the printer from the spool queue. The listing of the files may be controlled from the spool queue by specifying a print form name, the number of copies to be printed, a print priority number, and the number of print lines per inch. After the spooled files are printed, each file is automatically removed from the spool queue. Refer to the "Display Spooler Status" section in this chapter.

The file name pattern may use metacharacters to represent a pattern of characters. The metacharacters are:

- * — the asterisk (*) matches any string of characters
- ? — the question mark (?) matches any single character
- [ ] — the set of characters [ ] matches any of the enclosed characters

If the files are outside the current directory, the full pathname of the file name pattern is required.

Receive Mail

Receiving mail permits each message sent to the user to be displayed to the terminal. Each message is displayed in a last in first out format and shows the user who sent the message and the date and the time as to when the message was sent. Once the message is displayed, the message may be saved or deleted. If the Receive Mail command is performed and there is no mail, the system displays the message "no mail".

Remove a Directory

Removing a directory permits a specified directory and all its associated files to be deleted. If the directory is outside the current directory, the full pathname of the directory is required.

Rename a File

Renaming changes the current file name of a file to a new file name. The contents of the file are not changed during the renaming process. If the file is outside the current directory, the full pathname of the file is required. If the newly renamed file is to be created outside the current directory, the full pathname of the file is required.

Restore Selected Files

Restoring selected files copies back into the system files that have been lost accidentally or removed. These files are restored from a previous backup tape. This restore can be done with this selection in the multi-user mode. The menu selection item is not available for Release 1.02, refer to the "Maintenance and Diagnostic" chapter for more information on restoring selected files.

Retrieve Files from an ANSI Format Tape

Retrieving files from an ANSI format tape permits you to copy, to a specified directory in the operating system, files from an ANSI format tape. This menu selection item is not available for Release 1.02.

Send Immediate Message to Users

Sending an immediate message permits a message to be sent to one or all users currently logged on the system.

Send Mail

Sending mail permits a message to be sent to any user in the system. When the message is sent, the message is stored in the system. Once the specified user logs in the system, the message "You have mail" is displayed.

Set Password

Setting the password permits a new system administrator password to be specified or the current password to be changed.

Sort a File

Sorting a file permits a file to be sorted in either dictionary order or numeric order. Dictionary order specifies that the file is sorted according to the alphabetic data, numeric data,

and blanks. Numeric order specifies that the file is sorted according to the numeric data including leading blanks and signs. The sort may specify that leading blanks and non-ASCII characters are to be ignored, and that upper and lowercase letters are to be considered the same for the sort. The full pathnames are required if files are located outside the working directory.

Split a File into Multiple Files

Splitting a file permits a file to be separated into multiple files. The file splitting process reads the file and creates as many new files as necessary to contain a specified number of lines. When each new file is created, the file name is given a system generated suffix to identify the sequence and order in which it was created.

System Reconfiguration

Overview

The *System Reconfiguration* chapter describes the following jobs:

- Terminals — permits a terminal to be added to the system; a terminal to be removed from the system; the initial characteristics of an added terminal to be changed; and all terminals added or currently being used on the system to be listed.
- Printers — permits a printer to be added to the system; the initial characteristics of an added printer to be changed; the routing to a dedicated printer to be controlled, changed, or removed for a specified terminal; and the current spooler status for the terminals and printers to be listed.
- Devices and File Systems — permits devices to be added or deleted from your current system configuration; a directory to be moved to an unused disk; the root directory to be moved to an unused disk; a default file system to be assigned for your file system configuration; the current file system configuration to be displayed; and the system to change to either single-user or multi-user mode.
- Update the System Software — permits updates to the operating system software release such as updating release 3.01.00 to 3.01.01; updates to installed applications; and updates to installed communication applications. Also permits internal system software updates.
- Application Software Control — permits distributed applications to be transferred to the Winchester disk(s) and put in the application menu selections; an application developed for your system which is already on the Winchester disk(s) to be put in the application menu selections; an application to be deleted from the system; all installed applications to be listed; an

application menu to be created or removed; an application package to be moved to another location; and an application menu to be moved to another application menu level.

The job descriptions in this chapter are in alphabetical order.

Job Descriptions

Add a Printer

Adding a printer to your system permits the system software to access the printer. During the add a printer process you must specify the following:

- printer device number — a two-digit value which gives each printer on your system a unique printer name
- printer class — a one-digit value which determines the character mapping to the printer. The one-digit value of 0 and 1 are defined in the initial release. Class 0 maps certain control characters, backspaces, tabs, etc. Class 1 performs no mapping and characters are sent directly to the printer. Class 0 is the normal mode (default) of character mapping for most printers.
- type of port — a letter value signifying the port type, serial or parallel, depending on the type of printer to be connected
- tty line — the corresponding port number on the rear of the Main Unit where the printer is connected. If an 8-Channel I/O Controller is being used the serial printer must be connected to port 6, 7, 14, or 15, depending on which ports are associated with that controller. If a High Performance 8-Channel I/O Controller is being used the serial printer can be connected to any port associated with that controller.
- baud rate — the speed at which the printer is to operate
- parallel port — a one-digit value specifying the corresponding port on the rear of the Main Unit where the parallel printer is connected. Only those labeled printer and numbered 0 through 1 are used for the parallel printer.

If a printer has previously been added at the specified port, the port must be cleared before a printer can be added. Refer to the "Delete a Printer" section in this chapter.

If an error displays, the add a printer process was not successful and must be repeated after the error condition is resolved.

Add a Terminal

Adding a terminal to your system permits the system software to access the terminal. During the add a terminal process you must specify the following:

- terminal name — the port on the rear of the Main Unit where the terminal is connected
- terminal login mode — either a login line or a dial-out line
  - login line — permits users to login to the system
  - dial-out line — is used to connect your system to a modem
- Termcap name — specifies the Termcap definition for the terminal model being added. If you do not know the defined Termcap name for the terminal being added refer to the "List Defined Termcap Names" section in this chapter.
- type of terminal — specifies the type of terminal being added:
  - single baud-rate terminal
  - single-user terminal
  - console terminal
  - dial-in terminal
- Gettydefs label — specifies the baud rate of the terminal model being added. If you do not know the gettydefs label, refer to the "List Defined Gettydefs Entries" section in this chapter.

If a terminal has previously been added at the specified port, the port must be cleared before a terminal can be added. Refer to the "Delete a Terminal" section in this chapter.

This process may be used without a terminal being physically connected to the system. However you should only add terminals which are already installed on the system or are expected to be installed soon. The system software constantly checks for input from added terminals

during the processing day to promptly service the users. Checking for non-existent terminals is a waste of time.

If an error displays, the add a terminal process is not successful and must be repeated after the error condition is resolved.

After the terminal is successfully added, the terminal is named as (tnn) where t specifies a terminal and nn specifies the device number.

Add Devices

Adding devices permits you to install the following devices on your system.

- Floppy disk(s)
- Hard disk(s)
- Streaming cartridge or reel tape drive(s)
- 8-Channel I/O Controller(s)
- High Performance 8-Channel I/O Controller(s)

The add devices process is performed in two stages. The first stage defines the devices to be added to your system. If necessary, this stage links and reloads the operating system software and displays the system login prompt. The second stage creates the device nodes for the added devices; gives you the ability to format or not to format any added disk(s); permits a default file system to be assigned; and includes the added devices in the startup procedures.

NOTE: The current number (n) of devices plus the number of devices to add must be less than or equal to the maximum number that can be added to the system.

Before this process can be performed, the system must be in single user mode. Refer to the "Change To Single User Mode" section in this chapter. This process must be performed from the system console. It is recommended to perform a system backup before adding any additional devices. Refer to the "Backup Selected Files" section in the *Maintenance and Diagnostics* chapter in this book. If you are deleting, then adding a disk of larger capacity, then you must backup your current disk using the incremental backup option of the "Backup Selected Files" menu selection. After adding the new disk you must restore the files using the incremental file restore. Or you may ask your

superuser (root) of the system to do a backup of the entire disk using the cpio utility, then restore the files using the same cpio options. This methond prevents the loss of disk space on the new disk device.

If you are adding a hard disk during this process, it may be necessary to format the disk. Before the disk is formatted, the information on the Media Defect report and the System Error Log is needed. The information on the reports is entered during the formatting disks section of this process.

The Media Defect report lists the defective areas on the hard disk. This report is either in the print package sent with each system or in the shipping box of your new hard disk. Refer to the "Main Unit Unpacking" section of the *Main Unit and Mass Storage Expansion Unit Installation* chapter in the *Hardware Service* book. All the reports should be kept together in the print package for each inch hard disk.

The System Error Log report is a collection of the errors logged by the operating system. This report is only needed if the hard disk being added has previously been in operation and was logging unrecovered I/O errors for a logical block. Refer to the "Inspect the System Error Log" section of the *Start-of-Day* chapter in this book.

With the Media Defect report and the System Error Log report needed to format your hard disk, it is recommended to group the reports by the same disk device name: hnnn, where nnn is 801, 802, 803, 804, 501, or 502; or sdnn, where nn is 01, 02, etc. These device names are defined in the Device Names Chart in the *File System* chapter in this book.

If you are adding any new devices for the first time to your system, the operating system may be relinked. The system automatically relinks the operating system for the new device(s) being added. After the relinking process, the system automatically begins the reloading of the operating system software.

Formatting Disks

During the add a device process when a hard disk has been added, the system checks the format of each hard disk being added.

Formatting the disk device is a menu-driven process which performs the following functions:

- determines disk type
- formats and verifies the hard disks
- marks factory media defective areas
- marks unrecovered hard I/O errors of a logical block
- builds the bad block table

Before the disk device is formatted, the information on the Media Defect Report and the System Error Log is needed.

Use the information on the Media Defect Report sent with your system to answer the user response messages. The disk device name (hnnn or sdnn) on the Media Defect Report and on this display must be exactly the same. Each user response message is displayed one at a time.

You are asked to enter the following:

- Head Number (0 to x)?
- Cylinder Number (0 to xxx)?
- Byte Number (0 to xxxxx)?

If the information for Bad Block Number n is correct, enter the letter y. If the information entered is incorrect, enter n. Return and re-enter the bad block data. Continue with the next bad block or enter the word **end** when all the information on the Media Defect Report is entered.

Next, you are prompted to enter the information on the System Error Log report. Each user response message is displayed one at a time. Enter the following:

- Block Number (0 to xxxxxx)?

Enter the word **end** after all block numbers are entered or if this is the initial system software installation process for your system.

When the terminal displays the DISK FORMATTER, full format enabled screen, the following is displayed:

- Drive type:
- Isl to be written from: isl
- User supplied media defect information from: list

You are prompted to select the disk type that is being formatted at this time. This information can be found on the configuration sticker located on the inside top panel of the Main Unit or on the front panel of the drive.

If you are adding more than one hard disk that needs formatting, this process is performed one after the other.

In order to assign the default file system configuration to your added hard disk(s), refer to the "Assign Default File System Configuration" section in this chapter. Before the hard disk can be used, a file system directory must be moved to the disk. Refer to the "Move a Directory to an Unused Disk" section in this chapter.

NOTE: You are in single user mode. To continue as a fully operational system refer to the "Change to Multi-User Mode" section of this chapter.

Resolving Problems Incurred

When an error condition occurs, this process can not be recovered. The system automatically restores your operating system to the condition it was in before this process was started.

If during the relinking of the operating system, the newly configured kernel cannot be linked, then the original operating system must be reloaded. The add a device process was not successful and must be performed again.

Remove the top cover of the Main Unit by lifting it up. Move the MANUAL/AUTO LOAD toggle switch to the MANUAL position. Move the RESET/RUN switch to the RESET position and release the switch. When the Select Startup Function menu displays, move the MANUAL/AUTO LOAD toggle switch to the AUTO LOAD position. Replace the top cover of the Main Unit.

From the Select Startup Function menu, select item 3 LOAD. Enter the device name or press the newline or return key to specify the default load device of the root device. Enter the pathname of /unix.old for the pathname required. The old operating system is loaded. Enter a login name of "reconfig".

The old operating system is running, and the reconfiguration process must be performed again.

Assign Default File System Configuration

Assigning the default file system configuration assigns a file system for each unassigned disk on your system. During the file system assign process the system mounts all file

system(s), checks the current file system configuration, relinks and loads the operating system software if necessary, makes a file system on the disk device, moves the system assigned directory to the unassigned disk, updates the configuration files, and removes the original files from the disk.

To perform this process, the system must be in single user mode. Refer to the "Change To Single User Mode" section in this chapter. This process must be performed from the console terminal. It is recommended to perform a system backup before performing this process. Refer to the "Backup Selected Files" section in the *Maintenance and Diagnostics* chapter.

During this process, the terminal displays the disk name where a directory is being moved. The disk name and the file system name that may display are defined in the Device Names Chart in the *File System* chapter in this book.

The system checks the current file system configuration of your system and assigns file system(s) according to the unassigned disk(s) on your system.

The system moves the root file system to the disk with the largest capacity. After the root file system is moved, the system relinks the operating system.

If the system is unable to move a directory to an unassigned disk, the disk remains unassigned for you to expand your file system wherever expansion is required.

During the relinking process, progress messages are displayed indicating that the operating system was successfully relinked. After the relinking process, the system automatically begins the reloading of the operating system software.

When an error condition occurs, this process can not be recovered. The system automatically restores your operating system to the condition it was in before this process was started.

If during the relinking of the software the terminal fails to display the login prompt, the operating system software was not reloaded, and the old operating system must be reloaded. To reload the old operating system, remove the top cover of the Main Unit by lifting it up. Move the MANUAL/AUTO LOAD toggle switch to the MANUAL position. Move the RESET/RUN switch to the RESET position and release the switch. When the Select Startup

Function menu displays, move the MANUAL/AUTO LOAD toggle switch to the AUTO LOAD position. Replace the top cover of the Main Unit. From the Select Startup Function menu, select item 3 LOAD. Enter the device name or press the newline or return key to specify the default load device of the root device. Enter the pathname /unix.old to specify loading the old operating system. The old operating system is loaded. Retry the assign default file system configuration process.

Change Terminal Routing

Changing the routing of a terminal to a printer specifies that all print job processes entered from a specific terminal are to be printed at a specified print device. More than one terminal may be routed to the same print device. The assumed print device for all terminals is lp00 unless otherwise specified. It is recommended to list the routing of the terminals and printers on your system before and after this process. Refer to the "List Printers and Routing" section in this chapter.

Change to Multi-User Mode

Entering the multi-user mode permits the system to return to a normal operating state after performing in the single user mode. The system performs a file system check. After each file system is checked, the terminal displays the system login prompt to all system terminals.

Change To Single User Mode

Going from multi-user mode to single user mode puts all terminals in an inactive state, except for the terminal on which the command was selected. It is necessary to change to single user mode before single user procedures such as adding devices, assigning default file system configuration, deleting devices, moving a directory to an unused disk, and moving root to an unused disk, are performed. When the system goes into a single user mode:

- any user login session is terminated
- all other users are prevented from logging in on the system
- all processes of the terminated user sessions are cancelled

It is recommended to send a shut down message to all users before this procedure is performed.

Create an Application Menu Level

Creating an application menu level permits you to put another menu level in the selection process for your users.

When you install an application, the menu which is displayed on user login includes a selection for the application. For example, if you install Multiplan as an end user application, Multiplan is a selection entry in a menu level displayed on end user login. If this menu becomes full, or you wish to divide the selections into lower level menus, use this process to create the menus.

The following entries are required to create an application menu level:

- the category of application to be created
  - A — specifies that the category of the application is an end user
  - B — specifies that the category of the application is a development utility
  - C — specifies that the category of the application is a system support utility
- menu directory base name — name identifies the name of the files and directories of this application
- full pathname of a directory under which the new menu level is to be created
  - The parent directory of category A (end user application) must be specified at either the directory level /appl or a directory under /appl.
  - The parent directory of category B (development utility) may be classified as either a language type application or any other type of application. The language type application must be specified at either the directory level /appl/appdev/languages.dir or a directory under /appl/appdev/languages.dir. Any other type of application must be specified at either the directory level /appl/appdev/instapp.dir or a directory under /appl/appdev/instapp.dir.
  - The parent directory of category C (system support utility) must be specified at either the directory level /appl/suppanl/instsup.dir or a directory under /appl/suppanl/instsup.dir.

The files and directories associated with the base name are installed under the specified parent directory.

The application log contains a record of all system activity during the creation of the application menu level. For future reference and history of application installation, it is recommended to retain a copy of the system activity during the create an application menu level process.

Delete a Printer

Deleting a printer removes the permission from the system to access the printer. During the process, the printer initialization characteristics are removed from the system software. This process may be used without a printer being physically connected to the system.

Delete a Terminal

Deleting a terminal removes the permission from the system software to access the terminal. During this process, the terminal name, the terminal login mode, the Termcap name, and the type of terminal are removed from the system. This process may be used without a terminal being physically connected to the system.

Delete Devices

Deleting devices removes all the permissions of a specified device currently installed on your system. During the deleting devices process, the system mounts all the file system(s), reviews the current system configuration table to identify each device that may be deleted, lists all directories contained on a specified device to be deleted, permits you to continue the delete devices process or terminate the delete devices process, and updates the administration file after the device is deleted.

The system does not permit the root disk device, the primary 8-Channel I/O Controller or High Performance 8-Channel I/O Controller, or both 5.25 inch floppy disk drives to deleted. Before this process can be performed, the system must be in single user mode. Refer to the "Change To Single User Mode" section in this chapter. This process must be performed from the system console. It is recommended to perform a system backup before deleting any device from your system. Refer to the "Backup Selected Files" section in the *Maintenance and Diagnostics* chapter.

Delete Terminal Routing

Deleting the routing of a terminal removes the dedicated print device from being automatically accessed by the specified terminal. After the completion of this process, all jobs to be printed from the specified terminal are routed to the assumed print device lp00. It is recommended to list the routing of the terminals and printers on your system before and after this process. Refer to the "List Printers and Routing" section in this chapter.

Display File System Layout

Displaying the file system layout generates a report showing the configuration of your system as distributed during the system software installation or the operating system update. The following information may be displayed to the terminal, listed on the printer, or displayed and listed at the same time.

- disk — specifies the logical device name of the disk (h501, is the first 5.25 inch hard disk)
- slice — specifies the character device name of the file system (i.e. 0s1, is the character device name of the file system on the first 5.25 inch disk)
- size (sectors) — specifies the size in sectors the unformatted capacity of the disk
- directory — specifies the directory name of the file system
- disk description — specifies the physical size of the specified disk (i.e. 5.25 inch)

Inspect the System Console Log

The system console log is only on systems which have been updated to include the optional unattended operating system feature. The log contains a record of messages produced while the system is entering multi-user mode.

Inspect the System Software Log

Inspecting the system software log can be used as a debugging and system tool. The system software log contains a record of the steps, the data entries, and any error condition that may occur during the initial system software installation and the operating system update process. The system software log may be displayed to the terminal, listed on the printer, or displayed and listed.

Install Applications

Installation of an application transfers application programs and files from the application media to the Winchester disk(s) in your system. Applications can be installed from either floppy disk or streaming tape. The installation process generates the menu screens you need to permit your users to run the program application from the menu selection process.

The load media contains all of the files and programs you need to install and run the application. Applications from another vendor, either on floppy disk or streaming tape, may be installed using this procedure, or the vendor may provide you with special application installation instructions. Instructions on how the vendor must prepare the system media which permit you to use this application installation procedure are given in the Application Developer section of the *System Operation* book. If you receive applications from the application developers in your organization, the application may be installed from either floppy disks or streaming tape, or it may be installed directly from the Winchester disks in your system. Your application developer should advise you whether to use this procedure or the direct installation procedure described in the "Install Application Manually" section of this chapter.

Perform the install application procedure only if the label(s) on the application load media set has a category of any of the following:

- A — End User Application
- B — App Dev Application
- C — Sys Sup Application

If the label(s) on the load media set have a category of System Update Files, do not use this procedure; install an update application by following the procedure in the "Update System Software" section of this chapter. Some distribution streaming tapes contain both application and update software. Only the application files can be installed using this procedure; the system update files must be installed using the "Update System Software" procedure that is described in this chapter. You should complete the update system software procedure first.

Default answers are provided with the application load media, meaning that the base file names and application

names are already entered in the appropriate menus. If you are installing applications obtained either from other vendors or from your organization and default answers are not provided, enter the correct information.

The application control log contains a record of all system activity during the installation of the application software. For future reference and history of application installation, it is recommended to retain a copy of the system activity during the installation of the application software.

Install Application Manually

Installing an application manually permits certain users on your system to run an application which was created on your system by an application developer. The installation process generates the menu screens you need to permit your users to run the program in the application from the menu selection process.

An application developer on your system must have previously put all of the application's programs and files on the Winchester disk(s) in your system before you are able to install the application using this procedure. Your application developer should advise you whether to use this procedure or provide you with special application installation instructions.

To use this procedure, your application developer must supply you with the entries required during the application installation; these entries are defined in the *Application Interface* chapter of the *System Operation* book.

- The user category of application to be installed
  - A — user category is for either an application end user or an office procedures analyst
  - B — user category is for an application developer
  - C — user category is for a system support analyst
- The full pathname of the directory where the application is to be installed
  - The parent directory of category A (application end user or office procedures analyst) must be specified at either the directory level /appl or a directory under /appl.
  - The parent directory of category B (application developer) may be classified as either a language type application or any other type of application.

The language type application must be specified at either the directory level /appl/appdev/languages.dir or a directory under /appl/appdev/languages.dir. Any other type of application must be specified at either the directory level /appl/appdev/instapp.dir or a directory under /appl/appdev/instapp.dir.

- The parent directory of category C (system support analyst) must be specified at either the directory level /appl/suppanl/instsup.dir or a directory under /appl/suppanl/instsup.dir.

The files and directories of this application are installed under the specified parent directory.

The application log contains a record of all system activity during the installation of the application software. For future reference and history of application installation, it is recommended to retain a copy of the system activity during the installation of the application software.

After you complete this application installation procedure, you need to permit certain users on your system to run the application. Follow the instructions provided in the "Update a User's Application Selections" section of this chapter.

List All Installed Applications

Listing all installed applications on the system gives the user a report describing each type of application category and the applications installed under each category. The listing may be displayed to the terminal and listed to the printer.

List Application Control Log

Listing the application control log provides a report describing the operations that have been performed on all applications since the control log was last cleared. The listing may be displayed to the terminal and listed to the printer. The listing provides the following information:

- type of operation performed
- time and date when the operation was performed
- name of the application

The application control log is a file which increases in size each time any application maintenance is performed.

This file grows dynamically and should be cleared at least once a week. Refer to the "Check Size of System Log Files" section in the *System Services* chapter in this book.

List Defined Gettydefs Entries

Listing defined gettydefs entries displays to the terminal or lists to the printer either all available gettydefs labels or the characteristics of a specific gettydefs label. A gettydef label specifies the characteristics of a terminal.

List Defined Termcap Terminal Names

Listing defined termcap terminal names displays to the terminal or lists to the printer the valid system termcap names for specific terminal models.

List Printers and Routing

Listing the printers and the terminals routing provides a list of the current spooler status for the terminals and the printers on the system. The following information may be displayed to the terminal:

- printer status — displays the print device, print forms name, and status
- terminal routing status — displays the terminal name, designated printer, and status
- printer device port number — displays the port position where each printer is connected and its printer device name

The status values that may be reported are:

- active — the device is ready to print or printing
- wait — the device is waiting for the print command from the user

List Terminals

Listing the terminals gives you a report of either all added terminals or terminals currently being used on the system. The list provides the following information about each active terminal.

- terminal name
- login mode
- Termcap name
- Setup Ident (gettydef label)
- baud rate

The listing may be displayed to the terminal, listed to the printer, or displayed and listed at the same time.

Move a Directory to an Unused Disk

Moving a directory to an unused disk permits you to move a directory from a device currently on your system to a free disk. During the move a directory to an unused disk process the system mounts all the file system(s), reviews the current system configuration table to identify each free disk, makes a file system on the disk device, copies all files of the specified directory to the new disk, updates the administration files, and removes the original files from the root file system.

To perform this process, the system must be in single user mode. Refer to the "Change To Single User Mode" section in this chapter. This process must be performed on the system console. It is recommended to perform a system backup before moving a directory to an unused disk. Refer to the "Backup Selected Files" section in the *Maintenance and Diagnostics* chapter.

Before a directory can be moved, the disk must be unassigned and its size must be equal to or greater than the source directory. Refer to the "Display File System Layout" section in this chapter. If the disk is not unassigned or the size of the disk is not large enough, the move is not permitted and the process is terminated. The system does not permit the following directories to be moved during this process: /bin, /dev, /etc, /menu, /mnt, /usr, and /ncrm.

When an error condition occurs, this process can not be recovered. The system automatically restores your operating system to the condition it was in before this process was started.

Move an Application Menu

Moving an application menu moves a menu from one application menu parent directory to another.

Moving an application menu level effects any user already permitted to run the applications. Any user permitted to run the application from the menu selection process is no longer permitted to run the application. If the user attempts to run or delete applications, the previously available menu is no longer accessible. Therefore, after moving the application menu level, you must remove the

user permissions to run the application by following the instructions given in the "Update a User's Application Selections" section in this chapter.

To perform the move an application menu process you must enter the following:

- The category of the application
  - A — to specify that the category of the application is an end user
  - B — to specify that the category of the application is a development utility
  - C — to specify that the category of the application is a system support utility
- menu directory base name
- full path name of source parent directory
- full path name of destination parent directory
  - The destination parent directory of category A (end user application) must be specified at either the directory level /appl or a directory under /appl.
  - The destination parent directory of category B (development utility) may be classified as either a language type application or any other type of application. The language type application must be specified at either the directory level /appl/appdev/languages.dir or a directory under /appl/appdev/languages.dir. Any other type of application must be specified at either the directory level /appl/appdev/instapp.dir or a directory under /appl/appdev/instapp.dir.
  - The destination parent directory of category C (system support utility) must be specified at either the directory level /appl/suppanl/instsup.dir or a directory under /appl/suppanl/instsup.dir.

The application log contains a record of system activity during the move of the application procedure menu. For future reference and history of application installation, it is recommended to retain a copy of the system activity during this application procedure.

Move an Application Package

Moving an application permits you to move an application menu to another directory. This procedure only moves applications installed according to the instructions given in

the "Install Applications" and "Install Application Manually" sections in this chapter.

When you install the application, you specify a category for the user as A, B, or C.

- A — end user application
- B — development utility
- C — system support utility

Moving the application does not permit you to change the category. An application when moved effects any user already permitted to run the application. Any user permitted to run the application from the selection process is no longer permitted to run the application. If the user attempts to run or delete applications, the previously available menu is no longer accessible. Therefore, after moving the application package, you must remove the user permissions to run the application by following the instructions given in the "Update a User's Application Selections" section in this chapter.

The files and directories associated with the base name are installed under the specified parent directory:

- The destination parent directory of category A (end user application) must be specified at either the directory level /appl or a directory under /appl.
- The destination parent directory of category B (development utility) may be classified as either a language type application or any other type of application. The language type application must be specified at either the directory level /appl/appdev/languages.dir or a directory under /appl/appdev/languages.dir. Any other type of application must be specified at either the directory level /appl/appdev/instapp.dir or a directory under /appl/appdev/instapp.dir.
- The destination parent directory of category C (system support utility) must be specified at either the directory level /appl/suppanl/instsup.dir or a directory under /appl/suppanl/instsup.dir.

The application log contains a record of system activity during the move of the application package. For future reference and history of application installation, it is

recommended to retain a copy of the system activity during this application procedure.

Move Root to an Unused Disk

Moving root to an unused disk moves the root file system from one disk to an unassigned disk. During the move root to an unused disk process, the system mounts all the file system(s), reviews the current system configuration table to identify each unused disk, makes a file system on the disk device, copies all files of the root directory to the new disk, relinks the operating system, builds the swap device on the new disk, updates the administration files, and removes the original files.

To perform this process, the system must be in single user mode. Refer to the "Change To Single User Mode" section in this chapter. This process must be performed from the system console. It is recommended to perform a system backup before moving root to an unused disk. Refer to the "Backup Selected Files" section in the *Maintenance and Diagnostics* chapter.

Before root can be moved, the system must have an unassigned hard disk. The system makes the root file system and builds the swap device on the disk that has the largest file system capacity. Refer to the "Display File System Layout" section in this chapter. If the disk is not unassigned, or the size of the disk is not large enough, the move is not permitted and the process is terminated.

If the terminal fails to display the login prompt, the operating system software was not reloaded. To reload the operating system software, remove the top cover of the Main Unit by lifting it up. Move the MANUAL/AUTO LOAD toggle switch to the MANUAL position. Move the RESET/RUN switch to the RESET position and release the switch. When the Select Startup Function menu displays, move the MANUAL/AUTO LOAD toggle switch to the AUTO LOAD position. Replace the top cover of the Main Unit.

From the Select Startup Functions menu, select item 3 LOAD. Enter the device name or press the newline or return key to specify the default load device of the root device. Enter the pathname /unix.old to specify loading the old operating system. The old operating system is loaded. Retry the move root to an unused disk process.

The system is in the single user mode. Remember to

change the mode to multiuser to make the system fully operational.

Remove an Application

Removing an application deletes all programs in an installed application. This procedure only deletes applications installed according to the instructions given in the "Install Applications", "Update the System Software", and "Install Application Manually" sections in this chapter. After you complete this procedure, the state of the application in your system depends on the method used to install the application.

Install Applications or Update the System Software

If the application was installed by performing the install applications process or by the update process, all programs and files required to run the application are deleted from your system. Any data files created by the application are not deleted from your system. For example, if you remove a payroll application, the payroll record files are not deleted. The payroll application programs are deleted.

Install Application Manually

If the application was installed directly, the state of the application in your system is the same as described above, except that this procedure may not affect the application programs and files maintained in the user directory of the application developer. The programs and files maintained by the application developer are not deleted unless specified by the removal process of the install application manually procedure.

An application package when removed effects any user already permitted to run the application. Any user permitted to run the application from the selection process is no longer permitted to run the application. If the user attempts to run or delete applications, the previously available menu is no longer accessible. Therefore, after removing the application package, you must remove the user permissions to run the application by following the instructions given in the "Update a User's Application Selections" section of this chapter.

The application log contains a record of system activity during the removal of the application software. For future

reference and history of application installation, it is recommended to retain a copy of the system activity during the removal of the application software.

Remove an Application Menu Level

Removing an application menu level deletes a menu level created in the selection process for your users. Refer to the "Create an Application Menu Level" section in this chapter.

An application menu level when removed effects any user already permitted to run the application located under the specified menu level. Any user permitted to run the application from the selection process is no longer permitted to run the application. If the user attempts to run or delete applications, the previously available menu is no longer accessible. Therefore, after removing the application menu level, you must remove the user permissions to run the application by following the instructions given in the "Update a User's Application Selections" section in this chapter.

The application log contains a record of system activity during the removal of the application menu level procedure. For future reference and history of application installation, it is recommended to retain a copy of the system activity during this application procedure.

Route Terminal to Printer

Routing a terminal to a printer specifies that all printing requests entered from a specific terminal are to be printed at a specified print device. More than one terminal may be routed to the same print device. The assumed print device for all terminals on your system is lp00 unless otherwise specified. It is recommended to list the routing of the terminals and printers on your system before and after this process. Refer to the "List Printers and Routing" section in this chapter.

Set Printer Initialization Characteristics

Setting the printer initialization characteristics permits the baud rate and the forms name to be changed for a specified printer that is already added to the system. During the set printer initialization characteristics process you must specify the following:

- printer name — the two-digit value which identifies the printer on your system that is to be changed

- type of port — a letter value signifying the port type, serial or parallel, depending on the type of printer specified
- baud rate — the speed at which the printer is to operate
- forms name — the standard forms name for the print device

Set Terminal Initialization Characteristics

Setting the terminal initialization characteristics permits the initial characteristics of a system terminal to be changed. During the set terminal initialization characteristics process you may change any of the following:

- terminal name — the port number on the rear of the Main Unit where the terminal is connected
- terminal login mode — either a login line or a dial-out line
  - login line — permits users to login to the system
  - dial-out line — used to connect the system to a modem
- Termcap name — the Termcap definition for the terminal model being added. If you do not know the defined Termcap name for the terminal being added refer to the "List Defined Termcap Names" section in this chapter.
- type of terminal — the type of terminal being added:
  - single baud-rate terminal
  - console terminal
  - dial-in terminal
- Gettydefs Label — the baud rate of the terminal model being added. If you do not know the gettydefs label, refer to the "List Defined Gettydefs Entries" section in this chapter.

This process may be used without a terminal being physically connected to the system.

If an error displays, the set terminal initialization characteristics process is not successful and must be repeated after the error condition is resolved.

Update a User's Application Selections

Updating the application selections of a user permits application packages to be either added to or removed from the applications which may be run by an application user or

an office procedures analyst. The application selection process may be either through a selection menu where each specific application package is selected or by specifying a menu-driven user where an exact copy of the user's applications access is made. The application selections are available if the selections are installed on the system.

Update the System Software

Updating the system software permits you to install the following types of changes to the system software:

- Updates to the operating system software release such as updating release 3.00.00 to 3.00.01
- Updates to installed applications
- Updates to install communication applications such as SNA PU-T2
- Updates performed internally, such as demand paging or swapping

Use this update process to install any load media which has a label specifying a category of SYSTEM UPDATE FILES. Load media can consist of either floppy disk media or streaming tape media, or updates can be internal. Internal updates are installed with the initial release, but not activated until an internal update is performed.

The update process must be run from the system console, and the system must be in single user mode.

Some communication applications require a manager or administrator to perform such jobs as configure the network, start up the network, etc. After installing a communication application, refer to the appropriate system communication book to determine if you need to appoint a manager and if configuration is required before the application can be run.

If you do not have to manually load /unix.old, the session is terminated, and the update process is complete.

Resolving Problems Incurred

If after installing the system update, the updated operating system cannot be loaded, then the old operating system must be loaded.

Remove the top cover of the Main Unit by lifting it up. Move the MANUAL/AUTO LOAD toggle switch to the MANUAL position. Move the RESET/RUN switch to the

RESET position and release the switch. When the Select Startup Function menu displays, move the MANUAL/AUTO LOAD toggle switch to the AUTO LOAD position. Replace the top cover of the Main Unit.

From the Select Startup Function menu, select item 3 LOAD. Press the newline or return key to specify the default load device of the root device. Enter /unix.old to specify loading the old operating system. The old operating system is loaded.

The old operating system is running, and the update process must be performed again. If a communication application was part of the update process, remove the application before starting the update again. Refer to the "Remove an Application" section of this chapter.

Restore /kernel Procedures

If /kernel is not on the system, it must be restored by following the instructions displayed on the terminal to install all original and update software distribution media: floppy disks or streaming tapes.

- In the original system software installation set of media which have a label specifying a category of SYSTEM BASE FILES and a pathname of /kernel.
- All distribution media installed after the original system software installation which has a label specifying a category of SYSTEM UPDATE FILES and a basename of operating system.

Maintenance and Diagnostics

Overview

The *Maintenance and Diagnostics* chapter describes the following jobs (processes):

- In-Service Diagnostics — permits the testing and performance verification of the peripheral and communication hardware. The In-Service Diagnostic System contains the following types of tests.
  - Communication link and station tests
  - Peripheral device tests
  - SCSI Peripherals
  - System test — tests all hardware devices included in the system.
- Communication Maintenance — monitors the performance of the communication links and stations.
  - Display or display and clear link tallies (maintains records of previously determined events)
  - Change the tally thresholds (number of events that occur before exceptions are logged in the system error log)
  - Start, stop, or check communication link data capture processes (collection of data transferred on the link)
- File System Maintenance — monitors and maintains the performance of file systems, including floppy disk file systems.
- Displays current release numbers for system software modules.
- Permits you to check size of and inspect the system logs.

The job descriptions in this chapter are in alphabetical order.

Job Descriptions

Backup Selected Files

Backing up files to an off-line storage media (saving files) is important in recovering from system problems and operator errors. Backing up files to floppy disk or streaming tape permits the system administrator to save the entire file system, or any portion of the files contained on the system. For example, a backup may be performed for a particular user account (/usr/acct/username), for a specific file (/usr/acct/username/dirname/filename), or for a full file system.

During the backup process for the entire file system (/), the system must be in single user mode. When backups are being made for a user account, the user must not be logged in. This insures that the backup contains the latest updates.

The backup procedure destroys any files on the floppy disk or streaming tape. If an unformatted floppy disk is used, it is automatically formatted.

The system administrator must determine the schedule for system backups: daily, weekly, or monthly backup. It is not necessary to save the entire file system each time a backup is performed. Portions of the file system should be backed up on a regular basis, such as user accounts (/usr/acct) and system directories like /etc. These files and directories are modified more rapidly than most other files, and therefore should be backed up on a regular schedule. This menu item selection must be performed in the single user mode. If you wish to perform the backup of selected files, not a full system backup, in multi-user mode you must select the backup selection item in the System Services selection of the system administrator's main menu.

A daily backup schedule for file protection might be to backup the following files.

/etc
/usr/acct
/usr/bin

Seven sets of streaming tapes or floppy disks would be required for daily backup. At the beginning of the following week the same streaming tapes or floppy disks could be recycled.

A weekly backup should be made of the following files:

/etc
/ncrm
/appl
/usr

Four sets of streaming tapes or floppy disks should be used for weekly backups.

All of the system files which only change during reconfiguration or system updates must be saved once any changes are made to the operating system. These include customer dependent files and the following:

/kernel
/bin
/etc
/lib
/menu
/sys
/unix
/ncrm
/usr/adm
/usr/bin
/usr/dict
/usr/include
/usr/lib
/usr/sys

Check Data Capture

The check data capture process displays information about active data capture processes. Information provided includes:

- Process ID
- Console ID
- Link name
- Data capture file name

Check or Repair Floppy Disk File System

If a problem occurs while accessing a file system on a floppy disk, the file system should be repaired. The repair procedure automatically repairs any problems which can be repaired. The check procedure only reports problems. To perform this procedure, the file system must not be mounted.

Check or Repair the File System

If a problem occurs while accessing any mounted file system, the file system should be repaired. The repair procedure automatically repairs any problems which can be repaired. The check procedure only reports problems. To perform this procedure, the system must be in single user mode. Refer to the "Change to Single User Mode" section in the *System Reconfiguration* chapter.

Check Sizes/Clear System Log Files

The system maintains three system log files.

- Application Software Log — a log of applications installed, moved, and removed
- System Error Log — a log of system error and exception conditions
- User Login Log — a log of user logins

These files continuously grow and must periodically be cleared. Before clearing any log file, save it on a floppy disk or print it. You or the system support person may need these logs.

Display and Clear Data Link Control (DLC) Terminal Tallies

The display and clear DLC terminal tallies process displays and then clears (resets) the tally counts that the operating system maintains for the data link control (DLC) terminals connected to the Multi-Protocol Communication Controller (MPA) DLC communication links through an RS-232-C Line Interface Module (LIM).

Display and Clear Binary Synchronous Multi-Point Terminal Tallies

The display and clear binary synchronous multi-point terminal tallies process displays and then clears (resets) the tally counts that the operating system maintains for the binary synchronous multi-point terminals that are connected to the Multi-Protocol Communication Controller (MPA) bisync tributary communication links through an RS-232-C Line Interface Module (LIM).

Display and Clear Binary Synchronous Terminal Tallies

The display and clear binary synchronous terminal tallies process displays and then clears (resets) the tally counts that the operating system maintains for the binary synchronous terminals that are connected to the Multi-Protocol Communication Controller (MPA) bisync tributary communication links through an RS-232-C Line Interface Module (LIM).

Display and Clear Gateway Secondary Tallies

The display and clear gateway secondary tallies process displays and then clears (resets) the tally counts that the operating system maintains for the gateway secondary links that are connected to the Multi-Protocol Communication Controller (MPA) through an RS-232-C Line Interface Module (LIM).

Display and Clear Parallel Printer Port Tallies

The display and clear parallel printer port tallies process displays and then clears (resets) the tally counts that the operating system maintains for the parallel printer ports that are connected to the High Performance 8-Channel I/O Controllers.

Display and Clear Processor Terminal Tallies

The display and clear processor terminal tallies process displays and then clears (resets) the tally counts that the operating system maintains for the TTY terminals (communication links) that are connected to the Processor Memory Controller (PMC) Channel A and/or Channel B.

Display and Clear TTY Terminal Tallies

The display and clear TTY terminal tallies process displays and then clears (resets) the tally counts that the operating system maintains for the TTY terminals (communication links) that are connected to the 8-Channel I/O Controller or the High Performance 8-Channel I/O Controller.

Display Bad Block Report for System Disks

This procedure gives a report on the bad blocks of Winchester disks on the system. A selection menu for all system disks is generated; select the disk you want reported. No reports are generated for floppy disks. The option to print the report is provided.

Display Binary Synchronous Multi-Point Terminal Tallies

The display binary synchronous multi-point terminal tallies process displays the tally counts that the operating system maintains for the binary synchronous multi-point terminals that are connected to the Multi-Protocol Communication Controller (MPA) through an RS-232-C Line Interface Module (LIM).

The tally counts shown in this report identify the number of events that occurred before this display was generated. The counts are not updated while the display is on the screen, even though link activity (and possible additional error events) continues to occur.

Display Binary Synchronous Terminal Tallies

The display binary synchronous terminal tallies process displays the tally counts that the operating system maintains for the binary synchronous terminals that are connected to the Multi-Protocol Communication Controller (MPA) through an RS-232-C Line Interface Module (LIM).

The tally counts shown in this report identify the number of events that occurred before this display was generated. The counts are not updated while the display is on the screen, even though link activity (and possible additional error events) continues to occur.

Display Boot Block Report for System Disks

This procedure gives a report on the boot block of formatted floppy disks and Winchester disks on the system.

Display Data Link Control (DLC) Terminal Tallies

The display DLC terminal tallies process displays the tally counts that the operating system maintains for the data link control (DLC) terminals connected to the Multi-Protocol Communication Controller (MPA) DLC communication links through an RS-232-C Line Interface Module (LIM).

The tally counts shown in this report identify the number of events that occurred before the display was generated. The counts are not updated while the display is on the screen, even though link activity (and possibly additional error events) continues to occur. Updated counts are displayed if the display steps are repeated.

Display Gateway Secondary Tallies

The display gateway secondary tallies process displays the tally counts that the operating system maintains for the gateway secondary links that are connected to the Multi-Protocol Communication Controller (MPA) through an RS-232-C Line Interface Module (LIM).

The tally counts shown in this report identify the number of events that occurred before the display was generated. The counts are not updated while the display is on the screen, even though link activity (and possibly additional error events) continues to occur. Updated counts are displayed if the display steps are repeated.

Display Parallel Printer Port Tallies

The display parallel printer port tallies process displays the tally counts that the operating system maintains for the parallel printer ports that are connected to the High Performance 8-Channel I/O Controllers.

Display Processor Terminal Tallies

The display processor terminal tallies process displays the tally counts that the operating system maintains for the TTY terminals (TTY communication links) that are connected to the Processor Memory Controller (PMC) Channel A or Channel B.

Display Super Block Report for System Disks

This procedure gives a report on the super block of formatted floppy disks and Winchester disks on the system.

Display the File System Size

Displaying the file system size permits you to determine:

- the number of disk blocks used in a file system
- the number of free disk blocks in a file system
- the number of disk blocks used in a directory or file

You can use this information to determine if a user area or file is growing too large and needs to be stored off line or removed, and to determine if a file or directory fits on a floppy disk or other device.

The reports may be displayed on the terminal or displayed on the terminal and printed.

Display TTY Terminal Tallies

The display TTY terminal tallies process displays the tally counts that the operating system maintains for the TTY terminals (communication links) that are connected to the 8-Channel I/O Controllers or the High Performance 8-Channel I/O Controllers.

Format a Floppy Disk

Formatting a floppy disk prepares a new floppy disk to be used in your system. A new floppy disk must be formatted before you can use it for a backup, a file copy, or a file system.

You can also format an old floppy disk. The format process destroys any files on a floppy disk. You should format an old floppy disk only when other procedures cannot be performed using the floppy disk. If the floppy disk cannot be formatted, it is defective and must be discarded.

Make a File System on Floppy Disk

Making a file system on a floppy disk permits you to use the floppy disk as an online extension of your file system. After a file system is made on a floppy disk, the floppy disk file system can be mounted and unmounted. Mounting a file system includes the file system in your root file system. Unmounting a file system removes the file system from your root file system.

The definition of a file system and the effect of mounting (and unmounting) a file system are explained in the *File System* chapter in this book. Understanding the information in the *File System* chapter allows you to expand your electronic filing cabinet capacity and security.

To make a file system on a floppy disk, the floppy disk must be formatted. Refer to the "Format a Floppy Disk" section in this chapter.

Mount a Floppy Disk File System

Mounting a floppy disk file system makes the file system an extension of the root file system (see the *File System* chapter in this book).

A file system must be created on a floppy disk before it can be mounted. See the "Make a Floppy Disk File System" section in this chapter.

After a floppy disk file system is mounted, the floppy

disk must not be removed from the drive until the file system is unmounted (see "Unmount a Floppy Disk File System" in this chapter). Never remove a floppy disk which contains a mounted file system even if power failure occurs.

Process Data Capture Files

The process data capture files job provides a method of performing any or all of the following functions associated with processing data that has been captured by the data capture utility.

- Dump a raw data capture file to a formatted file
- Display a formatted file on the terminal
- Print a formatted file on the line printer

Remove Data Capture Files

The remove data capture files process deletes selected files from the /datacap directory. This directory contains either raw or formatted files that are associated with the data capture utility.

Restore Selected Files

In the event of a system problem or operator error when files are either lost or corrupted, files can be restored from the backup media. However, the system administrator must determine to what degree the file system is corrupted before proceeding with a restore procedure.

There are two basic restore procedures: a file restoration and a system restoration. Which restore procedure to use depends on the status of the system.

If the system is operational, the system is running normally from all observations then, with the system in this condition the system administrator can login and perform a file restore procedure through the system administrator menu interface.

If the system is not operational, the system administrator is unable to login and access the system administrator menus. Signs of this condition are lack of system response at the system console, the disk activity indicator shows no disk activity when known disk functions are expected, or both.

For a file restoration from the system administrator menu interface, follow the procedures in the "File Resotration" section. For a system restoration, follow the

procedures in the "System Restoration" section. A single file restore is not possible from a full system backup tape using the system administrator menu interface. You must request your superuser (root) to restore single files from the full system backup tape.

File Restoration

The file restoration is the menu-driven restore procedure of the system administrator. File restoration can be on the file, directory, or root directory level. The backup media is the floppy disk(s) or the streaming tape(s) necessary to restore the file(s) in question. Only those files that are suspected of being corrupt need to be restored.

For multiple files, the restore procedure is a series of file restorations starting with the most recent full backup media and ending with the most recent partial backup media.

For single file restoration, the most recent backup media is used to restore the file.

System Restoration

System restoration reinstalls the complete file system; while having its own set of menus, it is not performed from the system administrator menus.

If you are restoring from floppy disk, the backup media required are the floppy disks of the System Software Installation package labeled INSTALL, INSTALLATION FILE SYSTEM, and CHECKSUMS, plus the floppy disks created during the full system (/) backup procedure.

If you are restoring from streaming tape, the backup media required are the streaming tape from the System Software Installation package labeled, INSTALL, plus the streaming tapes created during the full system (/) backup procedure.

A full system restoration must be performed from the system console. The system should already be in the single user mode.

The system software installation media is used to install the initial root file system. Then, the full system backup is copied to the hard disk. Any mounted file systems are restored after the root file system has been restored. After this procedure, file restoration must be performed if any incremental backups were performed since the generation of the full system backup media. Each

restoration is performed according to the chronological order of the backup media sets. This brings the system as close as possible to the status it had at the time of the system failure. These file restorations are done from the system administrator menu interface.

Procedures

1. Lift up the cover of the Main Unit.
2. Move the Auto Load/Manual switch to the Manual position.
3. Move the Reset/Run switch to the Reset position.
4. Return the Auto Load/Manual switch to the Auto Load position.
5. Replace the top cover of the Main Unit.
6. From the Select Startup Function menu, select item 2 INSTALL SYSTEM.
7. ENTER THE DEVICE NAME
   - If you are performing a full system restore from floppy disk:
     - Enter f501 and press the new line or return key.
   - If you are performing a full system restore from streaming tape:
     - Enter st01 and press the new line or return key. When the system displays the message requesting whether or not to retension the tape, it is recommended that you respond yes.
8. INSERT THE SYSTEM MEDIA
   - If you are restoring from floppy disk:
     - Locate the floppy disks used in the system software installation. These disks are labeled INSTALL, INSTALLATION FILE SYSTEM, and CHECKSUMS. Insert the floppy disks as requested in the top, left, or only drive. Press the space bar to continue.
   - If you are restoring from streaming tape:
     - Locate the streaming tape labeled INSTALL, and insert the tape in the top, left, or only drive. Press the space bar to continue.
   - If when you installed your system software you used floppy disks to boot from, but installed the software from streaming tape:
     - Locate both the floppy disks used and the streaming tape labeled INSTALL. Insert the

boot floppy disk and the INSTALL streaming tape in their respective top, left, or only drives.

Refer to the "System Software Installation — Phase 1" section of the *System Software Installation* chapter in this book to continue with System Restore — Phase 1.

If an invalid format is detected, refer to the "Formatting Disk Device" section of the *System Software Installation* chapter in this book to continue.

9. After completion of Step 3 Termination of Phase 1 the terminal displays the screen titled: SYSTEM INSTALLATION / RESTORE / MAINTENANCE:
   - Select item 2 Perform System Restoration
10. During Phase 2 of System Restoration, continue as prompted by the terminal display with the system restoration using the floppy disks or streaming tapes created in the full system backup. There is some interaction by the system administrator with the restore menus.
    - If you are prompted Changing Drives? Type RETURN for no; '/dev/rmt' for yes:
      - Answer no by pressing the new line or return key.
    - MOUNT tape 2. Type volume ID when ready:
      - Remove the first tape and insert the second tape created during the full system backup. Enter the volume id shown on the label created during the labelit phase of the backup process. Continue as prompted by the system.
11. When the full system restore is complete, change to the multiuser mode to bring the system to a fully operational state.

Set Binary Synchronous Multi-Point Terminal Tally Thresholds

The set binary synchronous multi-point terminal tally threshold process sets a new threshold value or changes the threshold parameters for the tallies that the operating system maintains for the bisync multi-point terminal.

The tally threshold value determines the number of events associated with that tally that occur before the operating system records an exception event in the system error log.

Set Binary Synchronous Terminal Tally

The set binary synchronous terminal tally threshold process sets a new threshold value or changes the threshold parameters for the tallies that the operating system maintains for the binary synchronous terminals that are connected to the Multi-Protocol Communication Controller (MPA) bisync tributary communication links.

The tally threshold value determines the number of events associated with that tally that occur before the operating system records an exception event in the system error log.

Set Data Link Control (DLC) Terminal Tally Thresholds

The set data link control (DLC) terminal tally threshold process sets a new threshold value or changes the threshold parameters for the tallies that the operating system maintains for the DLC terminals that are connected to the Multi-Protocol Communication Controller (MPA) Data Link Control communication links.

The tally threshold value determines the number of events associated with that tally that occur before the operating system records an exception event in the system error log.

Set Gateway Secondary Tally Thresholds

The set gateway secondary tally threshold process sets a new threshold value or changes the threshold parameters for the tallies that the operating system maintains for the gateway secondary links that are connected to the Multi-Protocol Communication Controller (MPA).

The tally threshold value determines the number of events associated with that tally that occur before the operating system records an exception event in the system error log.

Set Parallel Printer Port Tally Thresholds

The set parallel printer tally threshold process sets a new threshold value or changes the threshold parameters for the tallies that the operating system maintains for the parallel printers that are connected to the parallel printer ports on any High Performance 8-Channel I/O Controller.

The tally threshold value determines the number of events associated with that tally that occur before the

operating system records an exception event in the system error log.

Set Processor Terminal Tally Thresholds

The set processor terminal tally threshold process sets a new threshold value or changes the threshold parameters for the tallies that the operating system maintains for the terminals (TTY communication links) that are connected to the Processor Memory Controller (PMC) Channel A and/or Channel B.

The tally threshold value determines the number of events associated with a tally that occur before the operating system records an exception event in the system error log.

Set TTY Terminal Tally Thresholds

The set TTY terminal tally threshold process sets a new threshold value or changes the threshold parameters for the tallies that the operating system maintains for the TTY communication links that are connected to the 8-Channel I/O Controller or the High Performance 8-Channel I/O Controller.

The tally threshold value determines the number of tally events that occur before the operating system records an exception event associated with the type of tally in the system error log.

Start Data Capture

The start data capture process captures and stores data that is transmitted and/or received on a selected communication link. The process stores the raw captured data in a disk file to be used later to help determine the accuracy level of the link. The operator must specify the name of this raw data capture file. The diagnostic system puts the specified file into the /datacap directory. Although the data capture process causes some decrease in overall system performance, it provides a valuable maintenance benefit. Use the stop data capture process to access the captured data and use the process data capture process to display and/or print the captured data.

If the data capture process is performed on a high-speed link, or on a high-volume link, the process creates a very large data capture file in a very short time. To prevent the data capture files from using excessive operating system file

space, use the remove data capture process to delete these files after they have been displayed and/or printed.

Stop Data Capture

The stop data capture process terminates any active data capture process for a specified communication link. Stop data capture provides the following format and display options during the process selection sequence.

- Dump the raw data capture file to a formatted file
- Display the file on the terminal
- Print the file on the line printer

Test a 5.25 Inch Floppy Disk

The 5.25 inch floppy disk test process provides five tests to verify the proper operation of the 5.25 Inch Disk Controller and the floppy disk drives that are connected to that controller.

The following sections describe the 5.25 inch floppy disk tests and the procedures that are used to perform those tests.

Self Test

Self test activates an on-board diagnostic program that is in the 5.25 Inch Disk Controller firmware. This test verifies only the internal functions of the controller. The controller returns a test status to identify the results of its self test. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Restore Test

The restore test sends a restore command to the selected 5.25 Inch Disk Controller and verifies that the controller returns a good status. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Seek Test

The seek test sends random read commands to read a block of data from every surface of every cylinder on the disk and verifies that each read operation is successful. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Read Data—Complete Disk

The read data test reads every block of the disk, except the maintenance cylinder, and verifies that all read operations terminate successfully. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Write/Read Data—Maintenance Cylinder

The write/read data (maintenance cylinder only) test verifies that at least one block on each maintenance cylinder surface can be written to and read from. This test verifies functions of both the controller and the drive. Because multiple bad blocks may exist on the maintenance cylinder, a single individual block failure is not reported as a test failure. Errors are reported if the controller detects multiple read or write failures, or if data miscompares occur in multiple data blocks.

Test a 5.25 Inch Hard Disk

The 5.25 inch hard disk test process provides six tests to verify the proper operation of the 5.25 Inch Disk Controller and the hard disk drives that are connected to that controller.

The following sections describe the 5.25 inch hard disk tests.

Self Test

Self test activates an on-board diagnostic program that is included in the 5.25 Inch Disk Controller firmware. This test verifies only the internal functions of the controller. The controller returns a test status to identify the results of its self test. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Restore Test

The restore test sends a restore command to the selected controller and verifies that the controller returns a good status. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Seek Test

The seek test sends random seek commands that access every surface of every cylinder on the disk and verifies

that each read is successful. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Read Data—Complete Disk

The read data test reads every block of the disk except the maintenance cylinder and verifies that all read operations terminate successfully. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Write/Read Data—Maintenance Cylinder

The write/read data (maintenance cylinder only) test verifies that at least one block on each maintenance cylinder surface can be written to and read from. This test verifies functions of both the controller and the drive. Because multiple bad blocks may exist on the maintenance cylinder, a single individual block failure is not reported as a test failure. Errors are reported if the controller detects multiple read or write failures, or if data miscompares occur in multiple data blocks.

ECC Test

The ECC test verifies the operation of the selected disk controller's Error Correction Circuitry (ECC). The test performs a normal write operation to a maintenance cylinder block and then reads the data and ECC information from that same block. The test inverts several bits of data in that block and then writes the data and ECC information back to the disk. The same block is read again, and if the controller ECC logic fails to correct the bad data, the test displays an error report and message in the In-Service Diagnostic Test Report.

Test an 8 Inch Hard Disk

The 8 inch hard disk test process provides seven tests to verify the proper operation of the Storage Module Drive (SMD) Controller in the Main Unit and the 8 inch hard disk drive(s) that are in the Mass Storage Expansion Unit.

The following sections describe the 8 inch hard disk tests.

DMA Test

The DMA test sends 32 bytes of data from memory to the Storage Module Drive (SMD) Controller via DMA

and then returns the same data from the controller to memory. The test reports an error if the data that the controller returns is not the same as the data sent to the controller.

This test verifies only the internal DMA function of the controller.

Buffer Test

The buffer test transfers 512 characters from memory to the Storage Module Drive (SMD) Controller's on-board buffer. The test reports an error if the data that the controller returns is not the same as the data that was sent to the controller.

This test verifies controller functions only.

Restore Test

The restore test sends a restore command to the Storage Module Drive (SMD) Controller and verifies that the status returned by the controller is good. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Seek Test

The seek test sends random seek commands that access every surface of every cylinder on the disk and verifies that each read is successful. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Read Data—Complete Disk

The read data test reads every block of the disk except the maintenance cylinder and verifies that all read operations terminate successfully. This test verifies functions of both the controller and the drive. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Write/Read Data—Maintenance Cylinder

The write/read data (maintenance cylinder only) test verifies that at least one block on each maintenance cylinder surface can be written to and read from. This test verifies functions of both the controller and the drive. Because multiple bad blocks may exist on the maintenance cylinder, a single individual block failure is not reported as a test failure. Errors are reported if the controller detects multiple read or write failures, or if data miscompares occur in multiple data blocks.

ECC Test

The ECC test verifies the operation of the selected disk controller's Error Correction Circuitry (ECC). The test performs a normal write operation to a maintenance cylinder block and then performs a read of the data and ECC information from that same block. The test inverts several bits of data in that block and then writes the data and ECC information back to the disk. The same block is read again, and if the controller ECC logic fails to correct the bad data, the test displays an error report and message in the In-Service Diagnostics Test Report.

Test a Binary Synchronous Terminal

The diagnostic system provides three tests to verify the proper operation of the binary synchronous terminals that are connected to the Multi-Protocol Communication Controller (MPA) bisync tributary communication link through an RS-232-C Line Interface Module (LIM).

The following sections describe the MPA bisync tributary communication tests.

Loop 1

The loop 1 test verifies the operation of the hardware controller to the DTE/DCE interface. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the data pattern that is in the diagnostic program code, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 1 test does not require a turnaround connector.

Loop 2

The loop 2 test verifies the operation of the hardware controller DTE logic, the communication circuit (telephone line), and the remote station's DCE logic. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is transmitted

and received 10 times. To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 2 test. The test uses the standard program data pattern if this option is set to no.

The loop 2 test requires a turnaround connector, unless the modem has loop 2 test capabilities.

Loop 3

The loop 3 test verifies the operation of the hardware controller DTE logic and the host DCE logic. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 3 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the data pattern that is in the diagnostic program code, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 3 test does not require a turnaround connector.

Loop 4

The loop 4 test verifies the operation of the hardware controller DTE logic, the host DCE logic, and the communication circuit (telephone line). This test verifies any part of the DCE (if any) that was included in the loop 3 test. For common carrier circuits, the loop occurs at the remote end of the communication circuit. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To select and enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 4 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the data pattern that is in the diagnostic program code, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 4 test requires a turnaround connector.

Test a Data Link Control (DLC) Terminal

The diagnostic system provides four tests to verify the proper operation of the DLC terminals that are connected to the Multi-Protocol Communication Controller (MPA) Data Link Control communication link through an RS-232-C Line Interface Module (LIM).

The DLC link must be disabled (down) to perform any test on a DLC terminal. If a DLC terminal test is selected before the link is disabled, the diagnostic system displays a 3X01 Link Busy error code on the test report screen.

The following sections describe the MPA DLC communication tests.

Loop 1

The loop 1 test verifies the operation of the hardware controller to the DTE/DCE interface. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. When the test displays the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 1 test does not require a turnaround connector.

Loop 2

The loop 2 test verifies the operation of the hardware controller DTE logic, the communication circuit (telephone line), and the remote station's DCE logic. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times. To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 2 test. The test uses the standard program data pattern if this option is set to no.

The loop 2 test requires a turnaround connector, unless the modem has loop 2 test capabilities.

Loop 3

The loop 3 test verifies the operation of the hardware

DTE logic and the host DCE logic. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 3 test. When the test displays the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (without parity).

The loop 3 test does not require a turnaround connector.

Loop 4

The loop 4 test verifies the operation of the hardware controller DTE logic, the host DCE logic, and the communication circuit (telephone line). This test verifies any part of the DCE (if any) that was not included in the loop 3 test. For common carrier circuits, the loop occurs at the remote end of the communication circuit. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To select and enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 4 test. When the test displays the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 4 test requires a turnaround connector.

Ping-Pong Test

The Ping Pong Test (PPT) transmits a test message (included in the diagnostic program or optionally entered through the keyboard) from one DLC station to another like station. The station that transmitted the message (initiator) expects the second station (responder) to return the same message. A DLC primary station may be the initiator. A DLC secondary station may be a responder only.

To transmit a specific test message or to change the number of times that the message is transmitted, set the Change Test Parameters option to yes before starting the PPT, and enter the optional information when the display requests it. If the Change Test Parameters option is set to no, the PPT uses the standard program message and transmits the message 10 times.

Test an ETHERNET Controller

The diagnostic system provides one test to verify the proper operation of the ETHERNET Controller that is in the Main Unit.

The ETHERNET network must be disabled (down) to perform this test on the ETHERNET Controller. The network manager is the only user that may disable the ETHERNET network. The System Administrator or NCR Field Engineer (NCRM) are not permitted to enable or disable this network.

The following section describes the ETHERNET Controller test.

Loop 1

The loop 1 test verifies the operation of the ETHERNET Controller to the DTE/DCE interface. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. When the test displays the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 1 test does not require a turnaround connector.

Test a Gateway Secondary

The diagnostic system provides tests to verify the proper operation of secondary Synchronous Data Link Control (SDLC) communication links and/or stations connected to the Communication/Peripheral Controller (C/PC) or the 6-2-1 Communication Controller through an RS-232-C Line Interface Module (LIM).

The tests can not be performed with an active device connected to the tested link. If a test returns a link busy status, the network manager must disconnect (via software) all devices from the link (line) being tested.

The following sections describe the Secondary SDLC communication tests.

Loop 1

The loop 1 test verifies the operation of the hardware controller to the DTE/DCE interface. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times. To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. The test uses the standard program data pattern if this option is set to no.

Loop 2

The loop 2 test verifies the operation of the hardware controller DTE logic, the communication circuit (telephone line), and the remote station's DCE logic. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times. To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 2 test. The test uses the standard program data pattern if this option is set to no.

The loop 2 test requires a modem that has manually operated loop 2 test capabilities.

Loop 3

The loop 3 test verifies the operation of the hardware controller DTE logic and the host DCE logic. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times. To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 3 test. The test uses the standard program data pattern if this option is set to no.

The loop 3 test requires a modem that has software-controlled local loopback capabilities.

Loop 4

The loop 4 test verifies the operation of the hardware controller DTE logic. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times. To select and enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 4 test. The test uses the standard program data pattern if this option is set to no.

The loop 4 test requires the installation of a turnaround connector at the I/O connector bulkhead or at the modem end of the external cable to the local modem.

Test an OMNINET Controller

The diagnostic system provides one test to verify the proper operation of the OMNINET Controller that is in the Main Unit.

The OMNINET network must be disabled (down) to perform this test on the OMNINET Controller. The network manager is the only user that may disable the OMNINET network. The System Administrator or NCR Field Engineer (NCRM) are not permitted to enable or disable this network.

The following section describes the OMNINET Controller test.

Loop 1

The loop 1 test verifies the operation of the OMNINET Controller to the DTE/DCE interface. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. When the test displays the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 1 test does not require a turnaround connector.

Test a Parallel Printer Port

The parallel printer port test process provides two tests to verify the proper operation of the parallel printer port on the High Performance 8-Channel I/O Controller.

The following sections provide the parallel printer port tests and the procedures that are used to perform those tests.

Loop 1

The loop 1 test verifies the operation of the hardware controller to the DTE/DCE interface. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes (or less) with a space between each byte. To use the data pattern that is in the diagnostic program code, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 1 test does not require a turnaround connector.

Pattern Test

The parallel printer port pattern test transmits a specified data pattern to the selected parallel printer device. The data pattern included in the diagnostic program is ABCDEFGHIJKLMNOPQRSTUVWXYZ$%&('. To enter a specific data pattern, set the Change Test Parameters option to yes before starting the test. The test continues to print the data pattern until terminated by the control-c key combination.

Select the option Pattern Test to perform the pattern test on the selected parallel printer port. The Run? indicator changes states (from no to yes or from yes to no) each time item 3 is selected.

The pattern test does not use the diagnostic test

report screen; instead, following the selection of the test options, the pattern test advances to the test configuration screen.

Test an SCSI Disk

The SCSI disk test process provides tests to verify the proper operation of the SCSI Controller and the hard disk drive(s) in the SCSI Unit.

The following sections describe the SCSI disk tests.

Unit Test

The unit test activates a series of tests to verify the performance of both the SCSI disk controller and a specified disk drive. The controller performs a combination of restore, seek, verify, and write/read to maintenance cylinder tests. The test verifies the returned status characters and displays an error report and message in the In-Service Diagnostics Test Report if a status error occurs.

Restore Test

The restore test sends a restore function to the selected disk drive. The controller terminates the instruction and returns a status at the completion of the restore function. The test verifies the functions of both the SCSI controller and the disk drive. The test verifies that the returned status is correct, and any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Seek Test

The seek test verifies the data surfaces on the disk drive. The test randomly accesses 512 sectors on the disk and verifies that the correct sectors were accessed and that each sector was read successfully. Any bad status displays an error report and message in the In-Service Diagnostics Test Report. The seek test verifies functions of both the SCSI controller and the disk drive.

Verify Data

The verify data test verifies that every user-accessible block of data on the disk can be read correctly. The test sends a series of verify instructions to the SCSI controller, which then verifies that each sector on the disk can be read without errors. Any bad status displays an error report and message in the In-Service Diagnostics Test Report. The verify data test verifies functions of both the SCSI controller and the disk drive.

Write/Read Data—Maintenance Cylinder

The write/read data test verifies that at least one block on each maintenance cylinder surface can be written to and read from. The maintenance cylinder is not typically available to the user, and its use does not destroy customer data. The test writes data patterns to the maintenance cylinder, reads the data, and compares the data read with the data written (byte for byte). Any bad status displays an error report and message in the In-Service Diagnostics Test Report. The write/read data test verifies functions of both the SCSI controller and the disk drive.

Inquiry

The inquiry test returns information about the drive and the controller. The test generates a report that displays the revision level of the controller hardware and firmware, the type of disk unit, its user-addressable capacity, and the physical number of cylinders, heads, and user-formatted sectors and tracks. Any bad status displays an error report and message in the In-Service Diagnostics Test Report.

Test an SCSI Tape

The SCSI tape test process provides tests to verify the proper operation of the SCSI Controller and the tape drive(s) in the SCSI Unit.

The following sections describe the SCSI tape tests.

Retension

The retension test verifies the function of the retension command. The test retensions the tape by streaming to end of tape (EOT) and then rewinding to the beginning of tape (BOT). Any bad status displays an error report and message in the In-Service Diagnostics Test Report. This test verifies the functions of both the SCSI controller and the tape drive.

Write/Read Data

The write/read data test checks the write/read functions of the tape drive. This test destroys data that was previously recorded on this tape, and should therefore be used only when this loss of data is acceptable.

The test rewinds the tape and writes one or more blocks of data and two file marks. It then rewinds the

tape, and does a byte-for-byte comparison of the expected and observed data. Any bad status displays an error report and message in the In-Service Diagnostics Test Report. This test verifies functions of both the SCSI controller and the tape drive.

Write/Read Data With Filemark

The write/read data with filemark test checks the write/read and filemark functions of the tape drive. The test rewinds the tape, writes two files of one or more blocks each, and marks the end of the first file with one filemark and marks the second file with two filemarks. It then rewinds the tape and searches for the filemarks. If the controller fails to detect the correct filemarks, or if it returns any bad status, the test displays an error report and message in the In-Service Diagnostics Test Report. This test verifies functions of both the controller and the tape drive.

Write Files

The write files test checks file writing functions of the tape drive. The test rewinds the tape and writes a series of files to it. Each file contains 32 blocks of data and a filemark. The last file is followed by a double filemark. The test then rewinds the tape and searches for 1, 2, 4, and 8 filemarks. After each search, the test reads the data and compares it with the expected data for the specific file. Any bad status displays an error report and message in the In-Service Diagnostics Test Report. This test verifies functions of both the SCSI controller and the tape drive.

Verify Tape

The verify tape test verifies that data can be read from the tape. The files on the tape must use a single filemark to indicate end of file and two or more consecutive filemarks to indicate end of data. The test rewinds the tape and reads it block by block and indicates the number of the block being read.

For each file, the test identifies the file number, the file size (number of blocks/file), and the number of retries required to read the file. For a unit test, use the tape created by the write file function. Any bad status displays an error report and message in the In-Service Diagnostics Test Report. This test verifies functions of both the SCSI controller and the tape drive.

Erase Tape

The erase tape test checks the erase functions of the tape drive. The test rewinds the tape and writes one or more blocks of data followed by a double filemark. It then rewinds the tape, sends an erase command to the controller, and attempts to read a block of data, expecting a no data status. Any other status displays an error report and message in the In-Service Diagnostics Test Report. This test verifies functions of both the SCSI controller and the tape drive.

Test a Streaming Tape

The streaming tape test process provides five tests to verify the proper operation of the Streaming Tape Controller and the streaming tape drive(s) that are connected to that controller.

The following sections describe the streaming tape tests.

Data Turnaround Test

The data turnaround test verifies the operation of the Streaming Tape Controller address counters. The test writes a sequential pattern (from 0 to FF) to the address counters, using input port 4, latches the counter outputs, and then reads the latches.

Retension Test

The retension test verifies the function of the retension command. This test verifies functions of both the controller and the drive. The test retensions the tape in the cartridge by streaming to the end of tape and then rewinding the tape. Any bad controller status displays an error report and message in the In-Service Diagnostics Test Report.

Write/Read Data

The write/read data test rewinds the tape, writes one or more blocks, and then reads the same block(s). This test verifies functions of both the controller and the drive. If the data read is not the same as the data written, or if the controller returns any bad status, the test displays an error report and message in the In-Service Diagnostics Test Report.

Write/Read Data W/Filemark

The write/read data w/filemark test rewinds the tape, writes two files of one or more blocks each, and marks

the end of each file with a filemark. The test rewinds the tape again and sends two read filemark instructions. If the controller fails to detect the filemarks or returns any bad status, the test displays an error report and message in the In-Service Diagnostics Test Report.

Erase

The erase test rewinds the tape, writes one block of data, sends an erase command, and then tries to read one block. The test expects a "no data' status. Any other status displays an error report and message in the In-Service Diagnostics Test Report.

Test Processor Terminals

The test processor terminals process provides five tests to verify the proper operation of the TTY terminals that are connected to the Processor Memory Controller (PMC) Channel A and/or Channel B.

None of the PMC TTY terminal tests can be performed on a busy link. All system activity on the selected link must be stopped before this test starts.

The following sections describe the five PMC TTY terminal tests.

Loop 1

The loop 1 test verifies the operation of the hardware controller to the DTE/DCE interface. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 1 test requires a turnaround connector.

Loop 2

The loop 2 test verifies the operation of the hardware controller DTE logic, the communication circuit (telephone line), and the remote station's DCE logic. A data pattern (included in the diagnostic program or

optionally entered through the keyboard) is transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 2 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 2 test requires a turnaround connector.

Loop 3

The loop 3 test verifies the operation of the hardware controller DTE logic and the host DCE logic. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 3 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 3 test requires a turnaround connector.

Loop 4

The loop 4 test verifies the operation of the hardware controller DTE logic, the host DCE logic, and the communication circuit (telephone line). This test verifies any part of the DCE (if any) that was not included in the loop 3 test. For common carrier circuits, the loop occurs at the remote end of the communication circuit. A data pattern (included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To select and enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 4 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test

Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 4 test requires a turnaround connector.

Echo

The echo test returns, to a specified device, any data that is received from that device. The test terminates only when control-c is entered at the selected device keyboard. This test uses its own test option values, and ignores any test option settings that are changed.

Test the System

The system test process performs a previously determined set of diagnostics tests that verifies the proper operation of both communication and peripheral devices. The system test is performed at the same time as other operating system processes and may test more than one hardware element at the same time. The system test is fast, not destructive to memory or peripheral data files, and requires no operator action after the test starts.

The system test does not test any TTY device that has been activated by a user login response or any TTY device that is waiting for a login response.

Test TTY Terminals

The test TTY terminals process provides five tests to verify the proper operation of the TTY terminals that are connected to an 8-Channel I/O Controller or to a High Performance 8-Channel I/O Controller.

None of the TTY terminal tests can be performed on a busy link. All system activity on the selected link must be stopped before this test starts.

The following sections describe the five TTY terminal tests.

Loop 1

The loop 1 test verifies the operation of the hardware controller to the DTE/DCE interface. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is internally transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 1 test. When the test starts, in response to the ENTER

XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 1 test does not require a turnaround connector.

Loop 2

The loop 2 test verifies the operation of the hardware controller DTE logic, the communication circuit (telephone line), and the remote station's DCE logic. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 2 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

The loop 2 test requires a turnaround connector.

Loop 3

The loop 3 test verifies the operation of the hardware controller DTE logic and the host DCE logic. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 3 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test Parameters options to no before starting the test. The standard program data pattern contains 00 thrugh 7F (with parity) or 00 through FF (no parity).

The loop 3 test requires a turnaround connector, unless the modem has local loopback capabilities.

Loop 4

The loop 4 test verifies the operation of the hardware

controller DTE logic, the host DCE logic. This test verifies any part of the DCE (if any) that was not included in the loop 3 test. For common carrier circuits, the loop occurs at the remote end of the communication circuit. A data pattern (that is included in the diagnostic program or optionally entered through the keyboard) is transmitted and received 10 times.

To select and enter a specific data pattern, set the Change Test Parameters option to yes before starting the loop 4 test. When the test starts, in response to the ENTER XMIT PATTERN instruction, enter ten bytes or less with a space between each byte. To use the standard program data pattern, set the Change Test Parameters option to no before starting the test. The standard program data pattern contains 00 through 7F (with parity) or 00 through FF (no parity).

Unmount a Floppy Disk File System

A floppy disk file system which is mounted must be unmounted before removing the floppy disk from the drive.

Test Report

The In-Service Diagnostics System uses one standard test report to display the results of the selected test or test sequence. The terminal displays the report immediately after the test or test sequence starts. The report remains on the terminal screen until the newline or return response is entered. The report is divided into three major areas as follows.

- Test Configuration
- Current Test Information
- Error Report and Messages

The following sections describe the function of each area of the report and identify the type of information that may be displayed in each field within these areas. This chapter provides this information so you may understand the test results and (if necessary) communicate these results to the System Support Analyst or NCR Field Engineer.

Test Configuration

The test configuration area of the test report identifies the mode of testing, the device(s) being tested, and the setting of the diagnostic test options. The following list describes the information that is displayed in each field of the test configuration area.

Test Mode:	[single]

The test mode field indicates whether the mode of testing is to test a single device, perform a single test, or perform a system test. The test mode field contains one of the following identifiers.

- Single
- System

Device:	[f502]

The device field identifies the standard diagnostic name for the device that is being tested, or if the system test is selected, the field contains the word [all] instead of a device name. If information about standard diagnostic device names is needed, refer to the Help step in the job selection procedure.

Options:		
	Cont-on-Error:	[yes]
	Change Test Parm:	[yes]
	Concurrent:	[no]
Loops:		[00100]

The options field has four sub-fields. Each sub-field describes the setting of one of the four diagnostic test options. The first three option fields display yes if the option is selected, or no if the option is not selected. The fourth option field (loops) displays a decimal number that represents the number of loops to be performed in this test sequence.

NOTE: If the loops option value is set to 00000, the diagnostic system repeats the test continuously until control-c is entered.

Current Test Information

The current test information area of the test report provides information about the test that is currently being processed. The following sections describe each field in the current test information area.

Test: [ ]

The test field identifies the name of the test that is currently being processed. Each job description section in this chapter identifies the test names that may be selected in that job. Return to that section for information about the function of the test that is currently being processed.

Device: [ ]

The device field identifies the standard diagnostic name of the device that is currently being tested. If information about standard diagnostic device names is needed, refer to the Help step in the job procedure.

Status: [ ]

The status field indicates the status of the test that is currently being processed. This field displays one of the following status descriptions.

- Passed
- Failed
- Skipped
- Running

Loop: [ ]

The loop field identifies the number of the test loop that is currently being processed. The diagnostic system increments this number by one each time the test or test sequence is completed. Depending on the time required to perform the test or test sequence, this value may be incremented very quickly.

Failures: [ ]

The failures field identifies the total number of errors that have occurred. The errors may have been caused by hardware, software, media, or by the operator.

Error Report and Messages

The error report and messages area of the test report provides information about any error that prevents the test from continuing. The following sections describe the function of each field in the error information and messages area.

Error Code: [ ]

The error code field is a four-character (two-byte) hexadecimal value that identifies the cause of the error. Each diagnostic generates its own unique error code values. For descriptions of all In-Service diagnostics error codes, refer to the "Diagnostic Error Codes" section of this chapter.

Module Addr: [ ]

The module address field identifies the type of module that was being tested when the error occurred and the hexadecimal address of the controller that is associated with the tested module. This field does not identify the specific device or the specific module (multiple modules of the same type may be present). Typical names that are displayed in the module field are:

- Octal I/O (for the 8-Channel I/O Controller or the High Performance 8-Channel I/O Controller)
- PMC (for the Processor Memory Controller)
- MPA (for the Multi-Protocol Communication Controller)
- 5 in disk (for 5.25 Inch Disk Controller or either the Winchester or floppy disk drive)
- 8 in disk (for the Storage Module Drive Controller or 8 Inch Winchester disk drive)
- tape (for the Streaming Tape Controller or streaming tape drive)
- TOWERNET (for the ETHERNET or OMNINET network controllers)

Test: [ ]

The test field identifies the name of the test that failed. Each job description section in this chapter identifies the test names that may be selected in that job. Return to that section for information about the function of the failing test.

Device:	[ ]

The device field identifies the standard diagnostic name of the device that failed. If information about standard diagnostic device names is needed, refer to the Help step in the job procedure.

Loop:	[ ]

The loop field identifies the number of the test loop that was being processed when the error occurred.

Error: Report	[ ]

The error report field is the first line of a multiple-line error report. This field contains a general description of the error and is followed by a variable number of fields containing both general and specific information about the error.

The following list represents the information in a typical streaming tape test error report. Error reports may contain more or less information than is shown in this example.

Error:	[ ]		
Block Number:	[ ]	Block Offset:	[ ]
Expected Data:	[ ]		
Observed Data:	[ ]		

The following list represents the information in a typical disk test error report. Error reports may contain more or less information shown in this example.

Error:	[ ]
Command = [ ]	Status = [ ]
Head = [ ]	Sector = [ ] Cylinder = [ ] Block = [ ]
Some error reports contain one or two descriptive messages on this line	

These descriptive messages do not always indicate that the hardware failed. These messages often describe software and operator errors and may contain an instruction that describes the action required to correct the error.

File Error:	[ ]
or	
INSERV Error:	[ ]

If a condition occurs that prevents the selected test from starting, the file error field contains a standard operating system error message to identify that condition. Errors in the inserv field are displayed by the diagnostic system, and mean the same things as file errors. These messages do not indicate that the hardware failed. A typical file error message is:

```
Enter <Control C> to stop
```

This message shows how to terminate the test or test sequence before the specified number of loops is complete. Enter control-c, and when the current loop terminates, the diagnostic system displays the newline request as follows.

```
Enter NEW LINE to continue
```

This message occurs when the test or test sequence terminates. When the NEW LINE response is entered, the diagnostic system returns to the Maintenance and Diagnostics menu.

Diagnostic Error Codes

The In-Service Diagnostic System error codes provide information about the cause of errors that occur during the processing of a diagnostic test. These error codes are part of the diagnostics test report and are also included (as ERROR CODE 1) in the error log record in reserved system memory. For information about the system error log, refer to the *System Information* chapter of this book.

Because some diagnostics can not be performed without the use of special tools, such as an oscilloscope, these diagnostics can not be processed by the system administrator, and these jobs are not described in this chapter. However, this section describes all diagnostic error codes to provide a complete error code reference.

Error Code Format

All diagnostic error codes are four-character hexadecimal values that occur in the format WXYZ, where the values of WXYZ are defined as follows.

W

W identifies the type of device that was being tested when the error occurred. The following list shows the valid values of W and the type of device that is associated with each value.

- 0 = 8-Channel I/O device
- 1 = Processor Memory Controller module
- 2 = Not used
- 3 = Multi-Protocol Communication Controller In-House device
- 4 = Multi-Protocol Communication Controller Bisync device
- 5 = 5.25 inch floppy disk device
- 6 = 5.25 inch Winchester disk device
- 7 = 8 inch Winchester disk device
- 8 = streaming tape device
- 9 = ETHERNET Controller
- A = SCSI disk device
- B = SCSI tape device

X

X identifies the name of the specific test that was being processed when the error occurred. The meaning of the

X values depends on the value of W (type of device being tested). For example, if the value of W is 0, X value of 1 means that the loop 1 test failed; but if W is 8 and X is 1, the data turnaround test failed. To determine the meaning of X in any specific error code, refer to the section that describes the error codes for the correct value of W.

YZ

YZ describes the specific condition that caused the error. Some YZ values display the actual hardware status code, and other YZ values define conditions that are not actual hardware failures. For example, in the 8 inch streaming tape tests, a YZ value of 03 is device busy (from the hardware status code) and a YZ value of 02 indicates that the device name is not a valid name for that type of device.

Error Codes

This section lists the diagnostic error codes in numerically ascending sequence.

0XYZ Error Codes

All error codes with the most significant character set to zero (0) identify errors that occurred during a test of the 8-Channel I/O Controller. The following list identifies the valid values and meanings of the character X.

1 = The Loop 1 test failed
2 = The Loop 2 test failed
3 = The Loop 3 test failed
4 = The Loop 4 test failed
5 = The Ping Pong test failed
6 = The Transmit Continuous Mark test failed
7 = The Transmit Continuous Space test failed
8 = The Transmit Continuous Pattern test failed
9 = The Basic Mode Echo test failed

The following list shows all valid values of YZ.

0X01

The selected link is busy. All system activity on this link must be stopped before starting this test.

0X02

The data pattern that was received is not the same as the transmitted data pattern.

0X03
The device name specified an invalid controller number.

0X04
The device name specified a controller that is not installed in the system.

0X05
The device name specified an invalid device number.

0X06
The requested diagnostic function is invalid or the function can not be performed.

0X07
The buffer size, as specified during the selection of the data capture utility, is not valid.

0X08
The number of loops (loop count) specified during the test selection is not valid.

0X09
An invalid tally type was specified during the selection of the driver tally utility.

0X0a
A parity error occurred.

0X0b
A framing error occurred.

0X0c
A data overrun occurred.

0X0d
A data overflow occurred.

0X0e
A link time-out occurred.

0X0f
The selected controller is not ready.

0X10
The selected communication link is not established. The most probable causes are the loop function of the modem is not enabled or the turnaround connector is not installed.

0X11
The transmission speed, as specified in response to the ENTER XMIT RATE instruction, is not a valid xmit (baud) rate.

0X12
The turnaround test connector is installed. This connector must be removed before the selected sequence can be processed.

0X13

One or more of the communication line signals (DSR, DTR, or so on) is in the wrong state.

0X14

A data transmission error occurred during the selected test.

0x15

The data capture process is already active for the specified link.

0Xff

A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

1XYZ Error Codes

All error codes with the most significant character set to one (1) identify errors that occurred during a test of a PMC TTY device. The following list identifies the valid values and meanings of the character X.

1 = The Loop 1 test failed
2 = The Loop 2 test failed
3 = The Loop 3 test failed
4 = The Loop 4 test failed
5 = The Ping Pong test failed
6 = The Transmit Continuous Mark test failed
7 = The Transmit Continuous Space test failed
8 = The Transmit Continuous Pattern test failed
9 = The Basic Mode Echo test failed

The following list shows all valid values of YZ.

1X01

The selected link is busy. All system activity on this link must be stopped before starting this test.

1X02

The data pattern that was received is not the same as the transmitted data pattern.

1X03

The device name specified an invalid controller number.

1X04

The device name specified a controller that is not installed in the system.

1X05
The device name specified an invalid device number.

1X06
The requested diagnostic function is invalid or the function can not be performed.

1X07
The buffer size, as specified during the selection of the data capture utility, is not valid.

1X08
The number of loops (loop count) specified during the test selection is not valid.

1X09
An invalid tally type was specified during the selection of the driver tally utility.

1X0a
A parity error occurred.

1X0b
A frame check sequence error occurred.

1X0c
A data overrun occurred.

1X0d
A data overflow occurred.

1X0e
A link time-out occurred.

1X0f
The selected controller is not ready.

1X10
The selected communication link is not established. The most probable causes are the loop function of the modem is not enabled or the turnaround connector is not installed.

1X11
The transmission speed, as specified in response to the ENTER XMIT RATE instruction, is not a valid xmit (baud) rate.

1X12
The turnaround test connector is installed. This connector must be removed before the selected sequence can be processed.

1X13
One or more of the communication line signals (DSR, DTR, or so on) is in the wrong state.

1X14
A data transmission error occurred during the selected test.

1X15
The data capture process is already active for the specified link.

1Xff
A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

3XYZ Error Codes

All error codes with the most significant character set to three (3) identify errors that occurred during a test of a MPA In-house DLC communication device. The following list identifies the valid values and meanings of the character X.

1 = The Loop 1 test failed
2 = The Loop 2 test failed
3 = The Loop 3 test failed
4 = The Loop 4 test failed
5 = The Ping Pong test failed
6 = The Transmit Continuous Mark test failed
7 = The Transmit Continuous Space test failed
8 = The Transmit Continuous Pattern test failed
9 = The Echo test failed

The following list shows all valid values of YZ.

3X01
The selected link is busy. All system activity on this link must be stopped before starting this test.

3X02
The data pattern that was received is not the same as the transmitted data pattern.

3X03
The device name specified an invalid controller number.

3X04
The device name specified a controller that is not installed in the system.

3X05
The device name specified an invalid device number.

3X06
The requested diagnostic function is invalid or the function can not be performed.

3X07
The buffer size, as specified during the selection of the data capture utility, is not valid.

3X08
The number of loops (loop count) specified during the test selection is not valid.

3X09
An invalid tally type was specified during the selection of the driver tally utility.

3X0a
A parity error occurred.

3X0b
A frame check sequence error occurred.

3X0c
A data overrun occurred.

3X0d
A data overflow occurred.

3X0e
A link time-out occurred.

3X0f
The selected controller is not ready.

3X10
The selected communication link is not established. The most probable causes are the loop function of the modem is not enabled or the turnaround connector is not installed.

3X11
The transmission speed, as specified in response to the ENTER XMIT RATE instruction, is not a valid xmit (baud) rate.

3X13
One or more of the communication line signals (DSR, DTR, so on) is in the wrong state.

3X14
A data transmission error occurred during the selected test.

3X15
The data capture process is already active for the specified link.

3Xff
A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

4XYZ Error Codes

All error codes with the most significant character set to four (4) identify errors that occurred during a test of an MPA Bisynchronous Tributary communication device. The following list identifies the valid values and meanings of the character X.

1 = The Loop 1 test failed
2 = The Loop 2 test failed
3 = The Loop 3 test failed
4 = The Loop 4 test failed
5 = The Ping Pong test failed
6 = The Transmit Continuous Mark test failed
7 = The Transmit Continuous Space test failed
8 = The Transmit Continuous Pattern test failed
9 = The Echo test failed

The following list shows all valid values of YZ.

4X01
The selected link is busy. All system activity on this link must be stopped before starting this test.

4X02
The data pattern that was received is not the same as the transmitted data pattern.

4X03
The device name specified an invalid controller number.

4X04
The device name specified a controller that is not installed in the system.

4X05
The device name specified an invalid device number.

4X06
The requested diagnostic function is invalid or the function can not be performed.

4X07
The buffer size, as specified during the selection of the data capture utility, is not valid.

4X08
The number of loops (loop count) specified during the test selection is not valid.

4X09
An invalid tally type was specified during the selection of the driver tally utility.

4X0a
A parity error occurred.

4X0b
A frame check sequence error occurred.

4X0c
A data overrun occurred.

4X0d
A data overflow occurred.

4X0e
A link time-out occurred.

4X0f
The selected controller is not ready.

4X10
The selected communication link is not established. The most probable causes are the loop function of the modem is not enabled or the turnaround connector is not installed.

4X11
The transmission speed, as specified in response to the ENTER XMIT RATE instruction, is not a valid xmit (baud) rate.

4X13
One or more of the communication line signals (DSR, DTR, so on) is in the wrong state.

4X14
A data transmission error occurred during the selected test.

4X15
The data capture process is already active for the specified link.

4Xff
A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

5XYZ Error Codes

All error codes with the most significant character set to five (5) identify errors that occurred during a test of a 5.25 Inch Disk Controller or one of the 5.25 Inch Floppy Disk drives that are connected to that controller. The following list identifies the valid values and meanings of the character X.

2 = The Self Test test failed
3 = The Controller Buffer test failed
4 = The Restore test failed
5 = The Seek test failed
6 = The Read Data—Entire Disk test failed
7 = The Write/Read Data—Maintenance Cylinder test failed
8 = The ECC test failed

The following list shows all valid values of YZ.

5X01
The selected disk drive returned a bad status. Refer to the Function And Status Codes chapter in the *Hardware Service* book for a description of the disk drive status codes.

5X02
The selected disk drive returned a write fault status.

5X03
The selected disk drive is not ready.

5X04
The selected disk drive returned a seek error status.

5X21
The selected 5.25 Inch Disk Controller returned a bad status. Refer to the *Function And Status Codes* chapter in the *Hardware Service* book for a description of the 5.25 Inch Disk Controller status codes.

5X22
The selected 5.25 Inch Disk Controller failed to generate a required interrupt within the allotted time.

5X23
The selected 5.25 Inch Disk Controller caused a system overload error.

5X24
A Multibus parity error occurred.

5X25
A SASI bus parity error occurred.

5X26
The selected 5.25 Inch Disk Controller stays active.

5X27
The selected 5.25 Inch Disk Controller generated an error, but the specific cause of the error can not be determined.

5X41

The 5.25 Inch Disk Controller returned an End Of Media (EOM) status. This error is usually caused by the media.

5X42

The 5.25 Inch Disk Controller returned a bad media status. This error is usually caused by the media.

5X43

There is a bad block on the disk media.

5X44

The media in the selected disk drive does not contain the expected format information. Reformat the disk or use a different disk.

5X45

A correctable data error occurred. This error is caused by the media.

5X46

An uncorrectable data error occurred. This error is caused by the media.

5X51

The data read from the selected disk drive is not the same as the data previously written to the same disk. This data miscompare error is caused by either the 5.25 Inch Disk Controller or the disk drive.

5X5f

The 5.25 Inch Disk Controller's Error Check and Correct (ECC) logic failed. The error correction data generated by the controller is not correct for the data error that was created by the diagnostic test.

5X81

The requested function is not valid. This is a software error.

5X82

The specified disk address is not valid. This is a software error.

5X83

The I/O Parameter Block (IOPB) contains a bad parameter. This is a software error.

5Xf0

The disk media is write protected. This is an operator error.

5Xf1

The specified device name is not valid. This is an operator error.

5Xf2

The device name specifies a controller that is not installed in the system. This is an operator error.

5Xf3

The boot block does not contain the correct information. This is an operator error.

5Xf4

A media change status was detected. Since the last drive access, the drive status changed from not ready to ready.

5Xff

A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

6XYZ Error Codes

All error codes with the most significant character set to six (6) identify errors that occurred during a test of a 5.25 Inch Disk Controller or one of the 5.25 Inch Winchester Disk drives that are connected to that controller. The following list identifies the valid values and meanings of the character X.

2 = The Self Test test failed
3 = The Controller Buffer test failed
4 = The Restore test failed
5 = The Seek test failed
6 = The Read Data—Entire Disk test failed
7 = The Write/Read Data—Maintenance Cylinder test failed
8 = The ECC test failed

The following list shows all valid values of YZ.

6X01

The selected disk drive returned a bad status. Refer to the Function And Status Codes chapter in the *Hardware Service* book for a description of the disk drive status codes.

6X02

The selected disk drive returned a write fault status.

6X03

The selected disk drive is not ready.

6X04

The selected disk drive returned a seek error status.

6X21

The selected 5.25 Inch Disk Controller returned a bad status. Refer to the *Function And Status Codes* chapter in the *Hardware Service* book for a description of the 5.25 Inch Disk Controller status codes.

6X22

The selected 5.25 Inch Disk Controller failed to generate a required interrupt within the allotted time.

6X23

The selected 5.25 Inch Disk Controller caused a system overload error.

6X24

A Multibus parity error occurred.

6X25

A SASI bus parity error occurred.

6X26

The selected 5.25 Inch Disk Controller stays active.

6X27

The selected 5.25 Inch Disk Controller generated an error, but the specific cause of the error can not be determined.

6X41

The 5.25 Inch Disk Controller returned an End Of Media (EOM) status. This error is usually caused by the media.

6X42

The 5.25 Inch Disk Controller returned a bad media status. This error is usually caused by the media.

6X43

There is a bad block on the disk media.

6X44

The media in the selected disk drive does not contain the expected format information. Reformat or replace the disk.

6X45

A correctable data error occurred. This error is caused by the media.

6X46

An uncorrectable data error occurred. This error is caused by the media.

6X51

The data read from the selected disk drive is not the

same as the data previously written to the same disk. This data miscompare error is caused by either the 5.25 Inch Disk Controller or the disk drive.

6X5f

The 5.25 Inch Disk Controller's Error Check and Correct (ECC) logic failed. The error correction data generated by the controller is not correct for the data error that was created by the diagnostic test.

6X81

The requested function is not valid. This is a software error.

6X82

The specified disk address is not valid. This is a software error.

6X83

The I/O Parameter Block (IOPB) contains a bad parameter. This is a software error.

6Xf0

The disk is write protected. This is an operator error.

6Xf1

The specified device name is not valid. This is an operator error.

6Xf2

The device name specifies a controller that is not installed in the system. This is an operator error.

6Xf3

The boot block does not contain the correct information. This is an operator error.

6Xf4

A media change status was detected. Since the last drive access, the drive status changed from not ready to ready.

6Xff

A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

7XYZ Error Codes

All error codes with the most significant character set to seven (7) identify errors that occurred during a test of the 8 Inch Storage Module Drive Controller (SMD) or one of the 8 Inch Winchester Disk drives that are connected to that controller. The following list identifies the valid values and meanings of the character X.

1 = The DMA test failed
2 = The Self Test test failed
3 = The Controller Buffer test failed
4 = The Restore test failed
5 = The Seek test failed
6 = The Read Data—Entire Disk test failed
7 = The Write/Read Data—Maintenance Cylinder test failed
8 = The ECC test failed

The following list shows all valid values of YZ.

7X01
The selected disk drive returned a bad status. Refer to the Function And Status Codes chapter in the *Hardware Service* book for a description of the disk drive status codes.

7X02
The selected disk drive returned a write fault status.

7X03
The selected disk drive is not ready.

7X04
The selected disk drive returned a seek error status.

7X21
The selected 8 Inch SMD Controller returned a bad status. Refer to the *Function And Status Codes* chapter in the *Hardware Service* book for a description of the 8 Inch Storage Module Drive Controller (SMD) status codes.

7X22
The selected 8 Inch SMD Controller failed to generate a required interrupt within the allotted time.

7X23
The selected 8 Inch SMD Controller caused a system overload error.

7X24
A Multibus parity error occurred.

7X25
A SASI bus parity error occurred.

7X26
The selected 8 Inch SMD Controller remains active all of the time.

7X27
The selected 8 Inch SMD Controller generated an error,

but the specific cause of the error can not be determined.

7X41

The 8 Inch SMD Controller returned an End Of Media (EOM) status. This error is usually caused by the media.

7X42

The 8 Inch SMD Controller returned a bad media status. This error is usually caused by the media.

7X43

There is a bad block on the disk media.

7X44

The media in the selected disk drive does not contain the expected format information. Reformat or replace the disk.

7X45

A correctable data error occurred. This error is caused by the media.

7X46

An uncorrectable data error occurred. This error is caused by the media.

7X51

The data read from the selected disk drive is not the same as the data previously written to the same disk. This data miscompare error is caused by either the 8 Inch SMD Controller or the disk drive.

7X5f

The 8 Inch SMD Controller's Error Check and Correct (ECC) logic failed. The error correction data generated by the controller is not correct for the data error that was created by the diagnostic test.

7X81

The requested function is not valid. This is a software error.

7X82

The specified disk address is not valid. This is a software error.

7X83

The I/O Parameter Block (IOPB) contains a bad parameter. This is a software error.

7Xf0

The disk is write protected. This is an operator error.

7Xf1

The specified device name is not valid. This is an operator error.

7Xf2

The device name specifies a controller that is not installed in the system. This is an operator error.

7Xf3

The boot block does not contain the correct information. This is an operator error.

7Xf4

A media change status was detected. Since the last drive access, the drive status changed from not ready to ready.

7Xff

A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

8XYZ Error Codes

All error codes with the most significant character set to eight (8) identify errors that occurred during a test of the Streaming Tape Controller or one of the streaming tape drives that are connected to that controller. The following list identifies the valid values and meanings of the character X.

1 = The Data Turnaround test failed
2 = The Retension Test failed
3 = The Write/Read Data test failed
4 = The Write/Read Filemark test failed
5 = The Erase test failed

The following list shows all valid values of YZ.

8X01

The Streaming Tape Controller indicates that it received an invalid diagnostic instruction. This is a software error.

8X02

The specified device name is not a valid streaming tape device name.

8X03

The selected streaming tape drive returned a busy status.

8X04

The selected streaming tape drive does not contain a tape cartridge or the cartridge is not properly installed. Install the desired cartridge and try the test again.

8X05

The cartridge in the selected streaming tape drive is write protected. This is an operator error. Install the correct cartridge and try the test again.

8X06

An unrecoverable data error occurred during the read/write operation.

8X07

A soft error occurred during the read/write operation. Retries were required or underruns occurred.

8X08

No data was detected during the selected read operation. This error is usually caused by a blank tape.

8X09

The test failed to find the required filemark.

8X0a

The Streaming Tape Controller returned an End Of Track status.

8X0b

The Streaming Tape Controller can not select the specified streaming tape drive.

8X0c

The Streaming Tape Controller failed to complete the data turnaround test.

8X0d

The Streaming Tape Controller failed to reset properly.

8X0e

The Streaming Tape Controller generated an error, but the specific cause of the error can not be determined.

8X0f

The Streaming Tape Controller failed to generate a required interrupt within the allotted time.

8X10

The streaming tape drive returned an unexpected End Of File status.

8X11

The Streaming Tape Controller returned an Invalid Command status.

8X12

The device name specified a Streaming Tape Controller that is not installed in the system. This is an operator error.

8Xf0

A soft error occurred during the tape operation. Retries were required or underruns occurred.

8Xf1

The data pattern that was received from the Streaming Tape Controller is not the same data pattern that was sent to that controller.

8Xf2

The streaming tape drive failed to erase the tape. A read data operation indicates that cartridge contains data following an erase function.

8Xff

A problem prevents the streaming tape diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a streaming tape hardware failure.

9XYZ Error Codes

All error codes with the most significant character set to nine (9) identify errors that occurred during a test of the ETHERNET Controller. The following list identifies the valid values and meanings of the character X.

1 = The Loop 1 test failed

The following list shows all valid values of YZ.

9101

The selected link is busy. All system activity on this link must be stopped before starting this test. The ETHERNET network manager must disable the network. Neither the System Administrator nor the NCR Field Engineer can disable the ETHERNET network.

9102

The data pattern that was received is not the same as the transmitted data pattern.

9103

The device name specified an invalid controller number.

9104

The device name specified a controller that is not installed in the system.

9105

The device name specified an invalid device number.

9106
The requested diagnostic function can not be performed.
9107
The buffer size, as specified during the selection of the data capture utility, is not valid.
9108
The number of loops (loop count) specified during the test selection is not valid.
9109
An invalid tally type was specified during the selection of the driver tally utility.
910a
A parity error occurred.
910b
A framing error occurred.
910c
A data overrun occurred.
910d
A data overflow occurred.
910e
A link time-out occurred.
910f
The selected controller is not ready.
9110
The selected communication link is not established.
9111
The transmission speed, as specified in response to the ENTER XMIT RATE instruction, is not a valid xmit (baud) rate.
91ff
A problem prevents the diagnostic test from starting. This error is usually caused by a software or file problem and does not indicate a hardware failure.

AXYZ Error Codes

All error codes with the most significant character set to A identify errors that occurred during a test of an SCSI controller and the SCSI disk drive associated with that controller. The following list identifies the valid values and meanings of the error code character X.

- 0 = The host controller detected SCSI link errors
- 1 = The controller detected a recoverable error
- 2 = The disk drive is not ready

- 3 = The controller detected a media error
- 4 = The controller detected a hardware error
- 5 = The controller detected an invalid request (software error)
- 6 = The controller detected a media change status (unit attention)
- 7 = The drive is write protected
- D = A driver error occurred (software error)
- E = The controller detected an error
- F = A data miscompare occurred

The following list shows the values for YZ. Note that the meaning of YZ depends on the value of X. The value of y indicates the following:

- 2 = The host controller could recover from the error indicated by the character Z.
- 3 = The host controller could not recover from the error indicated by the character Z.

The value of Z identifies the type of error. The following list shows the valid values of Z.

- 1 = Multibus memory error
- 2 = Select/reselect timeout (device does not respond to select)
- 3 = SCSI bus parity error
- 4 = SCSI message parity error
- 5 = Message reject sent
- 6 = Message reject received
- 7 = Message not sent
- 9 = Host controller hardware error

A040
: The command terminated with a bus reset. This usually means that there is a problem with the link protocol.

A050
: The command terminated with a command block error. This usually means that there is a problem with the link protocol.

A080
: The host controller received an unexpected reselection from another device on the SCSI bus. This usually indicates an error in the link protocol.

A081
The host controller detected an ID error. This usually indicates an error in the link protocol.

A082
The host controller received an unexpected abort from the SCSI bus. This usually indicates an error in the link protocol.

A083
The host controller received an invalid device reset from the SCSI bus. This usually indicates an error in the link protocol.

A084
The controller bus was reset by some other device on the SCSI bus during the performance of an instruction.

A085
A hardware error occurred in the host. No communication is possible on the link.

A086
The host controller received an unexpected selection from the SCSI bus. This usually indicates an error in the link protocol.

A1YZ
The controller detected a recoverable error.

A2YZ
The disk drive is not ready.

A3YZ
The controller detected a media error. of YZ.

A4YZ
The controller detected a hardware error.

A5YZ
The controller detected an invalid request (software error).

A6YZ
The controller detected a media change (unit attention).

A7YZ
The drive is write protected.

AD01
The selected function is not available. There is a software problem with the diagnostic program or the driver.

AD02
The program sent an invalid function code. There is a software problem with the diagnostic program or the driver.

AD03
The selected function can not be performed successfully. There is a communication failure on the link.

AD04
The driver can not communicate with the host controller. There is a communication failure on the link.

AE00
The function terminated successfully. Although an error was indicated, no error could be found.

AE02
The SCSI controller is busy. Another processor is accessing the controller.

AE12
Some other processor on the SCSI bus has already reserved the SCSI controller.

AF00
The data read was not the data that was expected; however, no additional errors were detected.

AF01
The data read was not the data that was expected, and additional errors were detected.

BXYZ Error Codes

All error codes with the most significant character set to B identify errors that occurred during a test of an SCSI controller and an SCSI tape drive that is associated with that controller. The following list identifies the valid values and meanings of the error code character X.

- 0 = The host controller detected SCSI link errors
- 1 = The controller detected a recoverable error
- 2 = The tape drive is not ready
- 3 = The controller detected a media error
- 4 = The controller detected a hardware error
- 5 = The controller detected an invalid request (software error)
- 6 = The controller detected a media change status (unit attention)
- 7 = The drive is write protected
- 8 = The tape is blank (contains no data)
- D = A driver error occurred (software error)
- E = The controller detected an error
- F = A data miscompare occurred

The following list shows the values for YZ. Note that the meaning of YZ depends on the value of X. The value of Y indicates the following:

- 2 = The host controller could recover from the error indicated by the character Z.
- 3 = The host controller could not recover from the error indicated by the character Z.

The value of Z identifies the type of error. The following list shows the valid values of Z.

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- 2 = Select/reselect timeout (device does not respond to select)
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B082
: The host controller received an unexpected abort from the SCSI bus. This usually indicates an error in the link protocol.

B083
: The host controller received an invalid device reset from the SCSI bus. This usually indicates an error in the link protocol.

B084
The controller bus was reset by some other device on the SCSI bus during the performance of an instruction.

B085
A hardware error occurred in the host. No communication is possible on the link.

B086
The host controller received an unexpected selection from the SCSI bus. This usually indicates an error in the link protocol.

B1YZ
The controller detected a recoverable error.

B2YZ
The tape drive is not ready.

B3YZ
The controller detected a media error.

B4YZ
The controller detected a hardware error.

B5YZ
The controller detected an invalid request (software error).

B6YZ
The controller detected a media change (unit attention).

B7YZ
The drive is write protected.

B8YZ
The tape is blank (contains no data).

BD01
The selected function is not available. There is a software problem with the diagnostic program or the driver.

BD02
The program sent an invalid function code. There is a software problem with the diagnostic program or the driver.

BD03
The selected function can not be performed successfully. There is a communication failure on the link.

BD04
The driver can not communicate with the host controller. There is a communication failure on the link.

BE00
The function terminated successfully. Although an error was indicated, no error could be found.

BE02
The SCSI controller is busy. Another processor is accessing the controller.

BE12
Some other processor on the SCSI bus has already reserved the SCSI controller.

BF00
The data read was not the data that was expected; however, no additional errors were detected.

BF01
The data read was not the data that was expected, and additional errors were detected.

SEE REVERSE SIDE OF THIS FORM FOR INSTRUCTIONS

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