

TOPS-20
System Manager's Guide

VERSION 6.0 INTERIM RELEASE DRAFT

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This document is intended for the person who is responsible for making final decisions for setting up and maintaining the efficient operation of a TOPS-20 installation.

Operating System: TOPS-20 (KL Model B), V6

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PREFACE

The TOPS-20 System Manager's Guide is written for the person who is responsible for establishing policies and procedures for a timesharing and/or batch processing installation, using the TOPS-20 Operating System. Usually, this person is responsible for setting up and maintaining both the system hardware and software. The Site Management Guide and the TOPS-20 Operator's Guide provide you and your operations people with the necessary information to maintain your system hardware. These two manuals are referenced throughout this guide.

This guide deals primarily with your system software. It contains general suggestions for planning the installation of your software and for setting up your computer room to begin operations. The guide contains hints and suggestions for your system's operation, including when, and many times why, particular functions or procedures should be considered. It assumes that your system operator is responsible for implementing many of the decisions you make. In most cases, where lengthy implementation procedures are required, the appropriate reference is noted.

Chapters 1 and 2 describe the documentation, system logs, and special forms that you should have available to you, and in some cases, to system users. Chapter 2 also includes preliminary planning functions that you can do before the software is installed.

Chapter 3 describes the system directories and files that your system contains immediately after you install the software. It also describes the mechanisms you can use to change the installed TOPS-20 batch system and to test the integrity of your newly installed or updated system.

- Chapter 4 describes using your disk-pack and disk-drive resources to set up disk structures in a way that best suits your installation's needs. It also includes guidelines for determining the available disk space that you have to create user directories.
- Chapter 5 describes creating and maintaining directories. It includes a detailed description of the three methods of administration you can choose from to control the creation and maintenance of directories. It describes how to use directory and file protection codes to expand or limit the type of access users can have to directories and files, and how to place users and directories in groups so that users can share files.
- Chapter 6 describes the TOPS-20 accounting facility. This description includes how to choose an accounting scheme, how to create accounting files, and how to set the system to begin validating accounts.
- Chapter 7 describes backing up your disk structures onto magnetic tape soon after software installation. It recommends the supplies needed and procedures that you should follow to save all your directories and files on a daily basis, and how to create a system crash tape in the event of a major problem with the file system.
- Chapter 8 describes how you can use magnetic tapes to store important files (file archiving) and to save valuable disk space by copying infrequently accessed files to tape (file migration). It also describes how to give control of tape drive usage to the system and the operator (tape drive allocation), and how to set up your system to use labeled tapes (tape labeling).
- Chapter 9 describes the procedures you must follow in the event that you have a problem with the file system or that a user has lost the files in a directory. It describes using your system crash tape and your daily backup tapes to resolve these problems.

- Chapter 10 describes the tuning mechanisms that allow you to change the behavior of your system. Each description includes why you may want to use a particular mechanism, how to use it, and the effects it may have on your system.
- Chapter 11 describes the access control mechanisms that you can use to alter system policy decisions or to increase security against unauthorized system use. It includes the type of policy changes you may want to make at your installation.
- Chapter 12 describes the Common File System, a software feature of TOPS-20. This chapter discusses the rules, options, and restrictions associated with sharing files among systems.

The following conventions and symbols are used throughout this guide:

Convention/Symbol	Description
n-	n refers to the latest version of a particular file, for example, 6-CONFIG.CMD.
UPPERCASE	In user input representations, indicates information that must be entered exactly as shown.
lowercase	In user input representations, indicates variable information that is determined by you.
red print	Indicates the information that you must type at your terminal.
()	In user input representations, encloses guide word information. Pressing the ESCAPE or ALTMODE key on your terminal causes guidewords to be printed by the computer.
<RET>	Indicates you should press the RET or RETURN key on your terminal. Unless otherwise noted, pressing RETURN terminates all command or input strings.
CTRL/	Indicates you should press the CTRL key on your terminal. The CTRL key is always used in conjunction with another key, for example, CTRL/Z.

CHAPTER 1

DOCUMENTATION

Section 1.1 describes the documentation provided by DIGITAL and recommends the manuals with which you should be familiar to manage your system. Section 1.2 describes adding your own documentation, for example, special forms, to the documentation you receive from DIGITAL. Be sure you have all available documentation convenient to your system users.

1.1 DOCUMENTS AVAILABLE FROM DIGITAL

All documentation for the TOPS-20 Operating System is contained in the TOPS-20 Software Notebook Set. This notebook set contains information pertaining to the most recent version of TOPS-20. It is organized functionally to facilitate referencing manuals. Each manual contains cross references to other manuals within the set that further explain a subject.

This manual assumes that you are familiar with some of the manuals in the notebook set. In particular, you should be familiar with the information in the TOPS-20 Operator's Guide, the TOPS-20 User's Guide, the DECSYSTEM-20 Technical Summary, and the TOPS-20 KL10 Model B Installation Guide. Any additional documents that you need depend on the configuration of your system. For example, if your system has IBM emulation and termination (DNxx), you should be familiar with the IBM Emulation-Termination, DN64 DN65 Manual. It includes installation procedures and descriptions of the operator and user interfaces. If your system is connected to the ARPA network, you should have access to the TOPS-20AN Monitor Calls User's Guide and the TOPS-20AN User's Guide. Finally, if your system has DECnet, you should be familiar with the various DECnet-20 manuals. The TOPS-20 Software Notebook Set includes all of these manuals.

In addition to the TOPS-20 Software Notebook Set, you receive the TOPS-20 Beware File Listing. It is distributed with the software installation and distribution magnetic tapes. Before installing a new version of the software on your system, read the Beware File. It

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contains last-minute changes to the software that have not been documented, and hints or suggestions for installing or using the new software.

With each new system, you should also receive two stand-alone documents, which are documents not included in the notebook set. These manuals assist you in 1) preparing your site for the hardware installation, the Site Preparation Guide, and 2) maintaining and reporting problems about your system's software and hardware, the Site Management Guide.

NOTE

Your Sales Representative delivers the Site Preparation Guide, and your Field Service Representative delivers the Site Management Guide.

This manual (the TOPS-20 System Manager's Guide) deals primarily with installing and maintaining the software on your system. Therefore, it is assumed that you have already used the Site Preparation Guide to install your system hardware.

The Site Management Guide is designed for use by both you (along with your operations people) and your Field Service Representative. You should begin using this manual immediately after you install your hardware. It contains schedules, procedures, and logs for recording and evaluating all information pertinent to the operation and care of the system. The manual belongs to DIGITAL, but it is kept and maintained at your computer site. For added convenience and organization, many system managers keep all their important system information in the same binder as the Site Management Guide. For example, they keep System Logs and Operator Shift Change information in the same binder, along with other special forms. Section 1.2 describes several forms that you may include in a system log book or, as suggested here, in the Site Management Guide.

DIGITAL places a major emphasis on the documentation provided to its customers. The Software Publications Department continues to solicit suggestions for improvement and corrections from the users of its documentation. Encourage users to comment on the manuals you receive with your system. For convenience, a Reader Comment Form is located at the back of each manual.

1.2 DOCUMENTS PREPARED AT YOUR INSTALLATION

Sections 1.2.1 through 1.2.5 describe some forms that may be useful at your installation. A sample form is provided in each section.

DOCUMENTATION

1.2.1 System Log

Every system must have a system log for recording problems and procedures relating to both hardware and software. All operators and system programmers should record the following types of activities in the log, along with the date, time, and their names:

- o System backup procedures
- o Beginning and ending of timesharing (for example, the times the system was started and stopped for preventive maintenance or repair)
- o Problems in hardware or software AND the actions taken to correct the problems (always save the CTY (operator terminal) output or copy of the typescript)
- o New or revised software installed
- o New users or changes to existing user data or directories
- o New structures or changes to existing structures

Most system problems are easier to solve (and, hence, less costly) if you keep an accurate record of all activities. The Site Management Guide has a section set aside for system log information. This section contains preprinted forms that you can use to record system log information, or you can design your own forms. You can store these forms in the Site Management Guide or in a separate binder.

You should design your log so that it is easy to use and read. Remember, you are likely to have the most problems when the system is new, so NOW is the time to start using the log. The following two pages contain sample left- and right-hand pages of a log book. The left-hand page (Figure 1-1) contains information concerning hardware maintenance; the right-hand page (Figure 1-2) is a problem report, containing:

- o The time of the entry
- o A "Y" or "N" answer to whether the system had to be reloaded
- o The name of the person making the entry
- o A few words describing the nature of the activity
- o A record of calls to Digital Field Service (F/S)
- o A description of the device or program causing the problem

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- o Remarks about the entry

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Figure 1-1: Sample System Log (Hardware Maintenance)

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Figure 1-2: Sample System Log (Problem Report)

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1.2.2 Mountable Structure Sign-Up Log

In addition to keeping the system log, you should also record requests from users to mount structures. (Chapter 4 describes how to set up and use structures.) Without a formal scheduling procedure, some users may monopolize the use of a structure and frustrate other users, who do not have the opportunity to mount and use their structures, usually because there are no disk drives available. To avoid this situation, set up a procedure whereby users inform the operator when they need to use a structure. The operator can then schedule the length of time specified on the request log. On a busy day, when many users are issuing mount requests for structures, the operator checks the log before granting or denying the mount requests. This scheduling allows you to service many requests for mounting structures in a fair and orderly manner. The sample Mountable Structure Sign-Up Log shown in Figure 1-3 contains:

- o The scheduled mounting time
- o The scheduled time needed to use the structure
- o The actual time the structure was mounted
- o The actual time the structure was removed
- o The name of the user who initiated the request
- o The structure name (or pack ID)
- o A column for any special instructions or notes

Remember that this log is only a sample; you should design a form that best suits your own requirements.

1.2.3 System Access Request Form

Some installations have many users requesting access to the system for the first time. You need standard information from these users before you can process their requests and create directories for them. For example, you must know which system they need to access (if you have more than one system), their names, selected passwords, departments, accounts, etc. You can organize these requests by providing a System Access Request Form that is kept in an easy-to-access area, perhaps outside the computer room. You can require signatures of department managers on the access form to ensure that prospective users have approval to charge computer usage to accounts. Figure 1-4 is a sample of a system access request form.

If you are using CFS-20 software, refer to Chapter 12, The Common File System, for further considerations in assigning users to systems.

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Figure 1-3: Sample Mountable Structure Sign-Up Log

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Figure 1-4: System Access Request

DOCUMENTATION

1.2.4 Operator Work Request Form

You may want a form that allows users to request work from the operator. Examples of requests made to the operator are initializing tapes, transferring files between systems, and making changes to directories. You should set up a procedure for handling these requests. Figure 1-5 is a sample of an operator work request form.

1.2.5 Operator Shift Change Log

You may want to set up a binder to contain operator shift change information. Each operator records new procedures, or special instructions that the incoming operator needs to know. The incoming operator reads the operator shift log before starting the new shift. For example, the first shift operator changes the procedure for storing tapes, and records the new procedure in the shift change log. The information in the shift change log should not concern problems with the system, but should contain important information about the system or the computer room. The incoming operator still reads the system log book to determine the status of the system and any problems that have occurred during the previous shift. Figure 1-6 is a sample of an operator shift change log.

DOCUMENTATION

Figure 1-5: Operator Work Request

DOCUMENTATION

Figure 1-6: Operator Shift Change Log

CHAPTER 2

PREPARING FOR SOFTWARE INSTALLATION

You can establish many of the policies and procedures for your computer site before you install the software. It may help you later if some of the preliminary decisions and preparations are done before you begin setting up the system and handling requests from users. The following suggestions for preparing your installation are not all-inclusive. Some TOPS-20 installations have specific requirements or restrictions that are not considered here. You can use this list as a guideline for the types of decisions you can make in the early stages of setting up your computer site.

2.1 SECURING THE COMPUTER ROOM

Select the type of computer room security you need and a method of enforcement. Many system managers do not allow non-operations people to enter the computer room. Establish an open- or closed-door policy, and notify users of your policy. If you decide on a closed-door policy, notify users of the procedures that they should use to contact you (or the operator) and to submit their job requests.

2.2 HANDLING USER REQUESTS

Determine how user requests will be handled. You can handle jobs on a first-come basis, or on a priority basis. You can set up request boxes outside the computer room that the operator checks regularly. You can also establish a location where users can leave disks and tapes for the operator to mount. Post a sign-up sheet so that users can specify the time they need the tape or disk mounted. Chapter 1 describes sample forms that can be completed by users to request initial access to the system and to request that work be done by the operator.

PREPARING FOR SOFTWARE INSTALLATION

2.3 ORDERING SUPPLIES

Assign someone the responsibility for ordering paper supplies, ribbons, cards, and magnetic tapes. Chapter 7 provides an estimate of the number of tapes you should have to begin a backup procedure immediately after you install the software. Be sure you have enough CTY (operator terminal) and line printer paper to begin operations.

2.4 SCHEDULING OPERATOR TASKS

The operator performs tasks either on a regular basis or on an as-needed basis. Decide which operator tasks will be performed on a regular schedule. Be sure to include hardware, software, and documentation-related tasks. These regularly scheduled tasks can be performed daily, weekly, or monthly.

The following lists are samples of hardware- and software-related tasks that your operator may perform.

Hardware-Related Tasks

Regular Schedule	As-Needed Schedule
Clean tops of disk drives.	Replenish paper in the line printer.
Clean magnetic tape drives.	Remove reports from the line printer and distribute (perhaps to mail boxes).
Vacuum line printer to remove paper chad.	Replenish paper in operator's console.
Load mountable structures according to a schedule.	Physically load and unload magnetic tape and disk drives.

Software-Related Tasks

Regular Schedule	As-Needed Schedule
Bring up system after weekly maintenance.	Bring up system after a crash.
Run scheduled batch production jobs.	Maintain the batch system for users.
Save the contents of disk on magnetic tape.	Save special disk areas on magnetic tape.

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Regular Schedule	As-Needed Schedule
Create a system "crash" tape for backup.	Restore selected user disk areas as needed.
Run the SPEAR program for daily error analysis.	Interact with users.
Submit a daily control file for accounting.	Create and update user directories.
Create the Message-of-the-Day with the MAIL program.	Monitor disk space.

Establish a location for keeping the hard-copy output from the CTY. Your Field Service Representative needs this information if you have problems with your system. Have the operator tear off the copy and store it daily.

Documentation-related tasks include:

- o keeping a hand-written log of system activities (System Log)
- o recording operator shift change information (Operator Shift Change Log)
- o coordinating the mounting and dismounting of structures (Mountable Structure Sign-up Log)

Chapter 1 describes creating a system log, an operator shift change log, and a mountable structure sign-up log.

2.5 SELECTING SYSTEM FEATURES

Determine the system features you want to enable during software installation. When you install the software, you create a file called n-CONFIG.COMD. This file is read by a start-up program (n-SETSPD) when the system is started for the first time and each subsequent time that you reload and start the system. The n-CONFIG.COMD file defines the line speeds for your terminals and many system parameters. Most of the decisions you must make concerning the parameters in this file are described throughout this manual. As you read each chapter, you can list the parameters that you want to place in the n-CONFIG.COMD file. Many system managers choose to introduce new pieces of software slowly. Therefore, you may want to disable some of the parameters until you have run the new software for awhile. You can edit the n-CONFIG.COMD file to add new software features to the system. You should edit the file at a convenient time before you reload the system. Then, when the system restarts, the new software features are

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enabled.

| Chapters 3 through 12 describe setting up and maintaining your system. Read these chapters thoroughly. They contain important information to help you make decisions both before and after you install the software.

CHAPTER 3

AFTER SOFTWARE INSTALLATION

3.1 OVERVIEW

After you install the TOPS-20 software, your system contains all the directories and files necessary for you to start preparing for timesharing and batch processing. This chapter describes the directories, files, and system logical names created during software installation. Also included are suggestions for creating additional directories and logical names to assist you and system users.

3.2 SPECIAL SYSTEM DIRECTORIES

You initialize the file system during software installation. At this time, the system automatically creates nine directories on the disk that you defined as the system structure. These directories are shown in Figure 3-1:

Figure 3-1: Special System Directories

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Sections 3.2.1 through 3.2.7 describe these directories and their use. Section 3.2.8 describes additional directories you can create and how they are useful.

Chapter 5 also describes creating directories and includes diagrams showing the structure of directories.

3.2.1 <ROOT-DIRECTORY>

The <ROOT-DIRECTORY> contains a separate file for each first level directory on the system structure as follows:

```
STR:<ROOT-DIRECTORY>
```

```
STR:<SYSTEM> ... STR:<SUBSYS> ... STR:<DIRECTORY>
```

(where STR: is the name of the structure).

The <ROOT-DIRECTORY> is the most important directory created. Without it, directories and files cannot be accessed. You must NEVER modify this directory. The system maintains a backup copy of <ROOT-DIRECTORY> that can be accessed if the original copy is destroyed. (Refer to Section 9.3, Restoring <ROOT-DIRECTORY>.)

Each structure you create in addition to the system structure has a <ROOT-DIRECTORY>. The <ROOT-DIRECTORY> on any structure points to all the first-level directories created under the <ROOT-DIRECTORY>.

After you install the software, give the DIRECTORY command for <ROOT-DIRECTORY>. The output on your terminal appears similar to the example below. Note that each directory is a file in the <ROOT-DIRECTORY>. The differences between this list and the one on your terminal depend on the model system you have and the type of unbundled software you have purchased.

```
$DIRECTORY (OF FILES) STR:<ROOT-DIRECTORY><RET>
```

```
STR:<ROOT-DIRECTORY>  
ACCOUNTS.DIRECTORY.1  
BACKUP-COPY-OF-ROOT-DIRECTORY.IMAGE.1  
BOOTSTRAP.BIN.1  
DSKBTTBL..1  
FRONT-END-FILE-SYSTEM.BIN.1  
INDEX-TABLE.BIN.1  
NEW-SUBSYS.DIRECTORY.1  
NEW-SYSTEM.DIRECTORY.1  
OPERATOR.DIRECTORY.1
```

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ROOT-DIRECTORY.DIRECTORY.1
SPOOL.DIRECTORY.1
SUBSYS.DIRECTORY.1
SYSTEM.DIRECTORY.1
SYSTEM-ERROR.DIRECTORY.1
UETP.DIRECTORY.1

Total of 14 Files

3.2.2 <SYSTEM>

The directory <SYSTEM> contains data and program files that the system uses during normal operation. Table 3-1 lists many of the files that appear in this directory.

Table 3-1: <SYSTEM> Files

File Name	Explanation
ODUMP11.BIN	Contains a dump of front-end memory after the front end crashes.
2060-MONBIG.EXE	The smallest runnable monitor.
2060-MONMAX.EXE	The largest runnable monitor.
n-CONFIG.COMD	Contains definitions of line speeds, system logical names, printer VFU files, magnetic tape logical unit numbers, and additional system-dependent parameters. These system parameters are set every time the system starts. The value n equals the latest release of TOPS-20.
n-SETSPD.EXE	Program that reads the n-CONFIG.COMD file and sets up the parameters that it contains. The value n equals the latest release of TOPS-20.
n-SYSJOB.EXE	Program that runs in a process created by the monitor and takes commands from the file n-SYSJOB.RUN.
n-SYSJOB.RUN	Contains commands that SYSJOB processes.

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File Name	Explanation
ACCOUNTS-TABLE.BIN	Contains the information necessary to validate accounts.
AN-MONBIG.EXE	A large ARPANET timesharing monitor.
AN-MONCFS.EXE	An ARPANET monitor that includes CFS-20.
AN-MONMAX.EXE	The largest ARPANET timesharing monitor.
BUGSTRINGS.TXT	Contains a list of all BUGHLT, BUGINF, and BUGCHK messages.
CHECKD.EXE	Program that creates structures and checks file-system consistency.
DEVICE-STATUS.BIN	Contains status information for tape drives, disk drives, and disk structures. It is maintained by MOUNTR.
DUMP.CPY	Contains a copy of main memory at the time of the last system crash. It is copied from DUMP.EXE to maintain a history of crashes. This file is written by the n-SETSPD program when the system is rebooted.
DUMP.EXE	Contains a copy of main memory at the time of the last system crash. You must have this file to get a system dump after a crash.
ERRMES.BIN	Contains binary system error messages.
EXEC.EXE	The TOPS-20 Command Processor.
FEDDT.EXE	A DDT program used for debugging the front end.
IPADMP.EXE	Program that copies the CI-20 microcode to the file <SYSTEM>CI-LOCAL-STORE.DUMP on the public structure. After the copying has completed, IPALOD.EXE is run.

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File Name	Explanation
IPALOD.EXE	Program that loads the CI-20 microcode. (The microcode is contained in the file.) After the loading has completed, TOPS-20 starts the CI.
MONITR.EXE	The current monitor.
MONNAM.TXT	Contains the monitor name printed at the beginning of the system greeting line.
PROGRAM-NAME-CACHE.TXT	Contains a list of the programs that should be loaded into the program-name cache. Read by the MAPPER program.
PTYCON.ATO	Contains the commands that are given automatically at the operator's console every time the system starts. You may modify this file to suit your own installation.
REAPER.CMD	Contains a list of default commands to REAPER. The REAPER program reads this file each time it is run.
RSX20F-MAP.1520	Contains symbol locations for the front-end processor. It is used by the FEDDT program.
SYSJOB.HLP	Contains information about the SYSJOB program.
SYSTEM.CMD	Contains OPR commands and is read by the OPR program at system startup.
TAPNAM.TXT	Text file that contains the installation identifier that is written on VOL1 labels for labeled tapes.
TGHA.EXE	Program that analyzes and corrects MOS memory problems.
TGHA.HLP	Contains information about the TGHA program.
TOPS20.BWR	Text file that contains important information about the latest release of TOPS-20.

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3.2.3 Restoring the Directory <SYSTEM>

If the contents of <SYSTEM> are accidentally lost or destroyed, you can restore the directory from the TOPS-20 Installation Tape or your latest system backup tape. (Refer to Chapter 7 for information about creating system backup tapes.) Use the procedure below to restore <SYSTEM> directory. If you have enabled tape drive allocation, use the MOUNT command instead of the ASSIGN command. (Refer to Section 8.3 for information about using tape drive allocation.)

1. Mount the appropriate tape (in this example, it is on drive MTAO:).
2. Give the following commands at your terminal.

```
@ENABLE (CAPABILITIES) <RET>
$ASSIGN (DEVICE) MTAO: <RET>
$SKIP (DEVICE) MTAO: 4 FILES <RET>
$RUN (PROGRAM) MTAO: <RET>

DUMPER> TAPE (DEVICE) MTAO: <RET>
DUMPER> RESTORE (TAPE FILES) DSK*:<*>*.*** (TO) <SYSTEM> <RET>

DUMPER TAPE #1 , , FRIDAY 1-NOV-85 330
LOADING FILES INTO <SYSTEM>

END OF SAVESET
DUMPER>EXIT <RET>
$
```

3.2.4 <SUBSYS>

The directory <SUBSYS> contains system programs (and their help files) that the user may want to run. The directory protection code set for <SUBSYS> prevents users from changing the files in this directory. Many of the file protections require users to enable WHEEL or OPERATOR capabilities to use the files. (Refer to Chapter 5 for information about directory and file protections and special capabilities.) Table 3-2 lists the programs and files commonly placed in <SUBSYS>. An asterisk precedes all unbundled software.

Table 3-2: STR:<SUBSYS> Files

Programs	Explanation
ACTGEN.EXE	Program that takes information from accounting files and creates the account validation data base.

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Programs	Explanation
ACTGEN.HLP	Contains information about the ACTGEN program.
ACTSYM.UNV	A file of universal symbols for USAGE accounting programs.
ANAUNV.UNV	A file of ARPANET universal symbols.
*B362LB.REL	BLISS functions needed to rebuild the Record Management Services facility (RMS-20) from AUTOPATCH.
*BASIC.EXE	The BASIC compiler.
BATCON.EXE	Program that controls batch jobs.
CDRIVE.EXE	Program that controls card readers.
CHECKD.EXE	Program that creates structures and checks file-system consistency (same as in <SYSTEM>).
CHECKD.HLP	Contains information about the CHECKD program.
CHKPNT.EXE	Program that makes accounting entries in the file <ACCOUNTS>CHECKPOINT.BIN.
CHKPNT.HLP	Contains information about the CHKPNT program.
CMD.REL	A library file of routines for the COMND monitor call.
CMD.UNV	A file of universal symbols for the COMND monitor call.
*COBDDT.HLP	Contains information about COBDDT.
*COBDDT.REL	The COBOL debugging program.
*COBOL.EXE	The COBOL compiler.
*COBOL.HLP	Contains information about the COBOL compiler.
CREF.EXE	Program that produces a cross-reference listing.
CREF.HLP	Contains information about the CREF program.
DIL.LIB	A library file of data definitions for COBOL programs that use the Data Interchange Library (DIL) facility.
DIL.REL	The DIL subroutines.

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Programs	Explanation
DILV7.FOR	Contains data definitions for FORTRAN programs that use DIL.
DITV7.FOR	Contains data definitions for FORTRAN programs that use the data transmission component of DIL.
DIXV7.FOR	Contains data definitions for FORTRAN programs that use the data conversion component of DIL.
DLUSER.EXE	Program that saves and restores the directory parameters.
DLUSER.HLP	Contains information about the DLUSER program.
DUMPER.EXE	Program that saves and restores files to and from magnetic tape.
DUMPER.HLP	Contains information about the DUMPER program.
DX20LD.EXE	Program that loads DX20 microcode.
DXMCA.ADX	Microcode for DX20 tape subsystem controller.
EDDT.REL	A component of the debugging program for the TOPS-20 monitor.
EDIT.EXE	A line-oriented text editor.
EDIT.HLP	Contains information about the EDIT program.
*FAL.EXE	Program that 'listens' for DECnet file transfers.
FE.EXE	Program that is used when copying files from the front-end file system to the TOPS-20 file system and vice versa.
FE.HLP	Contains information about the FE program.
FEDDT.EXE	The debugging program for the front end.
FILCOM.EXE	Program that compares the contents of two files.
FILCOM.HLP	Contains information about the FILCOM program.
FILDDT.EXE	A DDT program used for examining the contents of system dumps (DUMP.CPY).
*FORDDT.HLP	Contains information about the FORDDT program.
*FORDDT.REL	The FORTRAN debugging program.

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Programs	Explanation
FORMAT.EXE	Program used to format RP04/RP06 disk packs while the system is in timesharing mode.
FORMAT.HLP	Contains information about the FORMAT program.
*FOROTS.EXE	The FORTRAN object time system (operating system interface).
*FORTRA.EXE	The FORTRAN compiler.
GALGEN.EXE	Program that creates the parameter file for building the batch system.
GLOBS.UNV	A file of universal symbols for the TOPS-20 monitor.
GLXLIB.EXE	Object-time system used by the GALAXY programs.
HELP.HLP	Contains information about the HELP command.
*IBMSPL.EXE	Spooling program that sends IBM-batch-job files to remote IBM host and retrieves the output.
INFO.EXE	Program that gives information to programs using IPCF.
*ISAM.EXE	Program that maintains COBOL single-key indexed sequential files.
*ISAM.HLP	Contains information about the ISAM program.
KDDT.REL	A component of the debugging program for the TOPS-20 monitor.
*LIBARY.EXE	Program that creates, maintains, and lists the contents of COBOL library files.
*LIBARY.HLP	Contains information about the LIBARY program.
*LIBO12.EXE	The COBOL object-time system (operating system interface).
*LIBOL.REL	Contains the COBOL library subroutines.
LINK.EXE	Program that loads relocatable binary programs.
LINK.HLP	Contains information about the LINK program.
LP64.RAM	Translation RAM file for a 64-character line printer. Read by n-SETSPD.

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Programs	Explanation
LP96.RAM	Translation RAM file for a 96-character line printer. Read by n-SETSPD.
LPTSPL.EXE	Program that controls output to the line printer.
MACREL.REL	Run-time file for macros in MACSYM.
MACRO.EXE	The MACRO assembler.
MACRO.HLP	Contains information about the MACRO assembler.
MACSYM.UNV	Contains system macros.
MAIL.EXE	Program that sends messages to users.
MAIL.HLP	Contains information about the MAIL program.
MAILER.EXE	Program that receives mail from the MAIL program and places it in the appropriate mailbox.
MAKDMP.EXE	Program that produces a standard DUMP.EXE file in <SYSTEM>.
MAKLIB.EXE	Program that creates relocatable subroutine libraries.
MAKLIB.HLP	Contains information about the MAKLIB program.
MAKRAM.EXE	Program that creates a translation RAM file for line printers.
MAKRAM.HLP	Contains information about the MAKRAM program.
MAKVFU.EXE	Program that creates a vertical formatting unit (VFU) file.
MAKVFU.HLP	Contains information about the MAKVFU program.
MAPPER.EXE	Program that loads the program-name cache. (Refer to Section 10.4, Improving Program Startup Time.)
MDDT.REL	A program for debugging the monitor on a running system.
MONSYM.REL	Object file that contains monitor call symbol definitions.
MONSYM.UNV	Contains symbol definitions for monitor calls.
MOUNTR.EXE	Program that mounts tapes and structures.

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Programs	Explanation
MSCPAR.UNV	A file of universal symbols for MSCP.
*NETCON.EXE	DECnet program that performs the network control program (NCP) and the network control utility (NCU).
*NFT.EXE	DECnet file transfer program.
*NFT.HLP	Contains information about the NFT.EXE program.
NORMAL.VFU	Vertical formatting unit file for line printers.
*NSPPAR.UNV	A file of universal symbols for the DECnet NSP protocol.
OPR.EXE	Program that the operator uses to interface with all jobs and devices on the system.
OPR.HLP	Contains information about the OPR program.
ORION.EXE	Program that processes messages sent by the OPR, MOUNTR, LPTSPL, QUASAR, EXEC, etc. programs.
OVLAY.REL	Overlay manager for the LINK program.
PA1050.EXE	The TOPS-10 Compatibility Package.
PAT.EXE	Version of PA1050 that can be used in debugging.
PHYPAR.UNV	A file of universal symbols for TOPS-20 input/output programs.
PLEASE.EXE	Program that establishes a dialog with the operator.
PROLOG.UNV	A file of universal symbols.
PTYCON.EXE	Program that controls many jobs from a single terminal.
PTYCON.HLP	Contains information about the PTYCON program.
QMANGR.EXE	Program that manages the batch and print queues.
QUASAR.EXE	Program that does the central queuing and scheduling for the batch system.
RDMAIL.EXE	Program that allows a user to read mail sent with the MAIL program.

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Programs	Explanation
RDMAIL.HLP	Contains information about the RDMAIL program.
REAPER.EXE	Program that marks files for migration to magnetic tape.
REAPER.HLP	Contains information about the REAPER program.
*RERUN.EXE	Restarts COBOL programs.
*RERUN.HLP	Contains information about the RERUN program.
RETRFB.SPE	Contains SPEAR report templates.
RFB.EYE	Contains internal definitions for the RETRIEVE function of the SPEAR program.
RMS.EXE	RMS-20 used in Section 0 of memory.
RMSCOB.EXE	RMS-20 used by COBOL V12B programs.
RMSINI.REL	Routine called by BLISS and MACRO programs to initialize RMS-20.
RMSINT.R36	Unsupported BLISS interface file for RMS-20.
RMSINT.UNV	MACRO interface file for RMS-20.
RMSUTL.EXE	The RMS-20 file maintenance utility.
RSXFMT.EXE	Utility program used for converting TOPS-20 files to a format used by the front end and vice versa.
RSXFMT.HLP	Contains information about the RSXFMT program.
RUNOFF.EXE	Program that helps with text preparation.
RUNOFF.HLP	Contains information about the RUNOFF program.
SCAPAR.UNV	A parameter file of symbols for the SCA inter-system communication routines.
SCSTST.EXE	A program that tests SCA.
SDDT.EXE	DDT debugger for programs without a symbol table.
*SELOTS.EXE	Program that interfaces between the COBOL language and the COBOL object-time system (LIBOL). (It is used with versions of COBOL up to and including version 11.)

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Programs	Explanation
SERCOD.UNV	Contains definitions for the SYSERR error codes.
*SIX12.REL	The BLISS debugger.
*SORT.EXE	Program that sorts files record by record.
*SORT.HLP	Contains information about the SORT program.
SPRINT.EXE	Program that creates batch jobs from card input.
SPROUT.EXE	Output spooler for card punch, paper tape punch, and plotter.
SPEAR.EXE	Segment of SPEAR program.
SPRRET.EXE	Segment of SPEAR program.
SPRSUM.EXE	Segment of SPEAR program.
SYSJOB.HLP	Contains information about the SYSJOB program.
SYSTAP.CTL	Control file that creates a system backup tape.
TCX.EXE	A DIGITAL Standard Runoff index utility.
TCX.HLP	Contains information about the TCX utility.
TOC.EXE	A DIGITAL Standard Runoff utility for creating a table of contents.
TOC.HLP	Contains information about the TOC utility.
TV.EXE	A character-oriented text editor.
UDDT.EXE	DDT debugger for programs with a symbol table.
ULIST.EXE	Program for printing information about directories and users.
ULIST.HLP	Contains information about the ULIST program.
VERIFY.EXE	Program that is used during software installation to determine the integrity of files. It verifies checksums and version numbers of the .EXE files.
WATCH.EXE	Program for observing system performance.
WATCH.HLP	Contains information about the WATCH program.

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Programs	Explanation
*XPORT.REL	Library containing the BLISS transportable I/O, memory, and string functions.
XRMS.EXE	RMS-20 for use from memory sections other than Section 0.

NOTE

All the .HLP files can be displayed using the HELP command; for example, the command @HELP WATCH displays the WATCH.HLP file.

3.2.5 Restoring the Directory <SUBSYS>

If the contents of <SUBSYS> are accidentally lost or destroyed, you can restore the directory from the TOPS-20 Installation Tape or your latest system backup tape. (Refer to Chapter 7 for information about creating system backup tapes.) Use the procedure below to restore the <SUBSYS> directory. If you have enabled tape drive allocation, use the MOUNT command instead of the ASSIGN command. (Refer to Section 8.3 for information about using tape drive allocation.)

1. Mount the appropriate tape (in this example, it is on drive MTA0:)
2. Give the following commands at your terminal.

```
@ENABLE (CAPABILITIES) <RET>
$ASSIGN (DEVICE) MTA0: <RET>
$SKIP (DEVICE) MTA0: 4 FILES <RET>
$RUN (PROGRAM) MTA0: <RET>
```

```
DUMPER> TAPE (DEVICE) MTA0: <RET>
DUMPER> SKIP (NUMBER OF SAVESETS) 1 <RET>
DUMPER> RESTORE (TAPE FILES) DSK*:<*>*.*** (TO) <SUBSYS>
<RET>
```

```
DUMPER TAPE # 1 , , SATURDAY, 3-NOV-84 330
LOADING FILES INTO STR:<SUBSYS>
END OF SAVESET
```

```
DUMPER> EXIT <RET>
$
```

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3.2.6 <NEW-SYSTEM> and <NEW-SUBSYS>

The first time you install the TOPS-20 software, the DLUSER program creates the directories <NEW-SYSTEM> and <NEW-SUBSYS>. They do not contain files. You can use these directories when a new release becomes available and you are updating the existing system. When DIGITAL distributes an updated monitor on the TOPS-20 Installation Tape, you restore the first two savesets from this tape to the directories <NEW-SYSTEM> and <NEW-SUBSYS> respectively. You use these directories until you feel comfortable with the new software. Should you have any problems with the new software, you can easily revert to using the old software. Appendixes A and B of the TOPS-20 KL Model B Installation Guide detail the procedures to update one software release to another.

If you have no problems with the new monitor, and you are comfortable with it, copy all the files in the directory <NEW-SYSTEM> into the directory <SYSTEM> and all the files in the directory <NEW-SUBSYS> into the directory <SUBSYS>. You can now delete all the files in <NEW-SYSTEM> and <NEW-SUBSYS>. The directories <NEW-SYSTEM> and <NEW-SUBSYS> remain empty until a new version of the TOPS-20 software is distributed.

NOTE

After you copy the new files into the directories <SYSTEM> and <SUBSYS>, you cannot revert to the old system software unless you reinstall the system using the old monitor or backup tapes.

3.2.7 <ACCOUNTS>, <OPERATOR>, <SPOOL>, and <SYSTEM-ERROR>

<ACCOUNTS> - After installation, the directory <ACCOUNTS> contains one file, SYSTEM-DATA.BIN. This file contains all the accounting system entries for each user. If the directory <ACCOUNTS> is destroyed, the accounting system creates a new SYSTEM-DATA.BIN file.

After the first LOGIN on the system, the system creates the <ACCOUNTS>CHECKPOINT.BIN file. This file stores accounting entries for each user during the time the user is logged in. After a user logs out, the accounting data stored in CHECKPOINT.BIN is copied to the SYSTEM-DATA.BIN file. When the system comes up after a crash, the monitor examines <ACCOUNTS>CHECKPOINT.BIN to determine which users were logged in at the time of the crash, and stores the data in CHECKPOINT.BIN in SYSTEM-DATA.BIN. Therefore, users who did not log out in the normal fashion, because of a crash, are still charged for their log-in time.

<OPERATOR> - The directory <OPERATOR> normally contains the file PTYCON.LOG. This file usually contains a record of all the activities

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that occur under the operator jobs that are controlled by PTYCON. The directory <OPERATOR> may also contain files the operator needs to run the system.

<SPOOL> - The directory <SPOOL> contains files that the spooling system needs before performing any input or output. They are kept in this area until they can be output to a slow-speed device such as a line printer. The file PRIMARY-MASTER-QUEUE-FILE.QUASAR is created in this directory. It contains a copy of the input queues so that they are not destroyed if the system crashes. You must either delete this file or process all entries in the queues before installing a new version of the batch system that has a different queue format. The GALAXY.DOC file describes the new software components and tells you if the queue format has changed.

<SYSTEM-ERROR> - The directory <SYSTEM-ERROR> contains the file ERROR.SYS. The ERROR.SYS file contains entries about system errors and is read by the system error recovery program, SPEAR.

3.2.8 Other Useful Directories

You may want to create additional directories for storing different versions of programs or text. Some useful directories are listed below. You should give these directories the proper protection number and make them files-only directories.

Directory and File Protection

Directories and files that are executed or read by the entire user community should not be given the default protection 777700, which allows no access. They should be given the directory protection 777740 and the file protection 777752 or 777712. (Section 5.7 describes directory and file protections.)

<NEW> The directory <NEW> can contain versions of your software that are not completely tested or that are drastically different from the current versions. If you create a directory <NEW>, users will find it more convenient if you also create the system-logical name NEW: defined as <NEW>, SYS:.. This logical name allows them to run all new software by merely typing NEW: and the program name. If there is no file with the given name in <NEW>, the system uses the version currently on <SUBSYS>. (Refer to Section 3.3 for a description of logical names.)

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<OLD> The directory <OLD> can contain the old version of software as newer versions appear on <SUBSYS>. If programs or data do not work with new software, the user has a chance to correct the problems before the older software is no longer available. Users will find it convenient if you also define the system-logical name OLD: as <OLD>,SYS:.

By creating the directories <NEW> and <OLD>, you gradually introduce new software to system users. When a new version becomes available, place it in the directory <NEW>. When the software has been in use awhile, move the version in <NEW> to <SUBSYS>, and the version in <SUBSYS> to <OLD>. Store the version in <OLD> on a system back-up tape. Every time you change a version of the software, you should send a system-wide message to all users.

<HELP> The directory <HELP> contains documents and help files that describe the system software. As different versions of software appear on <SYSTEM>, <NEW>, and <OLD>, you should make a list of changes incorporated in the new versions and place it in the directory <HELP>. You can move all files with the file type .HLP from <SUBSYS> to the directory <HELP>. The HELP command still works correctly if you define the system-logical name HLP: to be <HELP>,SYS:.

<REMARKS> The directory <REMARKS> contains messages from users to the operator. These messages are usually general system comments or complaints. When a user wants to send the operator a message that does not require an immediate response, he can send a message to the directory <REMARKS> using the MAIL program. (Refer to the description of the MAIL program in the TOPS-20 User Utilities Guide.) A typical message may be a request for supplies, for example, LA36 paper or ribbon. Creating the directory <REMARKS> avoids constant interruptions to the operator from users issuing PLEASE requests. The operator can read the messages in <REMARKS> at a specified time each day, or simply when he has time.

3.3 SYSTEM-LOGICAL NAMES

A logical name is a descriptive word used to establish a search route to locate files. It can be up to 39 alphanumeric characters; however, it is usually three to six alphanumeric characters. Because logical

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names are used in place of device names, they always end with a colon. Logical names tell the system where and in what order to search for files. When a user types a logical name, the system searches the directories in the order they were defined or listed by the logical name. Although users can define logical names for their own use (refer to the TOPS-20 User's Guide), the logical names described here can be used by all users of the system. You can define system-logical names in the n-CONFIG.COMD file.

| During installation, several system-wide logical names are defined by
| the monitor, and may be overridden in the n-CONFIG.COMD file. They are
| SYS:, defined as <NEW-SUBSYS>, <SUBSYS>; SYSTEM:, defined as
| <NEW-SYSTEM>, <SYSTEM>; DEFAULT-EXEC:, defined as SYSTEM:EXEC.EXE; and
| POBOX:, defined as the public structure. You may decide to add other
| logical names to aid users in accessing files. If you want the
| logical names to be permanent, place the definitions (using an editor)
| in the <SYSTEM>n-CONFIG.COMD file on the public structure.

| SYSTEM:, SYS:, DEFAULT-EXEC:, POBOX:, and some other frequently used
| system-logical names are explained below.

3.3.1 SYSTEM:

| The logical name, SYSTEM:, defines a search list that contains all the
| system programs and files that the system needs to operate. SYSTEM:
| should always contain the directory <SYSTEM> on the public structure.
| If you are updating the system with a new monitor, the definition of
| SYSTEM: in the n-CONFIG.COMD file also contains the directory
| <NEW-SYSTEM>. For example,

```
DEFINE SYSTEM: STR:<NEW-SYSTEM>,STR:<SYSTEM>
```

3.3.2 SYS:

The logical name SYS: defines a search list that contains all the system programs a user may want to run. SYS: should always contain the directory <SUBSYS> and any other library directories that contain commonly used programs. If you are updating the system with a new monitor, the definition of SYS: in the n-CONFIG.COMD file also contains the directory <NEW-SUBSYS>. For example,

```
DEFINE SYS: STR:<NEW-SUBSYS>,STR:<SUBSYS>
```

Be sure to set the protection on the library files in <SUBSYS> (or <NEW-SUBSYS>) to 777752. This protection allows access by all users.

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3.3.3 NEW:

The logical name NEW: defines a search list containing a directory that has new software, followed by the system-logical name SYS:. The definition for this, which you would put in n-CONFIG.CMD, is the following:

```
DEFINE NEW: STR:<NEW>,SYS:
```

With this system-wide logical name, the user can give the command:

```
@DEFINE (LOGICAL NAME) SYS: (AS) NEW: <RET>
```

Now, when the user runs a program, the system looks first in the directory STR:<NEW>, and then in the normal system search list SYS:. This way, the user always gets the most recent version of any program.

3.3.4 OLD:

If you have old versions of programs, defining the system-logical name OLD: may be helpful to users. The usual definition of the logical name OLD: is:

```
DEFINE OLD: STR:<OLD>,SYS:
```

The definition OLD: has the same type of effect as the definition NEW:. If the user gives the command:

```
@DEFINE (LOGICAL NAME) SYS: (AS) OLD: <RET>
```

whenever he runs a program, he will get the oldest version available.

3.3.5 HLP:

If you want to keep programs and documentation in separate directories, you should store the documentation in <HELP>. The HELP command searches the directories identified by the logical name HLP:, so you must define the logical name HLP: to be the directory <HELP>.

The definition of HLP: in n-CONFIG.CMD should be:

```
DEFINE HLP: STR:<HELP>
```

3.3.6 SERR:

The logical name SERR: defines a search list that contains the system

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error file ERROR.SYS. The SERR: logical name tells the system to search the directory <SYSTEM-ERROR> for the ERROR.SYS file. This file may be used later to produce reports.

The definition of SERR: in n-CONFIG.COMD should be:

```
DEFINE SERR: STR:<SYSTEM-ERROR>
```

3.3.7 DMP:

When the system is re-booted after a crash, the file DUMP.EXE is overwritten with a copy of memory. Upon system startup, the n-SETSPD program copies the contents of DUMP.EXE to the DMP:DUMP.CPY;P770000 file. System crashes cause DUMP.EXE to be overwritten, but new versions of DUMP.CPY accumulate. To keep the public structure clear of DUMP.CPY files, the definition of DMP: in the n-CONFIG.COMD file should be:

```
DEFINE DMP: STR:<DIRECTORY>
```

The structure and directory are your choice; you should not specify a filename. Versions of DUMP.CPY hereafter accumulate in the defined area.

In CFS configurations, systems should not share a common DMP: definition, because this could lead to confusion about which dump came from which system.

3.3.8 DEFAULT-EXEC:

The logical name DEFAULT-EXEC: defines a search list that points to the TOPS-20 Command Processor (EXEC). When users log in or give the PUSH command, the EXEC program is activated. Some experienced users may choose to run their own copies of the EXEC, not the standard system version. Such users can define DEFAULT-EXEC: to be the file name for their private EXEC, and can take advantage of this feature after giving the PUSH command. This command must be given at the EXEC level, while in batch or interactive mode. PUSH commands issued from other program levels may invoke the standard system version, unless the program has been written to use DEFAULT-EXEC: if it is defined. By default, DEFAULT-EXEC: is defined as SYSTEM:EXEC.EXE.

Refer to the DECSYSTEM-20 Technical Summary for more complete information on the EXEC.

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3.3.9 POBOX:

The logical name POBOX: points to the structure where users' mail files reside. Mail sent to users goes to the MAIL.TXT files in their directories on the structure POBOX:. Therefore, a directory must be created on that structure for each user. By default, POBOX: is defined as the public structure. You can redefine POBOX: in the n-CONFIG.COMD file to be any structure you choose.

By redefining POBOX:, you can prevent users' mail files from filling up the public structure.

In CFS-20 configurations, redefining POBOX: is especially useful. You can define POBOX: to be the same structure for all systems, establishing a central location for all mail files in the configuration. Then, no matter what system users log onto, they are automatically directed to this one area when they give commands to access their mail. They do not have to spend time logging onto various systems to access mail that would otherwise have been sent to a public structure. To set up this central location, the same DEFINE command should be entered in each system's n-CONFIG.COMD file. Refer to Chapter 12, The Common File System, for further information on CFS-20.

3.4 CONSOLE FRONT-END FILES

The console front-end computer consists of a PDP-11 with 28K 16-bit words of memory. When the system is brought up for timesharing, the front-end monitor, RSX20F, is loaded in the PDP-11 memory and started. The TOPS-20 monitor is loaded in KL10 main memory and started. Thus, you have two computers working together. Both computers have their own monitor and related software.

The front-end file system consists of the RSX20F monitor and related programs (tasks) and files. During software installation, these front-end files are transferred from floppy disks to a special area on the system structure unless an RP07 is being used as the system structure. If an RP07 is being used as the system structure, only the files on the TOPS-20 Installation Tape will be placed on the RP07. The front-end files, on the floppy disks, must be placed on a dual-ported RP04 or RP06 disk drive attached to the PDP-11 front end. (Refer to the TOPS-20 KL Model B Installation Guide for the procedure for creating the front-end file system when using an RP07 disk drive as the system structure.)

The area the front-end files are placed on is called the FRONT-END FILES area, or FILES-11 area. Once this area has been set-up, there is normally no need to get these files again from floppy disks. The floppy disks used to install the system become backup devices in case the public structure is destroyed, or in the case where an RP07 is

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being used as the system structure, they can be used to recreate your front-end file structure. It is a good idea to make an extra copy of your installation floppies in the event one of your original floppies is destroyed and you need to restore the FRONT-END FILES area. Refer to Chapter 7, System Backup Procedures, for a description of the COP program that is used to copy floppy disks.

As previously stated, the front-end files must always be placed on a dual-ported RP04 or RP06 attached to the PDP-11 front end. This allows the front-end processor to access these files while the main processor accesses TOPS-20 files on the same or different disk packs.

The RSX20F monitor and its related programs do the following:

- o Control input/output and communications devices.
- o Interface with the main computer.
- o Load the TOPS-20 monitor at system startup, and reload TOPS-20 if a crash occurs.
- o Report system errors to TOPS-20.
- o Perform system diagnostic functions.

Table 3-3 lists the programs and files located in the FRONT-END FILES area, with a brief description of each. Files with the file type TSK are programs that can be run under the front-end monitor RSX20F; files with the type MCB contain the microcode for the host processor (KL10); files with the type EXB are bootstrap programs used to load the TOPS-20 monitor; and files with the type CMD are programs that record information about system errors. This information is read by the system error recovery program, SPEAR. With TOPS-20 Version 6, console front-end filenames include edit-level numbers that indicate the versions of the particular programs, for example, F11ACP.TSK;1505.

Table 3-3: Console Front-End Files

File	Contents or Function
BF16N1.A11	MOS memory-timing RAM file. It is a nonexecutable file containing MOS memory data.
BOO.TSK	Used to boot RSX20F.
BOOT.EXB	The central processor disk bootstrap program that boots TOPS-20 from disk.
CLOCK.CMD	Saves contents of memory locations for diagnosing Field Service induced errors.

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File	Contents or Function
COP.TSK	Copies the contents of floppy disks.
CRAM.CMD	Saves contents of memory locations for diagnosing CRAM parity errors.
DEX.CMD	Saves contents of memory locations for diagnosing Deposit Examine failures (PI level 0 interrupt).
DMO.TSK	Dismounts a front-end device and allows a reboot.
DRAM.CMD	Saves contents of memory locations for diagnosing DRAM parity errors.
EBUS.CMD	Saves contents of memory locations for diagnosing EBUS parity errors.
FMPAR.CMD	Saves contents of memory locations for diagnosing fast memory parity errors.
F11ACP.TSK	File handler for front-end disk files.
HALT.CMD	Saves contents of memory locations for diagnosing KL halt errors.
INI.TSK	Initializes a front-end files area.
KLDISC.TSK	Provides the KLINIK line disconnect service.
CLI.TSK	KLINIT program for initializing the central processor (KL20). Loads microcode, configures cache and main memory, loads bootstrap.
KLRING.TSK	Provides the KLINIK line ring service.
KLX.MCB	KL10 microcode file.
KPALV.CMD	Saves contents of memory locations for diagnosing keep alive cease errors.
LOGXFR.TSK	Transfers the PARSER.LOG file to the TOPS-20 error file.
LOOP.CMD	Saves contents of memory locations for diagnosing errors causing the KL to hang but not crash.
MIDNIT.TSK	Updates the time of day through midnight.
MOU.TSK	Mounts a device for use with the front end.
MTBOOT.EXB	Boots a TOPS-20 monitor from magnetic tape.

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File	Contents or Function
PARSER.TSK	The front-end command parser (prompts PAR>). The primary means of access to front-end programs.
PIP.TSK	Front-end program for file transfer.
RED.TSK	Tells the system where to look for the front-end files device, SY0:.
RSX20F.MAP	Contains symbolic definitions for RSX20F.
RSX20F.SYS	Virgin image of front-end monitor (RSX20F).
SAV.TSK	Saves the front-end monitor and bootstrap on disk.
SB0.CMD	Helps field service diagnose SBUS-related problems.
SB1.CMD	Helps field service diagnose SBUS-related problems.
SETSPD.TSK	Sets system parameters, such as line speeds.
TIMEO.CMD	Saves contents of memory locations for diagnosing protocol timeout errors.
TKTN.TSK	Terminates tasks, reports errors, and requests reloads.
T20ACP.TSK	Interfaces between front-end and TOPS-20 file systems.
UFD.TSK	Sets up user-file directories in the front-end files area.
ZAP.TSK	Makes binary modifications to task images.

3.5 TAILORING THE BATCH SYSTEM

Most installations use the parameters and defaults in the distributed version of the batch system. However, you can modify some of these parameters if required by the batch processing procedures at your installation.

DIGITAL distributes a program with the TOPS-20 software that allows you to tailor the standard batch system to the requirements of your installation. This program, called GALGEN.EXE, is located in the directory <SUBSYS> on the system structure. You can run GALGEN at the

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time the system software is installed or at a later date. In either case, you must have a working batch system before you can generate a new one using GALGEN. This means if you are installing the system, you must first install the batch system that is distributed with every new version of the TOPS-20 software (on the software installation tape). You can then run the GALGEN program and tailor the batch system before it becomes available for general use.

If you tailor the batch system at a later date, you can run the GALGEN program with users logged in. However, for safety reasons, the system should be stand-alone during the critical phase of stopping the old batch system and starting the new one. The batch queues, however, need not be empty. That is, batch jobs can be waiting to be processed at the time you bring the system down.

| The TOPS-20 KL Model B Installation Guide contains the procedures for
| running the GALGEN program.

3.6 CHECKING THE SOFTWARE (UETP)

After the system software is installed, you or the Software Specialist can run the User Environment Test Package (UETP). UETP is a collection of programs, data files, and batch control files designed to allow you to test the integrity of various system elements. In addition to testing that the hardware has been properly installed, UETP ensures that the TOPS-20 Operating System is running and that the languages you have selected for your operation are available.

UETP creates a moderate load on the system, consisting of various defined procedures that closely resemble the load in an actual operation. Later, you may want to tailor UETP to test a software load that more closely resembles your particular system's use.

The TOPS-10/TOPS-20 User Environment Test Package Reference Manual describes UETP, the individual component tests, typical message information, and the procedures for adding new tests.

CHAPTER 4

CREATING STRUCTURES

4.1 OVERVIEW

One of the first decisions you must make about your new (or upgraded) installation is what type of disk storage environment best suits your needs. Some of the considerations that determine your decision are:

- o How large will the data base be?
- o How many users will be using the system?
- o How experienced will these users be?
- o Will there be a full-time operator?
- o How often will you run diagnostics and how critical is it that the system remain available during this maintenance?
- o Must all files be available to all users at all times during system operation?
- o Are multiple systems part of a CFS configuration? Refer also to Chapter 12, The Common File System.

The mountable structure facility of TOPS-20 provides several options for making this decision. The option you choose depends on the answers to the previous questions and the number of disk packs and drives that are available. For example, if your installation has a number of disk packs and two or more drives, you can store data and program files on different structures.

A structure is a collection of data and program files contained on one or more disk packs and referenced under one name.

When you install your software, you create a structure known as the public structure (sometimes called the system structure). All packs in this structure remain on-line at all times during system operation. If your public structure does not encompass all of your available

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drives you can create and mount other structures.

Sections 4.2 through 4.8 describe the public structure and how you can best utilize your disk resources and create and use other structures.

4.2 THE PUBLIC STRUCTURE

Sections 4.2.1 and 4.2.2 provide an overview of what the public structure is, including its relationship to the system and its contents.

4.2.1 What Is the Public Structure?

The public structure is the most important structure on your system. It is created and brought on-line at system installation when you answer the appropriate questions in the installation dialog. (Refer to the TOPS-20 KL Model B Installation Guide.) The name of the public structure can be up to six characters.

The public structure can be one or more disk packs, depending on the configuration of your system and your disk drive resources. You may use one or more RP04, RP06, or RP07 disks as the public structure; the maximum number of disks per structure is given in Table 4-4. You may NOT use an RA60, RA81, or RP20 as the public structure.

While installing the software, you copy the console front-end files to the public structure pack that is mounted on a dual-ported drive (usually drive 0). The dual port allows the front-end processor and the central processor to access the data on the public structure. However, if you are using an RP07 as the public structure, you must reserve space for the front-end files on an RP04 or RP06 disk that is dual-ported to the PDP-11 front end. If the disk structure containing the front-end files has multiple packs, the first pack of the structure must be permanently mounted on the dual-ported drive.

All disk packs in the public structure must be online at all times, because this structure contains all the programs, files, and swapping area that the system needs to operate. The structure also contains all user directories necessary to support users logging into the system. If the file system is destroyed on the public structure, or if a drive that contains all or part of the structure malfunctions, the system halts. Refer to Chapter 9 in this manual and to the TOPS-20 Operator's Guide for the steps that you and the operator must follow if you have problems with the file system or if a drive goes down.

You can have another structure online that is capable of being used as the public structure. This structure must have a unique name,

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however, at least while it is mounted. (Section 4.5.2 provides information about mounting structures having the same name.) Section 4.5.5 discusses why you would have such a structure.

If you are using CFS-20 software, refer to Chapter 12, The Common File System, for additional information on the public structure.

4.2.2 The Contents of the Public Structure

The following list provides an overview of the contents of the public structure:

1. The TOPS-20 command processor.
2. A <ROOT-DIRECTORY> (Section 3.2.1) that points to the location on disk of all first level directories on the public structure.
3. All the files in the directories <SYSTEM> and <SUBSYS> (Sections 3.2.2 and 3.2.4).
4. The directories <NEW-SYSTEM>, <NEW-SUBSYS>, <ACCOUNTS>, <OPERATOR>, <SYSTEM-ERROR> and <SPOOL> (Sections 3.2.6 and 3.2.7).
5. The front-end monitor (RSX20F) and the console front-end files (Section 3.4). If you are using the RP07 as the public structure, the front-end file system must reside on either an RP04 or RP06 dual-ported disk drive.
6. The required swapping area. The size of this area depends on the TOPS-20 monitor you are using. For example, 2060-MONMAX uses 15,000 pages of disk space for swapping. (Refer to Section 4.7 for a description of the swapping area.)
7. A HOME block that contains the following parameters:
 - o the structure name
 - o the number of disk packs in the structure
 - o the number of pages used for the front-end file system (usually 950)
 - o the number of pages set aside for swapping
8. A directory for every user who requires access to the system. Users must log into a directory on the public structure to use the system. Afterwards, they can mount and connect to a different structure and directory.

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4.3 ONE-STRUCTURE SYSTEMS

A one-structure system consists of a single structure, the public structure, which is always on-line. All packs in the structure must be on-line for the system to operate.

Usually, a one-structure system has only one or two disk drives. Smaller TOPS-20 installations choose to keep all their directories and files on one structure for some of the following reasons:

- o It is the simplest system.
- o It is the easiest system to maintain.
- o There is no requirement to physically remove packs from the drives, for example, for security reasons.
- o The majority of users are inexperienced.
- o All files are available at all times, and thus are easy to access.
- o A full-time operator may be unnecessary.
- o There is only one disk drive (only one structure supported).

Chapter 5 describes the methods you can use to create and maintain directories on your one-structure system.

4.4 MOUNTABLE STRUCTURES

If the public structure does not encompass all available disk drives, you can create and mount other structures on the unused drives. These "mountable" structures are created using the CHECKD program. The TOPS-20 Operator's Guide describes creating structures with CHECKD.

NOTE

The public structure is the only structure created at installation time. All other structures are created (using the CHECKD program) and brought on-line during system operation.

4.4.1 Differences Between Mountable and Public Structures

Unlike the public structure, a mountable structure can be mounted and dismounted during timesharing. Also, it need not contain a front-end file system. Therefore, a mountable structure does not have to reside

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on a dual-ported disk drive. Although a mountable structure has its own <ROOT-DIRECTORY> and directory system, a user cannot log into a mountable structure, but must log in as a user on the public structure. A user can then mount a different structure and connect to directories. Table 4-1 summarizes the differences between a mountable and public structure.

4.4.2 Similarities Between Mountable and Public Structures

There are, however, many similarities between the public structure and mountable structures. Both contain user directories and files. A mountable structure can have a front-end file system, and can be used in place of the public structure to load the system for timesharing. A mountable structure is created with the eight special directories (mentioned in Chapter 3) as for a public structure. Likewise, a mountable structure has a HOME block that contains information such as the name of the structure and the number of disk units in the structure. These and other similarities are summarized in Table 4-2.

Table 4-1: Differences Between Mountable and Public Structures

Public Structure	Mountable Structures
Always up during timesharing	Can be mounted and dismounted
Has a front-end file system (unless an RP07)	Need not have a front-end file system
Resides on a drive that is dual ported with the front-end computer (unless an RP07)	Need not reside on a dual-ported disk drive
Used for logging into the system	Cannot be used for logging into the system
Belongs to the system	Can belong to a private user
Has the <SYSTEM> and <SUBSYS> directories	Need not have the <SYSTEM> and <SUBSYS> directories unless the structure will be used as the public structure
Must contain a swapping area	Need not contain a swapping area unless the structure is to be mounted as the public structure

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Table 4-2: Similarities Between Mountable and Public Structures

Public Structure	Mountable Structures
Has a HOME block	Has a HOME block
Has a front-end files area (unless an RP07)	Can have a front-end files area
Is used to load the system	Can be used to load the system if the proper file areas and files have been established
Contains system files	May contain system files
Contains user files	Contains user files
All packs must be on-line for the system to operate	All packs in the structure must be on-line to use the structure

4.5 MULTIPLE-STRUCTURE SYSTEMS

A multiple-structure system consists of a public structure and one or more additional structures. Figure 4-1 illustrates a system with three disk drives and two structures. The two-pack public structure MASTER: must be online during timesharing. The one-pack mountable structure ADMIN: can be removed during timesharing. Another one-pack structure can be mounted in its place.

Figure 4-1: System with 3 Disk Drives and 2 Structures

Using Figure 4-1, suppose you want structure ADMIN: to remain on-line at all times during system operation. The structure is automatically mounted if you turn on the drive that contains the structure before the system is brought up. The TOPS-20 Operator's Guide describes mounting structures automatically.

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In addition to the public structure and perhaps another permanent on-line structure, you may choose to keep one or more disk drives available for users to mount and dismount "private" packs during timesharing.

Figure 4-2 illustrates a system with three disk drives and three one-pack structures, the public structure MASTER:, ADMIN:, and PROG:.

Figure 4-2: Three-Structure System

In this example, MASTER: contains all the directories necessary to support log-ins. ADMIN: contains the same, a superset, or a subset of the same directories as those on MASTER: and remains online at all times during system operation. The drive that contains PROG: is used for short-term mounting of different one-pack structures. PROG: remains online only for the time it is needed.

There can be up to 32 structures online at one time.

Several of the advantages in a mountable structure environment are:

- o Some users or groups of users may require a structure exclusively for their use. They can 'own' or possibly pay for the use of certain structures.
- o Service engineers can mount their own pack on the short-term drive and perform some diagnostics without disturbing normal system operation.
- o Creating structures on mountable packs provides additional security to that already within the system. For example, you can create a structure that contains highly confidential data, remove it from the drive(s) when you are done with it, and lock it in a security cabinet or safe. At the end of the day, the operator locks up any confidential structures.
- o In this type of environment, you are not limited in the size of your system's data base. You can create as many structures as you have disk packs to contain them, and you can mount as many at one time as your system can support.

The principal disadvantages of using mountable structures are the need for scheduling both access to the data and operator coverage to install and remove packs on the drives, as described in Section 1.2.2, Mountable Structure Sign-Up Log. There is also some risk that packs will be damaged during handling.

After the system is operating and structures have been created, the

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operator responds to requests from users to mount and dismount structures. Section 4.5.5 describes how to place user directories on your mountable structures to obtain maximum availability to priority jobs.

4.5.1 Choosing Structure Names

Each device on the system has a name, called the physical device name, which is used when giving commands to the software. Unlike the generic device name that applies to a class of devices, for example: TTY:, DSK:, LPT:, the physical device name applies to a particular device on the system; for example, TTY6: and LPT0:. The physical device names for disks are structure names. A structure name can be from one to six alphanumeric characters of your choice, and, like other device names, must be followed by a colon. The colon indicates to the software that a device is being used and not, for example, a file.

It is important to carefully assign a unique name to each structure that you create. Section 4.5.2, Mounting Structures Having the Same Name, explains why this precaution avoids confusion for users if an operator is unavailable during timesharing.

Because structure names are used in the device field (dev:) of a file specification, you should not create any structures with the same name as a defined (or valid) device name. Table 4-3 lists device names that may be defined in your system.

For the same reason, avoid naming a structure with a defined logical name, for example, SYS:, SYSTEM:, NEW:, OLD:, HLP:, etc., because the system searches the list of defined systemwide logical names before device names. (Refer to Section 3.3 for a description of logical names.)

Refer to Chapter 12, The Common File System, for structure-naming considerations in a CFS environment.

Table 4-3: Sample Device Names

DSK:	CDP:
MTAn:	FEn:
MTn:	TTY:
LPT:	TTYn:
LPTn:	PTYn:

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PLPT _n :	NUL:
CDR:	PLT:
PCDR _n :	PLT _n :
PCDP _n :	DCN:
TCP:	SRV:

Where n is the unit number of the device.

To avoid duplication, you can get a list of all structure names known to the system by giving the operator command, SHOW STATUS STRUCTURE. These structures do not have to be online. Their presence in the listing indicates that they were previously specified in a SET STRUCTURE command.

4.5.2 Mounting Structures Having the Same Name

A situation may arise requiring you to mount a structure that has the same name as a structure that is already online. Perhaps another installation has requested you to mount its public structure (named PUBLIC:) for testing purposes, but you already have a structure named PUBLIC: online. Because the system notices ambiguous structure names, you must mount the structure under a different name.

Each structure that is mounted is identified with two names: the physical identification and the alias. Usually, these names are the same. The physical identification is the actual structure name written in the HOME block of that structure. The alias is the name that you use to reference the structure while it is mounted. After a structure is online, it is known only by its alias. The MOUNT command is used to mount a structure and give it an alias different from the physical identification. This allows two or more structures with the same physical name to be online simultaneously. The system distinguishes them by their different aliases. (The TOPS-20 Operator's Guide describes this procedure.)

4.5.3 Maximum Size of Structures

The maximum size of a structure is approximately 805,680 pages. A structure of this size requires 2 RP20 disk drives (4 spindles).

Structures of the maximum size, however, may not be practical for your installation. Smaller structures enhance the reliability and availability of the system. Remember that you can have up to 32

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structures on-line at one time.

Also, if a structure is contained on more than one disk pack, the packs and drive units for that structure must all be the same type, that is, either all RP04s, RP06s, RP07s, RP20s, RA60s, or RA81s. For example,

Table 4-4 shows the maximum structure size using RP04, RP06, RP07, RP20, RA60, and RA81 disk drives. For all drive types, there can be 12,000 directories per structure and 5,000 files per directory.

NOTE

The number of directories per structure and files per directory that can be created is approximate. This is because the disk space needed to create a directory or file varies according to the lengths of the names chosen for directories and files.

Table 4-4: Maximum Size Structures

Type of Disk Drive	Max.No.Packs Per Structure	No. Pages Per Pack
RP04	4	38000
RP06	3	76000
RP07	1	216376
RP20	4	201420
RA60	4	90516
RA81	4	200928

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4.5.4 Increasing the Size of Structures

You can add more disk packs to increase the size of a mountable structure (not the public structure) during timesharing. To do this, you must:

- o Dump the entire file structure onto magnetic tape using the DUMPER program
- o Run the DLUSER program
- o Run the CHECKD program, specifying the new configuration, to re-create the structure
- o Restore all the directories and files from magnetic tape using the DUMPER program

IMPORTANT

If possible, re-create the structure and restore the files to a different set of packs from the structure that you dumped. This precaution ensures that you do not lose any valuable data should you have problems reading the tape back to disk. That is, you still have the original structure intact and can rerun DUMPER and copy the structure to another tape.

To increase the size of the public structure, you must shut down the system and follow the installation procedure for bringing up this structure with more disk packs. Refer to Chapter 9, System Problems/Crashes, and to the TOPS-20 KL Model B Installation Guide.

4.5.5 Setting Up Structures for Maximum Availability

Before you create structures and place user directories on them, you should determine which users must be on the system at all times. Place these users' directories and files on the public structure, or on another structure that is always available during timesharing. Divide the remaining users of the system by priority, and place their directories and files on the other structures. Although these users have log-in directories on the public structure, their large working area where they create and store files is on the other on-line structures. You may want to help users set up their LOGIN.COM and BATCH.COM files so that they can mount, connect, and access the appropriate directory on the structure where their files are located, if it is not the public structure. Dividing users into categories and placing them on structures accordingly ensures that the failure of one disk drive does not prevent the most important users from using the system. For example, if the drive that contains ADMIN: goes down, you can remove the ADMIN: pack from the broken drive, and mount it on

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another drive that contains a less critical structure.

Also, on-line disk diagnostics can be performed during timesharing. Sometimes, the service engineer can dismount a non-critical structure, mount the maintenance pack, and perform preventive maintenance or trouble-shooting with only a portion of the user community off-line.

To increase system availability, you can create another public structure for backup using the CHECKD program. After you create this structure, you should follow the procedures in your software installation manual for creating the front-end files area. The TOPS-20 Operator's Guide describes using the CHECKD program to create a backup public structure. If you have problems with the primary public structure, having a second public structure available allows you to resume timesharing without reinstalling the system.

The backup public structure can be mounted and online at all times under another name, or it can be kept in storage and mounted as a backup if the regular public structure is destroyed. If the backup public structure is kept in storage, the operator must update the structure periodically with the System Backup Tape and the latest incremental dumper tapes. (Chapter 7, System Backup, describes creating and using your System Backup Tape and incremental tapes.) Occasionally updating your backup public structure (in storage) keeps it reasonably up-to-date.

If you keep your backup public structure online at all times, and you have important files that are constantly accessed by the user community, you can improve your system performance by placing these files on the backup public structure. Now your swapping area and the files that you access frequently are not on the same disk. This procedure is useful with any structure that you keep on-line at all times.

If multiple systems are part of a CFS configuration, refer to Chapter 12, The Common File System, for further discussion of placement of files and user directories.

4.5.6 Taking Structures Off-Line

When a structure must be taken off-line, the operator should notify users that it will be dismounted at a certain time. Users should give the DISMOUNT command for the structure before the specified time. If the users do not cooperate, the operator can dismount the structure (via the DISMOUNT command to OPR) without leaving files in an unknown state. Files that are open simply become inaccessible, and the user who had the files open receives an error.

For information on dismounting structures in a CFS environment, refer to Chapter 12, The Common File System.

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4.5.7 Mounting Structures from Another Installation

If you mount a structure from another installation, or perhaps a structure that contains confidential data, some of the user names on this structure may match the user names on your public structure. You must mount this structure in what is called a FOREIGN state, to avoid the mishap of your users accessing directories that do not belong to them. The same is true if you bring one of your structures to another installation. You should have the operator at the installation mount your structure as a FOREIGN structure. Figure 4-3 illustrates this concept.

Figure 4-3: Domestic and Foreign Structures

A structure is brought online in one of two states, DOMESTIC or FOREIGN, according to the setting that the operator last specified for this structure with the SET STRUCTURE command. The system uses the FOREIGN state as the default if a SET STRUCTURE command has never been given for this structure. The structure remains in the specified state until the operator changes the state with the SET STRUCTURE or the UNDEFINE command. Note that the setting is unchanged across system crashes and reloads.

You should bring a structure online as DOMESTIC only if the directories on that structure were created for the same people as those on the public structure. One can be a subset of the other, but a given directory name should represent the same person on both. Conversely, you should bring a structure on-line as FOREIGN if the directories on that structure were not necessarily created for the same people as those on the public structure. This is because a user who is logged into a directory on the public structure is the owner of an identically named directory on a DOMESTIC structure, and can give the CONNECT or ACCESS command to that directory without giving a password (provided the directory protection allows this type of access for the owner, which is the usual case). However, a user who logs

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into the public structure and gives the CONNECT or ACCESS command to a directory with an identical name on a FOREIGN structure must give the associated password.

4.6 SHARING STRUCTURES (DISK DRIVES) BETWEEN TWO SYSTEMS

If you have two DECSYSTEM-20's and one or more structures that contain data common to both of these systems, you may want to set up your system to share disk drives alternately. For example, you could allow System A to use the drive that contains structure ADMIN: in the morning and allow System B to use this structure on the same drive in the afternoon. THE SYSTEMS CANNOT, HOWEVER, ACCESS THE DRIVE AT THE SAME TIME. (Refer to Chapter 12, The Common File System, for the exception.) Also, if one of your systems goes down, you can still use the drive that is connected to both systems.

A drive that is to be shared by two systems must be supported by both systems. For example, you cannot connect an RM03 disk drive to a DECSYSTEM-2020 and a DECSYSTEM-2065 because the 2065 system does not support RM03s. Also, the shared drive must be dual-ported. Your field service representative must make the appropriate connections from each DECSYSTEM-20 to a port on the disk drive. Be sure to have the field service representative tell you which system is connected to which port on the drive. Figure 4-4 illustrates this connection.

Figure 4-4: Shared Disk Drive

The port switch on this drive must be in either the A or B position, unless the systems are part of a CFS configuration. Otherwise, TOPS-20 will not permit either system to access the disk while it is in the A/B position. Error messages will be generated.

To use the drive, place the port switch in the position that corresponds to the first system that is using the drive (A or B). The operator mounts a structure using the normal procedure. After the first system is no longer allowed to use the drive, the operator gives the DISMOUNT command for the structure.

To use the drive on the second system, the operator leaves the pack on the drive (if you are using the same structure), turns the drive off-line, changes the port switch to the corresponding system, and turns the drive back on. Then, the operator (or a user) gives the MOUNT command to mount the structure on this system. The system automatically recognizes that another drive is on-line and mounts the structure.

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4.7 DETERMINING SWAPPING SPACE ON THE PUBLIC STRUCTURE

Sections 4.7.1 and 4.7.2 describe what swapping space is and how to determine the amount of swapping space that you should allocate for your system.

4.7.1 What Is Swapping?

The number of user jobs that can fit into main memory simultaneously depends on the size of the individual jobs, the size of the memory-resident portion of the monitor, and the size of memory physically available. (Only a portion of the TOPS-20 monitor resides in main memory at one time.) If a user wishes to run a job that is not currently in memory, space must be provided. This may necessitate moving some other job out of memory. The user's program or data that is transferred out of memory is placed on disk in the swapping area. The system sets aside a portion of the disk storage space on the public structure specifically for this purpose.

On some timesharing systems, a program must be entirely in main memory to execute. Swapping then consists of moving entire programs between disk and memory. Under TOPS-20, only portions of a program (those containing the instructions and data currently being referenced) need be in memory. Other portions of the program are brought into memory from disk as they are needed. In this case, swapping consists of moving portions of a program or data between disk and memory. The monitor decides which portions of which programs to swap, and when.

The size of a program is measured in a unit called a page. When swapping occurs, some of these pages are copied between memory and disk. Figure 4-5 illustrates the concept of swapping.

Figure 4-5: Swapping Concept

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4.7.2 When to Increase Swapping Space

For the most part, the size of your swapping space depends on the cumulative size of jobs you estimate will be on the system at any one time. Table 4-5 contains guidelines for estimating the amount of swapping space required for an approximate number of user jobs based on typical requirements. This amount is given in response to the question, "HOW MANY PAGES FOR SWAPPING?" in the software installation procedures.

The actual disk space used for swapping depends on the number of pages you give. The system rounds the number of pages given upward to an integral number of cylinders. The algorithm that follows Table 4-5 can be used to determine if the number of pages you choose for swapping space is the optimum number for the actual disk space used. For example, the number 5500 may require an additional cylinder on the disk, whereas 5000 may give you the number of pages you require in the least amount of disk space. As you can see in the algorithm, the number you should choose also depends on the number of disk packs in the structure. The swapping space is divided equally among the disk packs in the public structure.

You can allow for swapping space on structures other than the public structure. However, this is necessary only if you plan to mount the structure as the public structure in the future. Allocating swapping space avoids re-creating the structure should you decide to mount it as the public structure.

All the monitors are designed to default to an appropriate number of pages for swapping. In most cases, you can take this default. The algorithm following Table 4-5 simply provides you with a means of checking that the default is sufficient for your particular system.

The guidelines in Table 4-5 apply to systems whose users perform many editing jobs and an average or small amount of debugging programs and production jobs. If your users perform a great number of debugging and production jobs and only a small amount of editing, you should

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double the size of your swapping space. However, if you double the size of your swapping space, check the maximum swapping space allowed for the monitor you are running. (The TOPS-20 KL Model B Installation Guide lists the maximum number of swapping pages you can use with each monitor.) You cannot exceed this maximum. If you enter a number that is larger than the maximum, the monitor uses the maximum allowed. If you must exceed the maximum, you can bring up a larger existing monitor, or you can tailor your monitor by following the instructions in the BUILD.MEM file. This file is located in the saveset documentation files on the TOPS-20 Software Distribution tape.

Table 4-5: Determining Swapping Space

Estimated Number of Jobs	Recommended Number of Pages for Swapping*
20 or less	2500
21 to 30	3500
31 to 40	4500
41 to 50	5500

* For each additional 10 jobs, increase the number of pages for swapping by approximately 1,000.

Your estimate of the required number of pages for swapping is inserted as the value of X in the following algorithm:

X = the number of swapping pages you chose from Table 4-5

Y = the number of pages per cylinder (Y = 95 pages for an RP04 or RP06).

Z = the number of packs in a structure *Y

$$\text{ACTUAL DISK SPACE FOR SWAPPING} = \frac{X + Z - 1}{Z} * Z$$

(Note that this is integer arithmetic; do not cancel out any factors.)

The following example uses the system default number 10000 as the value of X (the number of swapping pages) and shows how much disk space will actually be allocated for a structure that is composed of two disk packs.

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Example:

X = default swapping space for monitor 2060-MONBIG. The default for monitor 2060-MONMAX is 15,000 pages.

Y = 95

Z = 2 (packs in structure) *95 = 190

- 1) 10000 + 190 = 10190
- 2) 10190 - 1 = 10189
- 3) 10189/190 = 53
- 4) 190 * 53 = 10070

10070 = The actual swapping space used for swapping in a 2-pack structure.

4.8 DETERMINING THE AVAILABLE DISK SPACE

4.8.1 Determining Disk Space Before Installation

To determine the available disk space that you will have to divide among your users before installing the system, first calculate the swapping space required by your system (Section 4.7.2). Second, insert the number you calculated for swapping space into the formula shown in Table 4-6, and perform the appropriate steps.

Table 4-6 outlines how to approximate the available disk space on the public structure. If you are calculating the available disk space on other structures, follow this same procedure but eliminate reserving space for any directories or areas that are not on that structure. If any possibility exists that a structure may be used as the public structure, reserve the swapping space.

NOTE

Remember that as your system expands, the number of pages in the <SYSTEM> and <SUBSYS> directories increases. Also, the number of pages reserved for directory <SPOOL> should be increased if: (1) you maintain large operator log files (2) users copy large numbers of files or large files to LPT:. A large backlog of user file retrieval requests can also use up much of the <SPOOL> area.

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Table 4-6: Calculating Available Disk Space

TABLE TO BE PART OF ART PACKAGE

4.8.2 Determining Disk Space After Installation

Shortly after you have installed the system, you can log in as OPERATOR and give the command INFORMATION (ABOUT) DISK-USAGE. One line of output tells you the actual number of system pages that are available on the public structure. You can divide this disk storage among your users. (Refer to Chapter 5, Creating Directories.)

CHAPTER 5

CREATING DIRECTORIES

A prospective user who requires access to the system must be assigned a user name (normally the user's surname), a password, an account, and disk storage quotas, and must have a directory created for him or her on the public structure. Optionally, you can assign certain capabilities and/or make the user or the user's directory a member of one or more groups. (Refer to Section 5.8 for a description of how to establish group relationships among users and Section 5.9 for a description of the capabilities you can assign to users.) You can also create additional directories for users on mountable structures.

This chapter describes three methods you can use to create and maintain directories. Using one method, the operator creates and maintains all the directories on the system. A second method allows you to delegate the responsibility for creating and maintaining directories to project administrators. The third method combines the first two methods, thus providing additional flexibility. Sections 5.1 through 5.3 explain these methods and the determining factors for choosing one of them. These sections also include some of the decisions necessary to assign user names and capabilities, and how to allocate disk storage according to the method you use to create and maintain directories. (Refer to Chapter 4 to determine the amount of disk space available to divide among the directories you create.)

Chapter 6 describes how to set up an accounting scheme and how to assign and validate accounts. You should read Chapter 6 if you want to allow users to log into the system and charge their computer usage to valid accounts immediately after you have created their directories.

Refer to Chapter 12, The Common File System, for considerations in creating directories in a CFS-20 environment.

5.1 HAVING THE OPERATOR CREATE AND MAINTAIN ALL DIRECTORIES (CENTRAL CONTROL)

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In this type of installation, the operator creates a directory on the public structure for each new user, and specifies the appropriate parameters. The name of the directory is the same as the assigned user name. Each user informs the operator when a change to his directory parameters is required. This type of operation allows you as system manager to have central administrative control over all directories and parameters.

Therefore, central control means that you or the operator create and maintain all the directories for all your system users. Central control has two types of directory schemes. One scheme allows you to create up to approximately 5,000 directories per structure. The other scheme allows you to use subdirectories and create up to approximately 12,000 directories per structure.

NOTE

The number of directories allowed per structure is approximate, because the disk space needed to create a directory or file varies.

5.2 DELEGATING THE CREATION AND MAINTENANCE OF DIRECTORIES TO PROJECT ADMINISTRATORS (PROJECT CONTROL)

An alternative type of installation involves project administrative control. Under this type of control, the operator creates directories only for the users who have been designated as project administrators, (e.g., the representatives of major departments). The project administrators, in turn, create subdirectories for users within their departments or projects and control the assignment of those users' directory parameters. This type of control allows you to delegate the responsibility for creating and maintaining directories for other users and still maintain ultimate control over your system and its resources.

Therefore, project control means that most of the directories created by you or the operator are project directories (e.g., MATH might be the assigned name of a project). The system's resources, such as disk space, are divided among these project directories either equally or according to the expected size of the project. Subdirectories are then created under project directories for users within the project. The people who have been appointed project leaders or administrators are responsible for creating, assigning parameters to, and maintaining the subdirectories within their project. The resources that you allocate to the project directory are divided among its subdirectories by the project administrators. Under project control, you are allowed to create up to approximately 12,000 directories (including subdirectories) per structure.

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5.3 COMBINING CENTRAL AND PROJECT CONTROL

A combination of central and project control can be used if you want to keep the majority of the user directories at the management level of control and separate only a portion of your system into projects and administrative control.

Therefore, combining central and project control means that the operator creates and maintains directories for most of the system users and creates project directories for special projects. The project administrators create directories under the project directories and are responsible for maintaining them. Combining the two types of control still allows up to approximately 12,000 directories per structure.

5.4 CENTRAL AND PROJECT CONTROL DESCRIPTIONS

Sections 5.4.1 through 5.4.4 describe the two types of central control, project control, and the combination of central and project control. Each description includes:

- o The determining factors for choosing a particular control
- o The format, including a diagram, of each type of control
- o The procedure for assigning user names
- o The procedure for creating user directories
- o The procedure for creating files-only directories
- o The restrictions, if any, that apply to using a particular control

Also, any additional considerations that apply to headings within each description are included.

Read each description thoroughly. The first central control description contains very general information and suggestions that apply to all the directory schemes.

5.4.1 Central Control

DETERMINING FACTORS:

- o Your business installation is relatively uncomplicated; therefore, there is no need to separate projects and assign the creation and control of directories to various

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administrators. All the directories on the system are created and maintained by you or the system operator.

- o You are sure that the number of directories you need is less than approximately 5,000.

FORMAT:

<ROOT-DIRECTORY> can point to approximately 5,000 directories per structure.

All directories under <ROOT-DIRECTORY> are on one level.

DIAGRAM:

ASSIGNING USER NAMES:

The user name that you assign should be as close as possible to the user's last name. This convention is true for any type of directory scheme that you use. The system uses this name when recording the authors of files, sending mail to users, and displaying system status. If you follow this convention, you can easily identify who is using the system when you give a SYSTAT command.

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All directories are created using the ^ECREATE command. (Only users who have WHEEL or OPERATOR capability enabled can use this command.) In the next example, the operator is connected to the public structure PUBLIC: and uses the ^ECREATE command to create a new directory named <BECKER> for the user who has been assigned the user name BECKER. Also, the operator assigns the password MARTIN.

```
@ENABLE (CAPABILITIES)<RET>
$^ECREATE (NAME) PUBLIC:<BECKER><RET>
[NEW]
$$PASSWORD MARTIN<RET>
$$<RET>
$DISABLE (CAPABILITIES)<RET>
@
```

This directory is called the user's logged-in directory and is always

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on the public structure. Whenever the user logs into the system, he is connected to this directory. He can remain in this directory or connect to and use files in another directory.

Refer to the TOPS-20 Operator Command Language Reference Manual for a complete description of the `^ECREATE` command that the operator uses to create new directories, and the `ULIST` program that prints information about all the directories on the system.

After creating a new directory (either files-only or user), remember to update the tape containing the monitor, TOPS-20 Command Processor, `DLUSER`, `DLUSER` data, `DUMPER`, `<SYSTEM>`, and `<SUBSYS>`. (Refer to Chapter 7, System Backup Procedures.)

CONSIDERATIONS:

If two users have mistakenly been assigned the same user name and you try to create the second directory with this duplication, the system prints `[OLD]` instead of `[NEW]`. Give the `ABORT` subcommand, assign the user a slightly different user name, and reissue the `^ECREATE` command with the new directory name. A common practice is to precede such names with the user's first initial. This allows recognition on the user or directory name without typing the entire name and the distinguishing character. For instance, if you have the two users Stephanie Sheldon and Andrew Sheldon, you should assign them the user names `S-SHELDON` and `A-SHELDON` or `SSHELDON` and `ASHELDON` rather than use the names `SHELDON-S` and `SHELDON-A`.

CREATING FILES-ONLY DIRECTORIES:

If a user wants to have a library area in addition to his logged-in directory, you can create a files-only directory on the public structure or on another structure. The user can gain owner privileges to this directory by giving the `CONNECT` command and the password associated with the directory. If the directory is located on a structure different from the public structure, the user must also give the `MOUNT` command to use the structure before he gives the `CONNECT` command. The user cannot give the `ACCESS` command for or log into a files-only directory.

For example, if you have a user named `BECKER` who processes payroll on a regular basis, he may want to develop the payroll programs in his directory and keep the payroll data in a more restricted directory. To accomplish this, you can create on the public structure the logged-in directory `<BECKER>` and the files-only directory `<PAYROLL>`. The directory `<PAYROLL>` can be on some other structure, (e.g., `ADMIN:<PAYROLL>`). `BECKER` now has normal protection on his directory, more restrictive protection on the directory `<PAYROLL>` and can still `CONNECT` to `<PAYROLL>` by giving its password. `BECKER` cannot, however, give the `ACCESS` command for or log into `<PAYROLL>`.

The next example shows how to create the directory `<PAYROLL>` on the

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```
| public structure MAIN:.  
  
@ENABLE (CAPABILITIES)<RET>  
$^ECREATE (NAME) MAIN:<PAYROLL><RET>  
[NEW]  
$$PASSWORD MONIES<RET>  
$$FILES (ONLY)<RET>  
$$PROTECTION (OF DIRECTORY) 774000<RET>  
$$DEFAULT (FILE) PROTECTION 770200<RET>  
$$<RET>  
$DISABLE (CAPABILITIES)<RET>  
@
```

Now if user BECKER logs in and wants to use the files in <PAYROLL>, he can give the following CONNECT command:

```
@CONNECT (TO DIRECTORY) <PAYROLL><RET>  
Password: monies<RET>
```

| The TOPS-20 Operator Command Language Reference Manual describes all the parameters you can give to directories and describes how to create directories on mountable structures.

CONSIDERATIONS:

| When you create additional directories on mountable structures, consider if files-only directories are suitable. Some users will not want to give the CONNECT command to a directory each time they require owner access to the files in that directory. Also, files-only directories are members of groups only as directory group members and not user group members. Therefore, if you create ALL the directories on a structure as files-only, you cannot establish any valid user group relationships among those directories. (Refer to Section 5.8 for a description of setting up groups.)

Conversely, if you create user directories, users can give the ACCESS command to their additional directory and gain owner and group privileges without connecting to the directory, and they can use other directories on the structure as group members. Also, if the name of the directory you create is the same as the user's logged-in directory, and the structure is mounted as DOMESTIC, the user does not have to specify a password when giving the CONNECT or ACCESS command to the directory. (Refer to Section 4.5.7.) This is valuable when the user is submitting a batch job. No password is required on the batch input; therefore, security is preserved. In addition to creating user directories on the structure, you can create files-only directories to be used as library areas.

It is also possible to create only one user directory on a structure and to create all other directories as files-only. In this case, all users required to use a files-only directory on the structure could give the ACCESS command to the user directory (gaining owner and group

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privileges), and use the files in a files-only directory according to the group protection codes set. This would be useful if you have a private structure that contains several library areas that are common to the owners of the private disk pack(s). Each owner could give the ACCESS command for the one user directory and gain group privileges to all the library directories. Therefore, these users would need only one password to gain access to all the information on the pack.

Refer to the TOPS-20 User's Guide or the TOPS-20 Commands Reference Manual for a complete description of the CONNECT and ACCESS commands.

RESTRICTIONS:

The number of directories you create per structure cannot exceed approximately 5,000. This number is an approximation because the disk space that it takes to create a directory or file varies.

5.4.2 Central Control Using Subdirectories

DETERMINING FACTORS:

- o As stated in the previous directory scheme, your installation does not warrant segregation of projects and control. However, this directory scheme allows more directories per structure than the previous central control scheme. You or the operator can create up to approximately 12,000 directories per structure and assign and maintain all the directory parameters.
- o You can easily expand into a form of project control by adding project directories, and still maintain control at the management level over the majority of the user directories. (Refer to Section 5.4.4, Combined Central and Project Control.)

FORMAT:

<ROOT-DIRECTORY> points to 26 directories. The name of each directory is a letter of the alphabet, <A>, , <C>, ..., <Z>. The directories point to all user and files-only directories. The single-letter directories are on one level below <ROOT-DIRECTORY>. The user and files-only directories are on a second level below <ROOT-DIRECTORY> and are pointed to by the alphabetic directories.

The diagram below illustrates this flow. Also, although it is not shown in the diagram, the directories pointed to by the single letter directories, (e.g., <A.JONES>), can be allowed to create directories under them. Perhaps user A. JONES wants to create one or two subdirectories to store special files, such as memos. The user is

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responsible for maintaining the directory he created and is allowed to use only the disk quota you originally allocated to his logged-in directory. Refer to Section 5.4.3, Project Control, if you would like to allow some users to create directories of their own.

DIAGRAM:

ASSIGNING USER NAMES:

Each user name that you assign should be as close as possible to the user's last name prefixed by a first initial and a period. For example, Charles Baker would be assigned the user name C.BAKER. Under this type of directory scheme, you must follow the principle of prefixing the name with the first initial and a period.

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Have the operator create 26 directories using the `^ECREATE` command. The name of each directory is a letter of the alphabet, that is, `<A>` through `<Z>`.

The theory behind creating these alphabetic directories is the same as described in Section 5.4.3. That is, you must create directories that are allowed to have subdirectories. The directories `<A>`, ``, ..., `<Z>` can have approximately 5,000 user and files-only directories under them. Therefore, you must include some of the same parameters in these directories, as you would in project directories.

Refer to the TOPS-20 Operator Command Language Reference Manual for a complete description of the parameters that are defined when the operator uses the `^ECREATE` command to create directories, and the `ULIST` program that prints information about all directories on the system.

The procedures for creating the alphabetic directories and the user and files-only directories under them are described below. In the example, `COMMON:` is the name of the public structure.

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NOTE

The general considerations described in Section 5.4.1 for creating directories are also applicable to this directory description.

Even though the alphabetic directories are not associated with users, they must be created as log-in directories. However, do not assign passwords. This prevents users from gaining access to these directories.

```
@ENABLE (CAPABILITIES)<RET>
|$^ECREATE (NAME) COMMON:<A><RET>
| [NEW]
| $$
```

| Assign each directory a large number for creating subdirectories, for example, 400.

```
$$MAXIMUM SUBDIRECTORIES (ALLOWED) 400<RET>
```

Because many user directories are created under each of these alphabetic directories and the page quota (disk space) from these alphabetic directories is divided among (or passed on to) the user directories, you must assign the alphabetic directories a very large permanent and working page quota. Assigning them a sufficiently large page quota prevents any of these alphabetic directories from exceeding their page quota, thus requiring you to make a change to the quota at a later time. Therefore, assign each directory at least 500,000 pages of permanent and working disk page quota.

```
$$PERMANENT (DISK STORAGE PAGE LIMIT) 500000<RET>
$$WORKING (DISK STORAGE PAGE LIMIT) 500000<RET>
```

Assign a list of SUBDIRECTORY-USER-GROUP numbers to each directory. The list should be the same for each directory. The range of numbers you use depends on how many groups you plan to establish, (e.g., 5 groups, 10 groups, 40 groups). The numbers used in the following examples are for illustration; you can choose any sequence:

```
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 200<RET>
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 201<RET>
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 202<RET>
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 203<RET>
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 204<RET>
```

Later, when you create a user directory and place that user in a user group, you must enter one of the numbers in this list. No other numbers will be valid. (Refer to Section 5.4.3, for a more detailed description of why you are using this list of numbers, and Section 5.8 for establishing valid group relationships.)

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| In the following example, the operator is connected to the public
| structure COMMON: and creates the first two directories, <A> and :

```
@ENABLE (CAPABILITIES) <RET>
| $^ECREATE (NAME) COMMON:<A><RET>
  [NEW]
  $$MAXIMUM-SUBDIRECTORIES (ALLOWED) 400<RET>
  $$WORKING 500000<RET>
  $$PERMANENT 500000<RET>
  $$SUBDIRECTORY-USER-GROUP (ALLOWED) 200<RET>
  $$SUBDIRECTORY-USER-GROUP (ALLOWED) 201<RET>
  $$SUBDIRECTORY-USER-GROUP (ALLOWED) 202<RET>
  $$SUBDIRECTORY-USER-GROUP (ALLOWED) 203<RET>
  $$SUBDIRECTORY-USER-GROUP (ALLOWED) 204<RET>
  $$<RET>
  $
| $^ECREATE (NAME) COMMON:<B><RET>
  [NEW]
  $$MAX 400 !You can use abbreviations<RET>
  $$WORKING 500000<RET>
  $$PERMANENT 500000<RET>
  $$SUB 200<RET>
  $$SUB 201<RET>
  $$SUB 202<RET>
  $$SUB 203<RET>
  $$SUB 204<RET>
  $$<RET>
  $ !Continue creating directories <C>
  $ !through <Z> in exactly the same manner.
```

After all 26 directories are created, you can give the DIRECTORY command to see all the directory files that have been created under <ROOT-DIRECTORY>.

```
$DIR COMMON:<ROOT-DIRECTORY>
```

```
COMMON:<ROOT-DIRECTORY>
```

```
A.DIRECTORY.1
B.DIRECTORY.1
C.DIRECTORY.1
```

```
Z.DIRECTORY.1
```

Next, after all 26 alphabetic directories have been successfully created, the operator again uses the ^ECREATE command and creates all the user directories.

| In the example below, the operator is connected to the public

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structure COMMON: and creates a directory named <A.JONES> for the user who has been assigned the user name A.JONES. This directory is A. Jones' log-in directory on the public structure. Each time A. Jones logs into the system, he is connected to directory <A.JONES>. In this example, the operator also assigns the password 2BY4. The operator gives the directory the system default of 250 pages for both working and permanent disk quota. Because he is using the default, he does not have to make any entries for these two parameters. The 250 pages given to this directory are taken from the superior directory's quota (directory <A>). (The PRESERVE subcommand can be issued to avoid having the disk space quota subtracted from the superior directory's allocation.) The operator also places user A.JONES in user group 202 and places directory <A.JONES> in directory group 202.

```
@ENABLE (CAPABILITIES)<RET>
|$^ECREATE (NAME) COMMON:<A.JONES><RET>
| [NEW]
|$PASSWORD 2BY4<RET>
|$USER-OF-GROUP (NUMBER) 202<RET>
|$DIRECTORY-GROUP (NUMBER) 202<RET>
|$<RET>
|$DISABLE (CAPABILITIES)<RET>
|@
```

After creating any new directories (either files-only or user), you should update the backup tape that contains the monitor, TOPS-20 Command Processor, DLUSER, DLUSER data, DUMPER, <SYSTEM>, and <SUBSYS>. (Refer to Chapter 7, System Backup Procedures.)

CONSIDERATIONS:

If users have duplicate first initials and last names, you can use middle initials. For example, if two users have the name C.BAKER, you can assign either one of them a user name in the form CL.BAKER or C.LBAKER. If you use the form CL.BAKER you must create a directory <CL> in addition to directory <C>. If you do not create this additional directory with the user's first and middle initial, you will receive error messages and will not be able to create the directory <CL.BAKER>. If, instead, you assign user Baker the user name C.LBAKER (the preferred method), you can create the directory <C.LBAKER> as described above using the standard procedure. You do not need to create the additional directory <CL>.

If a user requires special capabilities to perform privileged functions, the operator can include the parameter for the capability in the user's directory accordingly. (Refer to Section 5.9 for a description of the capabilities you can assign to certain users who require them.)

CREATING FILES-ONLY DIRECTORIES:

If a user wants a library area in addition to the logged-in directory,

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you can create a files-only directory.

Files-only directories can also be prefixed by a letter and a period. Because the first name initials of users do not always encompass every letter in the alphabet, you may want to use those infrequently used letters as the prefix to the files-only directories, e.g., <X.FORLIB> or <Z.TESTS>. This method allows you to distribute your disk storage resources equally. The example below shows how to create the directory <X.FORLIB> on the public structure PUBLIC:. The operator assigns the password SQUASH, makes the directory files-only, takes the 250-page default for working and permanent disk storage quotas, and places the directory in directory group number 202. (User members of groups 202 can now access this directory and the files it contains according to group protections.)

```
@ENABLE (CAPABILITIES)<RET>
|^ECREATE (NAME) PUBLIC:<X.FORLIB><RET>
[NEW]
$$PASSWORD SQUASH<RET>
$$FILES-ONLY<RET>
$$DIRECTORY-GROUP (NUMBER) 202<RET>
$$<RET>
$DISABLE (CAPABILITIES)<RET>
@
```

Follow the procedures in the TOPS-20 Operator's Guide for creating directories on mountable structures.

CONSIDERATIONS:

The CONSIDERATIONS described in the previous central control description (Section 5.4.1) for files-only directories also apply to this description.

If the number of files-only directories you want to create is small, you can create them on the same level as the alphabetic directories. That is, <X.FORLIB> can be created as <FORLIB>. Your directory scheme may look like:

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RESTRICTIONS:

The number of directories you can create per structure cannot exceed approximately 12,000.

The number of subdirectories under a single-letter directory, for example, <A>, cannot exceed approximately 5,000.

If you reach the maximum number of directories allowed per structure, the system prints the message:

MAXIMUM DIRECTORY NUMBER EXCEEDED; INDEX TABLE NEEDS EXPANDING

If you reach the maximum number of subdirectories that a single letter directory can point to, the system prints the message:

SUPERIOR DIRECTORY FULL

5.4.3 Project Control

DETERMINING FACTORS:

- o The complexity and perhaps geography of your organization warrants separating small or large groups of users into projects. The responsibility for creating and maintaining the directories within a project can be given to an administrator. This is especially helpful if a large number of users have directories on the system. This method frees the operator from spending an excessive amount of time creating directories and changing directory parameters.

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- o Even though you delegate the task of creating and managing groups of directories to project administrators, you still maintain ultimate control of the overall system and its resources. This means that you still determine and allocate the disk space that each project uses. The administrator distributes the disk space you allocate to directories within the project. Also, administrators can create and maintain directories for their projects without having WHEEL or OPERATOR capabilities by using the TOPS-20 BUILD command. Therefore, you do not weaken the security of your system. Unless you give WHEEL or OPERATOR capabilities to an administrator, he cannot assign those capabilities to other users.
- o In addition to allowing administrators to create directories for a project, you can allow other users of the system to create subdirectories. These users can separate and store files in a subdirectory. According to the protection they place on their subdirectories, they can share their files with other users without losing the security of their superior directory. The users are responsible for maintaining the directories they create.
- o Up to 12,000 directories (including subdirectories) can be created per structure.

FORMAT:

| <ROOT-DIRECTORY> can point to approximately 5,000 directories per structure.

| Each directory under <ROOT-DIRECTORY> can point to approximately 5,000 subdirectories.

| Each subdirectory can also point to approximately 5,000 subdirectories directly under it.

The number of subdirectory levels is determined by a maximum length of 39 alphanumeric characters, because each subdirectory name contains the name or names of any superior directories above it. Using the diagram below, the user who owns directory <PHYSICS> under <ROOT-DIRECTORY> creates the subdirectory <PHYSICS.LAB-12>. The new subdirectory name (LAB-12) has its superior directory's name (PHYSICS) as its prefix. The period separates the different levels of the directory name and is counted as one of the characters in the directory name.

DIAGRAM:

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ASSIGNING USER NAMES:

The names that you assign to users should be as close as possible to the user's last name. In addition, the project names that you assign and that will be used for project directory names should be closely related to the project, e.g., PHYS might be used for Physics and PHYED for Physical Education.

When you give a SYSTAT command, the user surnames and obvious project names make it easier to identify who is using the system, and under which project.

CREATING PROJECT AND USER DIRECTORIES:

The user and project directories that <ROOT-DIRECTORY> points to (first-level directories) are created by you or the operator using the ^ECREATE command.

The procedures you should use and the parameters that you must include in these directories are described below.

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Create all project directories as log-in (user) directories. You would not create a project directory as files-only, because files-only directories cannot have log-in directories created under them. However, log-in project (or user) directories can have both log-in and files-only subdirectories.

Assign a disk storage quota to each project directory. This quota must be large enough to accommodate both the files that are contained in the directory and the directories that are created under it. Each time a directory is created under a project directory, that directory's disk quota is taken from the project directory's disk quota. The total disk quota for directories created under a project directory cannot exceed the quota originally given to the project directory.

In the example below, the operator begins to create the project directory <CHEM>. He creates the directory as a log-in directory on the public structure ORANGE: and assigns the password H2O. This procedure allows an administrator to log into the directory, giving its password, and create the required subdirectories. He may also want to store his files in this directory. The operator gives the directory a 10,000-page working and a 10,000-page permanent disk storage quota.

```
@ENABLE (CAPABILITIES)<RET>
|^ $^CREATE (NAME) ORANGE:<CHEM><RET>
| [NEW]
| $$PASSWORD H2O<RET>
| $$WORKING 10000<RET>
| $$PERMANENT 10000<RET>
| $$
```

Next, the operator enters the parameter that allows the owner of the project directory to create subdirectories. This parameter, called MAXIMUM-SUBDIRECTORIES (ALLOWED), specifies how many directories can be created under the directory. Unless you enter this parameter (the default is 0), the owner of the directory cannot create subdirectories. For example, all users of the system can type the BUILD command to the TOPS-20 Command Processor, but, only those users who have the MAXIMUM SUBDIRECTORIES (ALLOWED) parameter in their directory with a number greater than zero can actually use the BUILD command to create subdirectories.

The following entry in the sample project directory <CHEM> allows the administrator to create 100 subdirectories.

```
$$MAXIMUM-SUBDIRECTORIES (ALLOWED) 100<RET>
```

The administrator who is responsible for this sample project might create 60 directories under the project directory and give each subdirectory approximately 50 pages of working and permanent disk quota. He keeps enough pages in the project directory to allow that

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directory's files to grow and to create additional subdirectories. (Refer to the TOPS-20 Commands Reference Manual for the description of the BUILD command, including distributing working and permanent storage quotas and maximum subdirectory quotas.)

Also, some of the MAXIMUM-SUBDIRECTORIES (ALLOWED) quota given to the project directory can be given to a subdirectory so that directories under it can be created. The quota for the project directory is decremented by the amount of quota given to the subdirectory.

For example, directory <CHEM> is given a subdirectory quota of 100. The administrator creates the directory <CHEM.STUDENT> under <CHEM> and gives the directory a subdirectory quota of 10. The number of subdirectories that can now be created under <CHEM> is 89. If the administrator creates another subdirectory under <CHEM> called <CHEM.STUDENT2> and gives that directory a subdirectory quota of 6, the number of subdirectories that can now be created under <CHEM> is 82.

If the administrator gives an INFORMATION (ABOUT) DIRECTORY <CHEM> command, the output line for maximum subdirectory quota is:

```
MAXIMUM NUMBER OF SUBDIRECTORIES ALLOWED 84
```

The two directories <CHEM.STUDENT> and <CHEM.STUDENT2> that were created under <CHEM> account for the two subdirectories not shown in the subtraction.

Next, the operator enters the parameter that allows the administrator for this project to place users in groups. The administrator can use the group facility as described in Section 5.8 to set up library directories and allow file sharing among members of the project.

The SUBDIRECTORY-USER-GROUP parameter accepts a number between 1 and 262143 as its argument. You can list a range of numbers that the administrator can use to establish groups within the project; however, you must enter each number separately. Be careful to assign a range of numbers that is unique to that project. For example, project directory <CHEM> may be given the range:

```
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2600<RET>  
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2601<RET>  
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2602<RET>  
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2603<RET>  
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2604<RET>
```

Project directory <PHYSICS> may be given the following range of numbers different from project CHEM.

```
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 3001<RET>  
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 3002<RET>  
$$$SUBDIRECTORY-USER-GROUP (ALLOWED) 3003<RET>
```

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```
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 3004<RET>  
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 3005<RET>
```

If you assign the same range of numbers to different projects, you can cause a security break among projects. For example, a user in group 2602 in project CHEM should not be able to access, as a group member, the directories and files in project.PHYSICS.

The range of numbers placed in a project (or user) directory's parameter list does not imply that the directory or any of its subdirectories has access to those groups. It means only that the administrator (or owner of the directory) can use those group numbers to establish group relationships among that directory and its subdirectories.

The following example shows the completed parameter list for the sample project directory <CHEM>:

```
@ENABLE (CAPABILITIES) <RET>  
$ ^ECREATE (NAME) ORANGE:<CHEM><RET>  
[NEW]  
$$PASSWORD H2O<RET>  
$$WORKING 10000<RET>  
$$PERMANENT 10000<RET>  
$$MAXIMUM SUBDIRECTORIES (ALLOWED) 100<RET>  
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2600<RET>  
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2601<RET>  
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2602<RET>  
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2603<RET>  
$$SUBDIRECTORY-USER-GROUP (ALLOWED) 2604<RET>  
$$<RET>  
$ DISABLE (CAPABILITIES) <RET>  
@
```

Refer to the TOPS-20 Operator's Guide for a complete description of the ^ECREATE command that the operator uses to create new directories, and the ULIST program that prints information about all the directories on the system.

After creating a new directory (either user or files-only), remember to update the backup tape that contains the monitor, TOPS-20 Command Processor, DLUSER, DLUSER data, DUMPER, <SYSTEM>, and <SUBSYS>. (Refer to Chapter 7, System Backup Procedures.)

CONSIDERATIONS:

If two projects or users have mistakenly been assigned the same name, and you try to create the second directory with this duplication, the system prints [OLD] instead of [NEW]. Give the ABORT subcommand, assign the user or project a slightly different name, and reissue the ^ECREATE command with the new directory name.

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A subdirectory is just like any other directory. It can be logged into (if it is not specified as files-only), it can be a member of user and directory groups, and it obeys the usual protection mechanisms. Therefore, there are no implied rights between a directory and its subdirectories, or between two subdirectories of the same directory. Files have three protection fields: owner, group, and world; and each directory has the same three protection fields. Refer to Section 5.7 for a description of directory and file protections.

The only additional rights that the owner of a directory has over that directory's subdirectory is the power to change its parameters (e.g., directory protection, password, or group memberships), or to use the KILL subcommand, which deletes the subdirectory.

If you or another user choose to delete a directory, you must first delete any subdirectories under the directory. You cannot delete a directory or subdirectory that has existing subdirectories. This protection insures that someone (possibly an administrator of a project) does not accidentally delete a directory that points to a large portion of the database. The operator or administrator must connect to the directory immediately above the lowest level subdirectory to begin deleting any directories. For example, using the diagram in the FORMAT description, if the owner of the directory <PHYSICS> wants to delete the directory <PHYSICS.LAB-12>, he must first connect to directory <PHYSICS.LAB-12> and delete the three <PHYSICS.LAB-12.STUDENT> directories. Then, he connects to directory <PHYSICS> and gives the KILL subcommand to delete directory <PHYSICS.LAB-12>. Note that the operator is the only person who can delete the directory <PHYSICS>.

If you or the administrator choose to grant special capabilities to a user, you can include the parameter for the capability in the user's directory. (Refer to Section 5.9 for a description of the capabilities you can assign to certain users.) You should instruct the administrator to inform you when special capabilities are given to a system user. You are protected against users randomly giving other users special capabilities, because the operator or the administrator who assigns special capabilities to a user must have (as a user) those same capabilities. A person with WHEEL or OPERATOR capabilities can assign any capability to another user. Also, the user or operator who is assigning the capabilities must have those capabilities enabled at the time the privileged parameter is entered into the user's directory.

CREATING FILES-ONLY DIRECTORIES:

Administrators or users can have library areas in addition to their logged-in directories. They can use the BUILD command and create files-only directories under their logged-in directories, provided you have given them the capability to do so by adding the MAXIMUM SUBDIRECTORIES (ALLOWED) parameter to the directory that will contain

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the subdirectories.

CONSIDERATIONS:

Refer to the CONSIDERATIONS under the first description of Central Control, Section 5.4.1. These considerations also apply to Project Administrative Control.

RESTRICTIONS:

- o You cannot exceed approximately 12,000 directories per structure.
- o The number of directories that a superior directory points to cannot exceed approximately 5,000.

If you reach the maximum number of directories that you can create on a structure, the system prints the message:

MAXIMUM DIRECTORY NUMBER EXCEEDED; INDEX TABLE NEEDS EXPANDING

If either you or an administrator reach the maximum number of directories that can be created under a superior directory, the system prints the message:

SUPERIOR DIRECTORY FULL

- o Files-only directories cannot have log-in subdirectories. If you want to allow a user to create user (log-in) subdirectories under his directory, you must make his directory a log-in directory.

5.4.4 Combined Central and Project Control

DETERMINING FACTORS:

- o Only a portion of your organization warrants being separated into projects. The directories for the majority of the user community are created and maintained at the central management level. But, where project administration is appropriate, the task of creating and managing directories within a project is given to administrators.
- o For example, if your company has groups of users with terminals in several distant locations, you may want to have the administrator at the remote location create and maintain all the directories for that site. You can create a project directory for the remote location, perhaps using the name of the site as the project directory name (for example,

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<CHICAGO> or <CHIC>, <SEATTLE>, ...). The remaining user directories at the central location are created by the system operator.

FORMAT:

<ROOT-DIRECTORY> points to all the project directories and 26 alphabetically named directories, <A> through <Z>. The project directories point to the user and files-only directories that an administrator creates for a given project. The directories <A> through <Z> point to user and files-only directories created and maintained by the operator. These directories can also be allowed to have subdirectories.

DIAGRAM:

ASSIGNING USER NAMES:

If you create any user directories that are pointed to by <ROOT-DIRECTORY>, assign project names and user names in the same manner as described under Project Control, Section 5.4.3. Again, assign the 26 directories that will point to the majority of the user

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directories, the names <A>, , <C> <Z>. The user names that will be the directory names under the alphabetic directories should, as previously stated, be the user's surname prefixed by a first initial and a period. (Refer to Section 5.4.2, Central Control Using Subdirectories.)

CREATING USER AND FILES-ONLY DIRECTORIES:

Create the user, files-only, and <A> through <Z> directories by following the instructions in Section 5.4.2.

Create the project directories according to the instructions in Section 5.4.3, and distribute the description of the BUILD command (TOPS-20 Commands Reference Manual) to the administrators who are responsible for creating the user directories within their project.

CONSIDERATIONS:

All the considerations that apply to both Central and Project Control also apply to combining the two types of control.

You may want to allow users whose directories are created by the operator to create several directories under their logged-in directories. The diagram under FORMAT illustrates this facility. User A.SMITH has created the subdirectory <A.SMITH.MEMOS> to store files that he wants to keep separate from his programming files. This user uses the BUILD command to create the number of subdirectories that he is allowed to create and divides the quota for his logged-in directory among the directories he creates.

In general, users can store files in these directories or, if they set the appropriate protection, can share the files in these directories with other users.

RESTRICTIONS:

Combined Central and Project Control allows up to approximately 12,000 directories per structure.

The number of directories that a superior directory can point to cannot exceed approximately 5,000.

If you reach the maximum number of directories per structure, the system prints the message:

MAXIMUM DIRECTORY NUMBER EXCEEDED; INDEX TABLE NEEDS EXPANDING

If you reach the maximum number of directories that a superior directory can point to, the system prints the message:

SUPERIOR DIRECTORY FULL

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5.5 ALLOCATING DISK STORAGE QUOTAS

In Chapter 4 you determined the amount of disk space that is available on the public structure after installation. Once you know the available disk space, you can decide how to allocate it among the directories you create. Each directory is given a number of pages for both working-storage and permanent-storage allocations. Working storage refers to the disk space that a user can have during the time he is logged-in. Permanent storage refers to the total disk space that a user can have to store files after he has logged-out.

The number of pages that you should assign to directories depends on whether you (or the operator) are creating all the directories on the system (central control) or you are delegating the task of creating and maintaining directories to project administrators (project control). When using central control, you may divide the disk space equally among directories, giving regard to special requirements of certain users. In the case in which the operator creates project directories, you should allocate a disk quota large enough to accommodate the expected size of each project. Remember that project directories must distribute their disk space to the directories created under them.

Several important points about working and permanent allocations are discussed below.

Assign a large (2000-3000 page) working-storage allocation to users who perform considerable sorting because the temporary files required for this operation can occupy substantial disk space.

As the number of users on the system increases and your disk space on the public structure becomes low, you can decrease the working-storage and permanent allocations on the public structure to add new log-in directories. If you have additional disk drives not used by the public structure, you can accommodate the directories with many or large files by creating other structures and directories. Users will log into their directories on the public structure, request the operator to mount the proper structure using the MOUNT command, and access their additional directories with the ACCESS and/or CONNECT command.

5.6 ENFORCING DISK STORAGE QUOTAS

Working-storage allocations are strictly enforced. Users cannot exceed their working-storage allocations unless they enable WHEEL or OPERATOR capabilities. (Refer to Section 5.9 for a description of the special capabilities that can be given to users who require them.) If users request additional space, you can increase their allocations as required.

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If a user exceeds his working-storage allocation and attempts to create or change a file, the system prints the following error message:

```
?DISK OR DIRECTORY FULL, OR QUOTA EXCEEDED
```

The user must decrease his disk usage to less than the working-storage allocation for the directory (in which the file is being changed or created) before he can create or change any more files.

The system informs a user if he is over this permanent storage allocation when he logs off the system or connects to a different directory. The system prints the following message after the CONNECT or LOGOUT commands:

```
<directory>OVER PERMANENT STORAGE ALLOCATION BY nn PAGES
```

This message reminds users that although they may not be over their working-storage allocation, they have exceeded their expected total disk usage. Users should delete any files that are unnecessary for their job. Also, because permanent quotas are not enforced, it is wise to instruct the operator or administrator to police each directory's disk usage. The operator should run the CHKPNT program daily to keep a record of each directory's disk usage. The TOPS-20 Operator's Guide contains the description of running the CHKPNT program. If you are using the file migration facility (refer to Chapter 8), you may want to run the REAPER program with the TRIM command to force users to stay below their permanent quotas.

Every time the available disk space on the public structure is less than 500 pages, the system prints the following warning message:

```
[CAUTION-DISK SPACE LOW ON structure name] [DELETED FILES WILL BE  
EXPUNGED IN 30 SECONDS]
```

After 30 seconds, the system prints the following message and starts expunging any deleted files in all directories on the structure mentioned in the warning message:

```
[EXPUNGING DELETED FILES]
```

The system prints this message when the expunging is complete:

```
[SYSTEM EXPUNGE COMPLETED]
```

If anyone tries to create or change a file when there is no more disk space available, the system prints an error message similar to the one below:

```
?FILE OR SWAPPING SPACE EXCEEDED
```

Again, the operator or administrator should check to see how many

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users are over permanent allocations. Also, if you are using the file migration facility, you may want to migrate files on the system more frequently if you are constantly running low on systemwide disk space. (Refer to Chapter 8 for a description of file migration.)

5.7 PROTECTING DIRECTORIES AND FILES

Every directory and file has a protection number associated with it. The system uses a default protection number for each directory and file when the directory or file is created.

Whenever a user accesses a file, the system first checks the directory protection. If that protection allows the user the appropriate access to the directory, the system then checks the protection of the individual file.

5.7.1 Directory and File Protection Digits

The directory and file protection numbers have three 2-digit fields. The first field applies to the owner of the directory or file, the second field to members of the same group as this directory, and the third field to all other users (or world).

Protection Code		
dd	dd	dd
Owner	Group	World

The default protection for directories and files is 777700. A directory or file protection of 77 in any given field allows full access. For example, the default protection allows the owner and members of his group full access but all other users no access.

Protection Code		
77	77	00
Owner	Group	World

Table 5-1 contains a list of the directory protection digits.

Table 5-1: Directory Protection Digits

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Digits	Privilege
04	Permits creating files in the directory.
10	Permits connecting to the directory without giving a password and changing the accounts and protection numbers of the files therein. Thus it gives many of the privileges the directory owner has. (Refer to the <u>TOPS-20 Monitor Calls</u> manual.)
40	Permits, subject to the protection on the individual file, listing the names of the files with the DIRECTORY command and reading the file, e.g., via the TYPE, PRINT, or LIST commands.

These protection codes are actually bits in a protection word. To get more than one protection, add the digits (octal) corresponding to the protection you want. Thus, 44 allows listing the files and creating new files. There are unused bits in the protection number; therefore, to provide complete access to files, use 77. Useful digit pairs are:

00	Permits no access.
40	Permits the files to be listed and read.
77	Permits full (owner) access.

A file protection number has the same format as a directory protection number, but the meanings of the digits are different. Table 5-2 contains a list of file protection digits.

Table 5-2: File Protection Digits

Digits	Privilege
02	Permits wildcarding of the file.
04	Permits appending to the file.
10	Permits executing the file.
20	Permits writing and deleting the file.
40	Permits reading the file.

Obtain a protection number by adding the file protection digits of the different protections you need. For example, protection number 775200 allows the owner full privileges; the members of the same group

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reading, executing, and directory listing privileges; and all other users no privileges. Useful digit pairs are:

00 Permits listing the file with the DIRECTORY command only if the file is specified explicitly and completely.

12 Permits executing and using the DIRECTORY command to list the file only.

This protection is useful when, for example, you purchase a program and agree in your contract not to allow any of your system users to read, write into, or copy the file. Set the protection on an execute-only file to 771212. The TOPS-20 Beware file provides additional considerations for setting up execute-only files.

52 Permits reading, executing, and using the DIRECTORY command to list the file.

77 Permits full access.

The system checks protection numbers starting with the two rightmost digits. Therefore, users do not restrict members of a group by assigning the file protection 770052, because the group gets at least the execute, read, and directory list access (52) granted to all users.

Also, because the system checks the directory protection before the file protection, files that have been given a low file protection are still secure in a directory with the default directory protection. For example, suppose the user KOHN tries to type the file EDIT.MAC in the directory <HESS>. The protection on the directory <HESS> is 777700 and the protection on the file EDIT.MAC is 777752. User KOHN and directory <HESS> are not in the same group, so the world protection applies. First, the system checks the directory protection, 777700. The last two digits (00) apply and permit no access to the directory. User KOHN is not allowed to type the file, even though the corresponding protection on the file (52) would allow the file to be read, executed, and listed with the DIRECTORY command if KOHN were allowed access to files in the directory.

5.7.2 Changing Directory and File Protection

Users can change file protection numbers via the SET FILE PROTECTION command or the RENAME command.

Users can change directory protection numbers via the SET DIRECTORY PROTECTION or BUILD command. You can, however, prevent users from making changes to their directory protection numbers by including the DISABLE DIRECTORY-PARAMETER-SETTING command in the system file called

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| <SYSTEM>n-CONFIG.COMD on the public structure. If you make this entry in n-CONFIG.COMD, only users with WHEEL or OPERATOR capabilities can change directory parameters (via the ENABLE and SET DIRECTORY PROTECTION commands).

NOTE

| Make an entry in n-CONFIG.COMD only if you DO NOT want to allow users to change their directory protections; otherwise, the system assumes that you want to use the system default command of ENABLE DIRECTORY-PARAMETER-SETTING. (Refer to the TOPS-20 KL Model B Installation Guide for a description of the parameters that are placed in the n-CONFIG.COMD file.)

5.8 ESTABLISHING GROUPS

You can let users share files by placing users and directories in groups. Members of a group can access directories and files in that group according to the middle digits of the directory and file protection code fields.

| Each group that you establish has two types of members: USERS and <DIRECTORIES>. Each group is identified by a number. This number is included as one of the directory parameters in each directory belonging to the group. Any directory (including subdirectories) or user can belong to as many as 40 groups. You can set up group relationships in the individual directories by using the DIRECTORY-GROUP and USER-OF-GROUP subcommands to the ^ECREATE and BUILD commands. The following example shows that you have placed user Smith in user group 268 and directory groups 268 and 418:

```
| @ENABLE (CAPABILITIES)<RET>  
| $^ECREATE (NAME) MAIN:<SMITH><RET>  
| $$PASSWORD SOAR<RET>  
| $$WORKING 500<RET>  
| $$PERMANENT 500<RET>  
| $$USER-OF-GROUP 268<RET>  
| $$DIRECTORY-GROUP 268,418<RET>  
| $$
```

| The DIRECTORY-GROUP or USER-OF-GROUP parameter that you place in the user's directory determines: 1) if this user can access another directory's files as a group member 2) if the files in this user's directory can be accessed by another user as a group member, or 3) both. The diagrams on the following pages illustrate the difference between being a member of a group as a directory and/or as a user.

When a user accesses a file in a directory that is a member of the same group, the system first checks to see if this user is the owner

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of the directory. When, in this example, it finds that the user is not the owner, the system then checks to see if the user is in the same group as this directory. In this case, the user and directory are in the same group; that is, the group numbers match. The system now checks the group protection code field of the directory being accessed. If the group protection allows the type of access that the user requested, the system proceeds to check the group protection on the individual file.

If you are setting up groups on different structures, there is no correlation between a group number on one structure and the same group number on another structure. For example, group 202 on MAIN: does not necessarily have the same user and directory members as group 202 on another structure.

Each directory has two lists of group numbers: Directory Group Numbers and User Group Numbers.

Directory Group Numbers identify the various groups of which this <DIRECTORY> is a member.

User Group Numbers are associated with users and identify the various groups of which each user is a member.

The Directory Group Numbers are important to users who require access to this directory. Those users who have a matching group number in the User Group Number List can access this <DIRECTORY> according to its group protection code.

The User Group Numbers are important to the owner of this directory. This owner can access any directory that has a matching group number in its Directory Group Number List. Note: Because files-only directories are not associated with a user, they do not contain User Group Numbers.

There are three common types of groups:

1. A file-sharing group, whose users can access a set of library directories and each other's logged-in directories.
2. A library group, whose users can access a set of library directories and their own logged-in directories, but not each other's logged-in directories.
3. A teacher-student group, in which the teacher can access the students' directories and the students can access their own logged-in directories, but not their classmates' directories or the teacher's directory.

Figures 5-1 through 5-3 illustrate these three common groups and the association between USER and <DIRECTORY> members of a group.

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In a file-sharing group (Figure 5-1), users share all their files according to the group protection field, both in the library directories (here it is <MANUALS>) and in their logged-in directories.

Figure 5-1: File-Sharing Group

In Figure 5-1, the two users, PORADA and HOLLAND, are members of the same group (group 2). The directories <PORADA>, <HOLLAND>, and <MANUALS> are also members of group 2. Users PORADA and HOLLAND can access their own directory and files according to the owner protection code fields. PORADA can access directories <HOLLAND> and <MANUALS> according to the group protection code fields, and conversely, HOLLAND can access directories <PORADA> and <MANUALS> according to their group protection code fields. The other numbers shown in the figure indicate that a user or directory can be a member of more than one group.

In a library group (Figure 5-2), USER members can access all the <DIRECTORY> members but not each other's logged-in directories. The library directories are usually files-only directories. This figure illustrates a library group that consists of the files-only directories: <SUBROUTINES>, <TAPE-TESTS>, <MACROS>, and users: ALUSIC, BROPHY and KOHN. This library group illustrates that just because you are a member of a group as a user, your logged-in directory need not belong to the same group.

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Figure 5-2: Library Group

In Figure 5-2, users KOHN, ALUSIC and BROPHY are not directory group members of the same group; however, they are all user group members in the same group (group 2). User KOHN can access directory <KOHN> according to the owner protection field and can access directories <SUBROUTINES>, <TAPE-TESTS>, and <MACROS> according to the group protection field. KOHN can access <BROPHY> and <ALUSIC> according to the "world" protection field. Although the arrows have not been drawn from users BROPHY and ALUSIC, their access privileges are the same as KOHN's.

Figure 5-3: Teacher-Student Group

In a teacher-student group (Figure 5-3), the teacher, WILEY, is a member of the group as a USER, while the directories <HURLEY>, <HALL>, <MILLER>, and <RUSSELL> are <DIRECTORY> members. The teacher, WILEY, can access the files in the directories <HURLEY>, <HALL>, <MILLER>, and <RUSSELL> according to the group protection. The students whose

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logged-in directories are in this group as <DIRECTORY> members can access the files in <WILEY> according to the protection set for all users, because only their directories are members of the group; they are not members of the group as users.

5.9 GIVING USERS SPECIAL CAPABILITIES

You can give special capabilities to certain users; they are WHEEL, OPERATOR, CONFIDENTIAL, MAINTENANCE, IPCF, ENQ-DEQ, ARPANET-WIZARD, and ABSOLUTE-ARPANET-SOCKETS. Each capability that you give to a user is placed in the user's directory parameter list when you create or change the directory. The person who enters the capability in a user's directory must have that capability himself, and have it enabled at the time the capability is entered into the directory parameter list. You should grant these capabilities only to users who absolutely need them. Table 5-3 lists all the available capabilities and a brief description of their function.

Table 5-3: Special Capabilities

Capability	Description
WHEEL	Allows the user to modify any system parameters or data. In particular, the WHEEL capability is needed if the user wants to give the ^EEDDT or ^EQUIT commands.
OPERATOR	Allows the user all capabilities required to control the system. The user cannot, however, give the ^EEDDT or ^EQUIT commands.
CONFIDENTIAL	Allows the user to obtain accounting information for another user's job.
MAINTENANCE	Allows the user (usually the field service representative) to perform certain maintenance functions, but he cannot give the ^E commands.
IPCF	Allows the user to perform the privileged functions of IPCF. (Refer to the <u>TOPS-20 Monitor Calls Reference Manual</u> .)
ENQ-DEQ	Allows the user to perform global ENQUEUE/DEQUEUE functions. (Refer to the <u>TOPS-20AN Monitor Calls User's Guide</u> .)

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Capability	Description
ARPANET-WIZARD	Allows the user to perform certain ARPANET privileged functions. (Refer to the <u>TOPS-20AN Monitor Calls User's Guide</u> .)
ABSOLUTE-ARPANET-SOCKETS	Allows the user to place absolute socket numbers in his programs.
ARPANET-ACCESS	Allows the directory owner to establish ARPANET network connections.
DECNET-ACCESS	Allows the directory owner to establish DECNET network connections.

With the exception of WHEEL and OPERATOR, these capabilities are not listed in a format where having one capability means you also have the capabilities listed below it. The user who has WHEEL capabilities can perform the OPERATOR, CONFIDENTIAL, MAINTENANCE, IPCF, and ENQ-DEQ functions. The user who has OPERATOR capabilities can also perform these privileged functions with the exception of the ^EEDDT and ^EQUIT commands. But the user who has CONFIDENTIAL capabilities can only perform functions that are allowed by this capability; that is, he cannot perform MAINTENANCE, IPCF, ENQ-DEQ, ARPANET WIZARD, and ABSOLUTE ARPANET SOCKETS functions, unless he has been given the individual capability. The same principle is true for the remaining capabilities.

Also, you are giving capabilities to a user, not the user's directory. Therefore, if user HALL has WHEEL capabilities, other users who connect to or access the directory <HALL> do not obtain WHEEL capabilities. However, if they log in as user HALL, they will obtain HALL's capabilities. For this reason, users with special capabilities (especially WHEEL and OPERATOR) should be especially careful in selecting and protecting their passwords. They should be encouraged to change them often, and to use passwords that cannot be readily guessed.

5.10 PRINTING DIRECTORY INFORMATION

The ULIST program prints information about directories on the system and is described in the TOPS-20 Operator's Guide. In addition to listing information about each directory, the ULIST program can list information about groups, capabilities, and related information.

The LIST subcommand of the ^ECREATE command prints information about the directory or user name you are currently creating, and the ^EPRINT command also prints the information on an individual basis.

CHAPTER 6

CREATING ACCOUNTS

The TOPS-20 accounting facility allows you to assign and charge computer usage to valid accounts. It provides you with a means for 1) adding security to your system, 2) determining charges for computer usage and billing users by account, and 3) associating classes with accounts for use by the class scheduler. You can use account validation for one or all of these reasons.

One or more accounts can be assigned to a user for specific tasks and validated each time they are used. All accounting data, including records of CPU time, structures used, and peripherals used under a valid account, are stored in a usage file and can be used later for reports and billing.

This chapter describes how to set up the system to use accounts and establish an accounting data base. The TOPS-20 USAGE File Specification describes how to create accounting reports from the Usage file and establish billing procedures. The following sections include:

- o How to set up your system to use accounts
- o How to select an accounting scheme
- o How to use your accounting scheme and create the necessary base account and subaccount files
- o How to run the account generator program (ACTGEN), which takes these account data files and creates the accounting data base
- o What the operator can do if the accounting data base does not work properly
- o How to initialize your system to start validating accounts

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6.1 SETTING UP THE SYSTEM TO USE ACCOUNTS

6.1.1 Enabling or Disabling Account Validation

During software installation, you can specify whether you wish to create the account data base and validate accounts. You can make an entry in the n-CONFIG.COMD file that specifies either DISABLE ACCOUNT-VALIDATION or ENABLE ACCOUNT-VALIDATION. If you do not make an entry in the n-CONFIG.COMD file for accounting, the system assumes ENABLE ACCOUNT-VALIDATION.

If you enter DISABLE ACCOUNT-VALIDATION, meaning you do not wish to use the account validation facility, the system checks each account only for length. The purpose of the check is to ensure that the maximum number of alphanumeric characters has not been exceeded in each account. No other checking is performed. If a user attempts to use or create an account greater than 39 characters, the system simply truncates the entry to the 39-character maximum.

If you have instructed the system to ENABLE ACCOUNT-VALIDATION but have not yet created an account validation data base, you receive a warning on the console terminal (CTY) when the system starts operation. The message is:

```
<SYSTEM>ACCOUNTS-TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED
```

The system continues its normal operation; however, no accounts are validated (except for length checking) until you create the necessary account data files and run the account generator program (ACTGEN) to create your account data base.

You should not receive the above warning message if you have created your account data base prior to bringing the system up for operation. Users can log into the system using their valid accounts.

6.1.2 Setting up Account Validation with Existing Files

If you are using account validation on a system that already has files, the accounts for these existing files should be updated before account validation is enabled in the n-CONFIG.COMD file. Notify the users who created these files to change the existing account on every file to their new account(s). This procedure ensures accurate billing immediately after the system is brought up and that daily DUMPER tapes contain files with valid accounts. This means that if you must restore files from a backup tape, the correct account for each file is properly restored; therefore, the disk file storage continues to be accurately charged. (Refer to the TOPS-20 Operator's Guide for the procedure to follow if all files do not get updated.)

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6.1.3 Setting up the System for Accounting Shift Changes

The accounting facility also allows you to change your billing rates for system usage at selected times during the day. This action is called an accounting shift change. Accounting shift changes are selected by day-of-week and time-of-day.

You must enter the appropriate commands in the n-CONFIG.CMD file to initiate accounting shift changes. The n-SETSPD program reads these commands each time the system is reloaded. The format of the command placed in the n-CONFIG.CMD file is:

```
CHANGE time days-of-week
```

You can use any format for the time and day, that is, 1500, 15:00, 3:00pm, MONDAY, MON. Or, you can use the keywords ALL, WEEKENDS, and WEEKDAYS. The default for days-of-week is ALL. The following is a typical set of commands that may appear in the n-CONFIG.CMD file:

```
CHANGE 9:00 WEEKDAYS
CHANGE 10:00 WEEKENDS,MONDAY
CHANGE 12:00 TUESDAY,THURSDAY,SAT
CHANGE 17:00
```

The CHANGE (ACCOUNTING SHIFT NOW) command to the CHPNT program provides you with a means of changing shifts during system operation. This command causes an accounting session to end and a new accounting session to begin for all active jobs on the system. Refer to the TOPS-20 Operator's Guide for a description of all the commands that can be given to the CHPNT program.

6.2 SELECTING AN ACCOUNTING SCHEME

The first thing you must do before you create account data files is set up an accounting scheme. This procedure includes deciding which accounts you wish to create, their expiration dates if you are going to open and close accounts, the names of the users who can use (or charge to) those accounts and, if you are using the class scheduler, the scheduling class associated with each account.

The TOPS-20 account validation facility allows several levels of project administration in a group of accounts having the same base account. For example:

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The accounts you would create using the above example are:

DENVER
DENVER.CHEM
DENVER.CHEM.OVERHEAD
and
DENVER.CHEM.LAB-12

In this example, users at Denver University taking a particular lab course in chemistry (e.g., 12) would log in and charge to their assigned account, DENVER.CHEM.LAB-12.

All accounts that you assign to users can have a maximum length of 39 alphanumeric characters. The system allows you to use a hyphen (-) within the accounts you create (e.g., LAB-12), but no other punctuation (including spaces) can be used. Note that the system uses the period (.) as a delimiter to separate each part of multi-level accounts and the period is counted as one of the 39 characters. Therefore, DENVER.CHEM.OVERHEAD is a user account with 20 characters.

The type of accounting scheme you use depends on the form of project administration you have at your installation. Multi-level accounts are usually created through a form of project administration similar to that used when allowing certain users (perhaps heads of departments) to create subdirectories. (Refer to Chapter 5, Creating Directories.) Remember that subdirectories are just like any other directory. Therefore, users must have accounts to log into their directory.

Generally, all files that contain data pertaining to base accounts are created by you or the operator, and all files that contain subaccount data are created by one, or perhaps more, project administrators. A project administrator, for example, might be the head of the Chemistry Department. (This could be the same person who handles the subdirectory creation for a group or groups of users.) Allocating the subaccount file creation to a project administrator allows you to collect or budget for one base account (e.g., DENVER.CHEM) and not be directly concerned with the subaccounts. In the example, the head of the Chemistry Department is responsible for creating the subaccount files under DENVER.CHEM., that is, LAB-12 and OVERHEAD. Section 6.3 describes how to create these account data files using a sample accounting scheme.

Figures 6-1 and 6-2 illustrate several ways that you can set up your accounting scheme. Figure 6-1 is a simple scheme that a small organization might use. It also allows you, as system manager, to have complete control over all accounts because you are aware of every account assigned.

Figure 6-1 shows that the manager at Correct Data Company has decided to set up one base account for Correct Data and one base account for each customer using his system. He used the customer name for the

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accounts. All the people who use the system at Correct Data can charge their computer usage to the Correct Data account, CORRECT-DATA. Unionbank, L & P Food, and Town Square Magazine submitted the names of those people who will be using the system from their respective sites. These are the only people who will be able to log in from their site and charge to their assigned account. The manager at Correct Data also planned expiration dates for each customer account.

Figure 6-1: Accounting Scheme 1

Using the same sample company, Figure 6-2 shows how a simple accounting scheme of this type can be expanded into a form of project administration. Here, Correct Data and one of its customers, Unionbank, broke down the base accounts into subaccounts.

Because Correct Data bills Unionbank for all its computer usage as one account, the manager at Correct Data is not concerned with how Unionbank subdivides its account, and is probably not aware of the subaccounts at Unionbank. The manager at Unionbank, however, is concerned with the computer usage costs incurred by each department within his company. He supplies Correct Data with the name of the file that contains his subaccount information.

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Figure 6-2: Accounting Scheme 2

Section 6.3 describes how to enter the information for Figures 6-1 and 6-2 into files that are used to create an account data base.

6.3 CREATING AN ACCOUNT DATA BASE

Sections 6.3.1 through 6.3.3 describe how to use your selected accounting scheme and create the necessary files for your data base. Specifically, these sections include how to enter accounting data into files, how to run the account generator program (ACTGEN) to create the data base, and what to do if an error occurs.

6.3.1 Entering Accounting Data into Files

Base and subaccount files are created using a text editor. The format below shows the combination of entries you can make in accounting files using the CREATE command. Each file you or a project administrator creates can contain one or more accounts. Each account can point to one subaccount file, where additional account information is stored pertaining to that account. Following the format is a summary of the valid commands in an account file.

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ACCOUNT DATA FILE FORMAT

```
@CREATE (FILE) <directory>filename.type
INPUT: filename.type.1

00100 ACCOUNT account/SUBACCOUNT:dev:<dir>filename.type-
00200 /CLASS:n/ALLOW:n,n
00300 USER name,name,name,...
00400 DIRECTORY dev:<directory>
00500 GROUP (ON STRUCTURE) dev:/USER:user group number
00600 GROUP (ON STRUCTURE) dev:/DIRECTORY:directory group number
00700 <ESC>
*EU

<filename.type.1>
```

In addition to the above entries, each entry in the file can have an expiration date in the form:

```
/EXPIRES:dd-mm-yy hh:mm
```

This switch indicates when the account will no longer be valid for that entry in the file. For example:

```
USER name1,name2/EXPIRES:10-JAN-86,name3,name4
```

In the above example, name2 can no longer use this account after 10 January 1986. Name1, name3, and name4, however, can continue to use the account beyond that date. You could also place the switch immediately following the USER entry. For example:

```
USER/EXPIRES:10-JAN-86, name1, name2, name3, name4
```

This format specifies that none of the users in the list can use the account after a certain date. The account, however, remains open, and you can place another list of users in the file who can use the account.

Table 6-1 summarizes the account data file commands. You can type the entire command, or just the characters necessary to distinguish one command from another. For example, ACCOUNT can be typed as AC.

Because the ACCOUNT command has several modifiers, you may have to continue typing the modifiers on the next line. To do this, use a hyphen at the end of the line and continue typing the ACCOUNT modifiers on the next line. For example,

```
0100 ACCOUNT TEST/SUBACCOUNT:SYSA:<MARK> ACCOUNT.TXT-
0200 /CLASS:2/ALLOW:1,3
```

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Table 6-1: Summary of Account Data File Commands

Command	Description
ACCOUNT	<p>Specifies the name of the account that you or a project administrator wish to assign.</p> <p>Note: The ACCOUNT command must be the first entry in an account data file because all subsequent entries up to the next ACCOUNT entry are modifiers.</p>
/SUBACCOUNT:	<p>Modifies the ACCOUNT command. It includes the specification of the file where additional data for the account can be found.</p> <p>Note: The ACCOUNT command accepts only one /SUBACCOUNT:modifier.</p> <p>Example: One of your accounting files contains the following commands.</p> <pre>ACCOUNT CORRECT-DATA/SUBACCOUNT: <GERHARD>ACCT.TXT ACCOUNT UNIONBANK/SUBACCOUNT: <WARRINER>ACCTG.TXT</pre> <p>ACTGEN looks in <GERHARD>ACCT.TXT for more account data for the account CORRECT-DATA, and it looks in <WARRINER>ACCTG.TXT for more data for account UNIONBANK.</p>
/CLASS:n	<p>Modifies the ACCOUNT command and is used in conjunction with the class scheduler. It specifies the scheduling class that is valid for this account. For example,</p> <pre>ACCOUNT CHEM-207/CLASS:3</pre>

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Command	Description
	<p>means that class 3 is valid when using the account CHEM-207. ACTGEN places this information in the system's accounting data base for use by the class scheduling routines. Use the /CLASS:n switch only if you have selected to specify class scheduling by account. (Refer to Section 10.1 for a complete description of using the class scheduler by account.)</p> <p>When a user gives an account that does not have a valid class associated with it, the system uses the default class, class 0. If the account has a class associated with it, that class is used. The percentage of CPU time that classes can receive is defined in the n-CONFIG.COMD file.</p> <p>To use class scheduling by account, you must have:</p> <ul style="list-style-type: none">o made the appropriate entries in the n-CONFIG.COMD file.o updated your ACCOUNTS.COMD file (and subaccount files) to specify the classes that are associated with each account.o run ACTGEN with the INSTALL command to update the ACCOUNTS-TABLE.BIN file.o given the ENABLE CLASS-SCHEDULER command to OPR or brought the system down and back up again to start class scheduling.
/ALLOW:n,n	<p>Modifies the ACCOUNT command and is used in conjunction with the class scheduler. It allows you to delegate the assigning of classes to subaccounts by project administrators. It specifies the class or classes that can be used by subaccounts of this account. For example,</p> <pre>ACCOUNT CHEM/SUBACCOUNT:<ABC>MORE.TXT- /CLASS:2/ALLOW:1,3</pre>

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Command	Description
	means the CHEM account is in class 2, and that subaccounts created under CHEM can be in either class 1 or class 3. If no /ALLOW switch is given, the administrator is not restricted to using certain classes and, therefore, can give the subaccounts any class. For example, the administrator can give them the same class as the superior directory. The /ALLOW switch is useful when you want the superior account to be in perhaps a higher percentage class than its inferior accounts. Remember that if the administrator does not give a /CLASS switch to the subaccount, users who log into or change to this subaccount will be in class 0.
USER	Specifies one user or the list of users who are allowed to use this account.
*	Specifies that an account is valid for all users on a system. The * is a special argument to the USER command. Example: One instance when you might use * is if you have not established an accounting scheme but would like to allow users to log into the system. You could set up one account and use the * to indicate that all users can use that account. You could also use the * as follows: ACCOUNT MATH-101 USER: MATH.* This means that all users with a user name beginning with MATH can use the MATH-101 account. For example, the users assigned the user names MATH.SMITH, MATH.JONES, and MATH.BROWN can all use this account.

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Command	Description
DIRECTORY	<p>Specifies a directory name. It indicates that the account is valid for anyone with write access to the directory. This feature allows users to create or store files in systemwide or groupwide directories and to charge them to an "overhead" account different from their own account. The usage charged to this directory could be absorbed by system or project administration. This command also prevents users from being charged for file storage in files-only directories.</p> <p>Note: The DIRECTORY command also accepts a form of the wildcard entry. The valid forms are: *:<*>, dev:<*>, or *:<dir>. The asterisk indicates that users with write access to any of the directories matching the wildcard entry may charge their file creation to a certain account.</p> <p>Example: The file that contains account data for account CORRECT-DATA.UNIONBANK.FUND has the entry:</p> <pre>DIRECTORY PS:<FORLIB></pre> <p>This entry means that anyone with write access to directory <FORLIB> can use the account CORRECT-DATA.UNIONBANK.FUND when storing files there.</p>
GROUP	<p>Specifies that an account is valid for use by certain user and directory groups on a structure. (Refer to Section 5.8 for a description of groups.)</p>
/USER:nnn /DIRECTORY:nnn	<p>Modifies the GROUP command and can be used in any combination. (nnn is a decimal user or directory group number.) /EXPIRES: can be placed after either modifier to indicate when an account becomes invalid for use by the group.</p> <p>Note: Using the GROUP command is helpful if many people are eligible to use an account. Specifying their group number (if they are in a group) eliminates typing a long list of names incorrectly.</p>

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6.3.2 Sample Data Files

The examples below show how you could enter the information in Figures 6-1 and 6-2 into account data files. The first example shows the data file for Figure 6-1. Tabs and comment lines beginning with an exclamation point (!) can be used within the file for ease in reading or formatting the file. This file in particular contains all the base accounts and should be stored in your directory. You may find it easier when you run ACTGEN if you name the file ACCOUNTS.CMD. ACCOUNTS.CMD is the default file that the TAKE command under ACTGEN looks for. (Refer to Section 6.3.3 for running ACTGEN and giving the TAKE command.)

```
@CREATE (FILE) <HUDSON>ACCOUNTS.CMD<RET>
Input: ACCOUNTS.CMD.1
```

```
00100 !This file contains definitions of top-level accounts<RET>
00200 ACCOUNT CORRECT-DATA<RET>
00300 USER Hudson,Holland,Gerard,Gionet<RET>
00400 USER King,Kelly,Kohn<RET>
00500 ACCOUNT UNIONBANK/EXPIRES;1-JUN-86<RET>
00600 USER Warriner,Bloomstran,Prest,Pendergast<RET>
00700 ACCOUNT LP-FOOD/EXPIRES:1-JUL-86<RET>
00800 USER Schied,Queeny,Smith<RET>
00900 ACCOUNT TOWN-SQUARE/EXPIRES:15-JUL-86<RET>
01000 USER Markley,Gerhard,Dole<RET>
01100 <ESC>
*EU<RET>
```

```
<ACCOUNTS.CMD.1>
```

NOTE

Lines 300 and 400 contain all the users at Correct Data. However, you would not use the asterisk (*) because it would enable all the users of the system, including the users at Unionbank, L & P Food, and Town Square to charge to the CORRECT-DATA account.

Figures 6-3 and 6-4 show what information to enter into base and subaccount files for Figure 6-2. Each block in Figures 6-3 and 6-4 contains information to be entered into a separate file. Some of the blocks contain subaccount (/SUB:) entries that point to other files containing more information about that particular account.

Figure 6-3 shows which entries to make for account CORRECT-DATA and its subaccounts (the top half of Figure 6-2.)

Figure 6-4 shows which entries to make for account UNIONBANK and its subaccounts (the bottom half of Figure 6-2.) Note that all the base account entries for both Correct Data and Unionbank are contained in

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the file <HUDSON>ACCOUNTS.COMD.

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Figure 6-3: Correct-Data Accounting Files

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Figure 6-4: Unionbank Accounting Files

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6.3.3 Running the ACTGEN Program

After you create the base account files and the project administrator notifies you that all his subaccount files are complete, you can tell the operator to run the ACTGEN program. ACTGEN takes the accounting information in these files and creates an account validation data base. It is through this data base that the monitor validates all accounts entered by the users of your system. ACTGEN is a privileged program, so you must enable WHEEL or OPERATOR capabilities before giving the ACTGEN command. The command appears as follows:

```
@ENABLE (CAPABILITIES)<RET>
$ACTGEN<RET>
ACTGEN>
```

Valid commands that can be given to ACTGEN are HELP, EXIT, TAKE, CTRL/A, and INSTALL.

The HELP command lists information to assist you when running the ACTGEN program.

The EXIT command terminates the program and returns you to the TOPS-20 command level (\$).

The TAKE command accepts as its argument either a file specification or a carriage return. A carriage return defaults to your connected directory and the filename ACCOUNTS.CMD. If you do not name your base account file ACCOUNTS.CMD, the file you specify should be the one that contains your base account information and points to all the existing subaccount files. The TAKE command tells ACTGEN to look in the specified (or default) file for account information. It also tells ACTGEN to look at any subaccount file specifications for additional information pertaining to the account(s) in the base account file. Using Figures 6-1 and 6-2, the manager, Hudson, would specify the TAKE command as follows:

```
@ENABLE (CAPABILITIES)<RET>
$ACTGEN<RET>
ACTGEN> TAKE (COMMANDS FROM FILE)<RET>
```

If the manager in these examples had named his base account file MACCT.TXT, he would specify the TAKE command as follows:

```
ACTGEN> TAKE (COMMANDS FROM FILE) <HUDSON>MACCT.TXT<RET>
```

CAUTION

If the data files that are pointed to by your base account file are located on structures other than the public structure, be sure the required structures are mounted. Otherwise, the ACTGEN program will fail on those accounts that have subaccount files on unmounted

CREATING ACCOUNTS

structures.

ACTGEN takes all the information specified in the account files, forms the valid accounts, and creates a new version of the file ACCOUNTS-TABLE.BIN in the directory where ACTGEN is running. Each time the ACTGEN program is run successfully, a new version of this file is created.

While ACTGEN is creating the data base file, it checks for duplicate entries, e.g., two accounts of the same name, and the length of the accounts. If an error occurs, an appropriate message is printed on the terminal where ACTGEN is running, but the program continues to build the data base, using only the accurate data. You should make a note of the error on an error log sheet that you have prepared and later correct the appropriate files using an editor.

ACTGEN also checks expiration dates. If two or more expiration dates are given for the same entry in a file, the system uses the earliest date. For example: if you specify May 15, 1985 as the expiration date for account MATH and your project administrator specifies August 30, 1985 for the account MATH.LAB-201, the system will stop validating all accounts beginning with MATH as of May 15, 1985.

You can press CTRL/A while ACTGEN is running to stop the program and return to ACTGEN command level. The data files are closed and no new version of the data base file ACCOUNTS-TABLE.BIN is created from this session.

The INSTALL command starts account validation. When you enter this command, ACTGEN copies the ACCOUNTS-TABLE.BIN file in your connected directory (or the directory where ACTGEN created the file) to <SYSTEM>ACCOUNTS-TABLE.BIN on the public structure and enables account validation using this new data base.

Because the new version of ACCOUNTS-TABLE.BIN is kept in the directory where ACTGEN was run and not in the directory <SYSTEM>, you have a means of correcting any errors that might occur without disturbing the version currently running in the <SYSTEM>ACCOUNTS-TABLE.BIN file on the public structure. You can give the INSTALL command after you have corrected any problems.

If you do not receive any errors while ACTGEN is creating the data base file (ACTGEN has successfully completed the accounting file and you receive the ACTGEN prompt), you can give the INSTALL command immediately.

You should keep track of which version of the <SYSTEM>ACCOUNTS-TABLE.BIN file you are using. A log book that contains the date that ACTGEN was run and the version number of the data base file is helpful should a system problem occur and you are not sure of which data base file you were using. To find out which version you are using, enable capabilities and give the DIRECTORY

CREATING ACCOUNTS

command for <SYSTEM>ACCOUNTS-TABLE.BIN on the public structure. The generation number indicates the version that is presently running. The system looks in the current data base file each time it validates a given account.

6.3.4 Data Base Failures/Recovery

If your accounting files were set up inaccurately, or you entered random incorrect data into the data base file, account validation will not work properly. You are aware of this because users cannot log in and/or use accounts that are normally valid for them. Therefore, the account OPERATOR is set up for the user OPERATOR and is always valid. The operator can log into <OPERATOR> with the OPERATOR account, fix the files that are in error, and run ACTGEN to get account validation working again.

6.4 VALIDATING ACCOUNTS

An account is validated when a user gives any one of the following TOPS-20 commands.

- o LOGIN - A user must have a valid account to successfully log into the system
- o SET ACCOUNT (TO) argument
- o Any queue commands, for example, PRINT, SUBMIT, if the account is different from the currently validated account
- o SET FILE ACCOUNT (OF FILES) arguments (TO) argument
- o File creation with an explicit account

The system records the computer time used for valid accounts. This includes CPU time, time used per structure, [1] and peripherals used per job, that is, the number of pages printed on the line printer, tape mounts, tape records read/written, card reader usage, and disk storage. The computer usage incurred by each account is stored in the accounting USAGE.OUT file. This file is used for reports and billing. (Refer to the TOPS-20 Usage File Specification for information about reading and using this file).

How often you run ACTGEN and create a new data base file depends on

[1] To account for the time used on a structure, you must set the structure as REGULATED. Refer to the TOPS-20 Operator's Guide for a description of REGULATED and NONREGULATED structures.

CREATING ACCOUNTS

how frequently you change your accounts. If you expect to have frequent changes (e.g., opening and closing accounts), you may want to establish a standard time each week to run ACTGEN. Your administrators should inform the operator when changes are made to their subaccount files.

NOTE

Once ACTGEN is run and the data base file has been created, you can dump all the account files to magnetic tape and conserve some of your disk space. You must copy the files to disk the next time you need to run the ACTGEN program.

CHAPTER 7

SYSTEM BACKUP PROCEDURES

All the disk packs on your system must be backed up on magnetic tape. This procedure provides both a permanent record of the contents of the disk and a precautionary measure in the event a disk pack and/or its contents are destroyed. On the first day of operation, start a system backup procedure that includes:

1. Saving all the files in all the directories on all structures
2. Saving the directory parameters and critical system programs
3. Saving the front-end file system (one time only)

These procedures should become a part of the operator's scheduled duties.

It is important to start backing up the system immediately after installation. If you follow the backup procedures as they are outlined here and in the TOPS-20 Operator's Guide, you can restore the file system quickly and easily should a mishap occur.

DUMPER

The following sections discuss using the DUMPER program to save files. Make sure when you restore these files with DUMPER that you are running the correct version of DUMPER with your TOPS-20 monitor and that the tape version is compatible with the software. Otherwise, directory passwords could become unusable and you may have to manually respecify them with the BUILD command. Refer to Section 11.2, Password Encryption, for details. In addition, project-programmer numbers, supported in TOPS-20 version 6, may not be restored at all with incompatible versions of the software.

In a CFS configuration, DUMPER must run on the system to which the tape drives are attached.

To simplify backup and restore operations, you can create DUMPER command files for the operator. Rather than type a list of commands

SYSTEM BACKUP PROCEDURES

to DUMPER, the operator can then just give the TAKE command with a command file name as an argument. DUMPER will sequentially execute commands contained in the file.

The TOPS-20 User Utilities Guide and the TOPS-20 Operator's Guide discuss the DUMPER program in detail.

7.1 SAVING ALL FILES IN ALL DIRECTORIES

Have the operator run the DUMPER program (with the /FULL-INCREMENTAL switch to the SAVE command) to save all files in all directories. This procedure includes saving all the directories on the public structure and all the directories on any additional structures you have created. You can save all the files (a full dump) or just the files that have changed since the last time the operator ran DUMPER (an incremental dump).

Start a library of the magnetic tapes from the DUMPER operations. Each structure should be copied to a separate tape(s). Each tape should be identified with the system model number or name, for example, 2060, or System-A, the date, the type of save (full or incremental), the name of the structure, and the tape number. (A tape set name may replace the tape number, if labeled tapes are used.) A typical identification may look like:

SYSTEM-A (2060)		SYSTEM-A (2060)
30-JANUARY-1985		30-JANUARY-1985
Incremental	OR:	Full
ADMIN:		ADMIN:
Tape #1 of 2		Tape #3 of 3

In addition to keeping the tapes, keep the listing of their contents. (The operator includes a command to DUMPER to list the contents of the magnetic tapes on the line printer.) These DUMPER log files can be conveniently kept in a binder with the most recent listing on top. Identify each binder with the system model or name, for example, 2065 or System-A. (Chapter 9, System Problems/Crashes describes how to use these log files to restore directories and files.)

Tell users that backup files do exist and post the times when the operator normally creates the backup tapes. Many system managers do not allow users to enter the computer room to mount and use the tapes themselves.

NOTE

The DUMPER program DOES NOT save the files in the console front-end file system. If you lose these files, you must restore them from the floppy disks. (Refer to Section 7.6)

SYSTEM BACKUP PROCEDURES

7.1.1 Full Dumps

Full dumps contain all the information on the system, with the exception of the console front-end files, and can be used to restore many of the files that were on the system to their previous state. Therefore, full dumps contain a copy of every file in every directory on every structure.

NOTE

Full dumps are known as FULL-INCREMENTAL dumps. This name corresponds to the /FULL-INCREMENTAL switch that you give with the SAVE command to DUMPER.

7.1.2 Incremental Dumps

Incremental dumps (using the /INCREMENTAL switch with the SAVE command) cause DUMPER to save the files that have never been saved (new files) and the files that have been updated since the last time an incremental DUMPER operation was performed. Many managers request an incremental dump Monday through Thursday and a full dump on Friday.

The File Descriptor Block (FDB) of each file contains the information necessary to determine if the file has been updated since it was last saved during an incremental DUMPER operation. A file that has changed since the last time it was saved is automatically saved again on tape; otherwise, it is passed over.

The operator should give the INCREMENTAL switch to DUMPER and specify each structure one at a time. By running DUMPER for each structure individually, the operator can copy each structure onto a separate tape. After running DUMPER and copying the structures that are presently on-line, the operator should mount any additional structures that have been used that day and run DUMPER for them also.

An incremental dump is faster than a full dump and requires less magnetic tape.

7.2 A COMMON BACKUP POLICY

A common backup policy is outlined below. You can set up your own backup policy.

1. Each day, take an incremental save of the files that have changed from the previous day's backup tape. Keep the incremental saves until a full save is made, at which time you can recycle the incremental tapes.

SYSTEM BACKUP PROCEDURES

2. At the end of the week, take a full save of all the files on the system. Keep the full saves for six months, at which time you can recycle the tapes into the backup system.
3. Every six months, take a full save and keep it for a number of years, or if you choose, indefinitely.

7.3 MAGNETIC TAPE REQUIREMENTS

You need a supply of magnetic tapes to start a system backup procedure. This section provides a guideline for the number of tapes you should have on hand for your installation. It is assumed that there are 2400 feet per reel of tape.

Type of Disk Drive	Reels Per Drive	Bits Per Inch
RP06	7	1600
RA60	9	1600
RP04	4	1600
RP20 (one spindle)	19	1600
RP20 (both spindles)	37	1600
RP20 (one spindle)	6	6250
RP20 (both spindles)	12	6250
RP07	7	6250
RP07	19	1600
RA81	6	6250
RA81	19	1600

Therefore, the number of tapes you stock depends on the type of disks at your installation. It also depends on the backup procedure you use. For example, if you save your daily incremental tape dumps for a longer time than usual, it takes longer to recycle these tapes into the backup system, and thus you need more tapes.

Generally, during the first month after installation, you may need approximately 36 (2400 ft.) tapes for each RP06 or RA60, 24 tapes for each RP04, 45 tapes (6250 bit/in) or 180 tapes (1600 bit/in) for each

SYSTEM BACKUP PROCEDURES

| RP20 disk (2 spindles), and 72 tapes for each RP07 or RA81 (1600
| bit/in).

NOTE

| These estimates assume a magnetic tape blocking factor
| of 1. You can specify a higher blocking factor and
| save much space on your tapes. Before doing this,
| however, there are cautions that you must consider.
| The description of DUMPER in the TOPS-20 User
| Utilities Guide explains how and when you can increase
| blocking factors.

7.4 MAKING A SYSTEM CRASH TAPE

| As the name implies, the system crash tape is used to re-create the
| public structure should it become unusable. This tape is created in
| addition to the tapes that contain FULL-INCREMENTAL and INCREMENTAL
| saves of all files and directories. You should make a new system
| crash tape whenever you add a new user, change any directory
| parameters, or make a change (patch) to:

- o The monitor you are running
- o The TOPS-20 Command Processor
- o The DLUSER program
- o The DUMPER program

| Therefore, the crash tape contains only the files necessary to recover
| user directory parameters and important system programs. User files
| themselves are restored from the FULL-INCREMENTAL and INCREMENTAL
| saves of the public structure.

| Label this tape SYSTEM BACKUP TAPE and include the public structure
| name; DECSYSTEM-20 model number or name, for example, 2060 or
| System-B; and the date and time the tape was created. You should
| follow this procedure once a day if users are allowed to change their
| own directory parameters. (Refer to Section 5.7.2 for information
| about allowing users to change directory parameters.)

NOTE

| Do not use a labeled tape when creating a System Crash
| Tape. The reason for this is that the installation
| software that is used to create the public structure
| cannot read tape labels.

| The order of files on the crash tape is:

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1. <SYSTEM>MONITR.EXE
2. <SYSTEM>EXEC.EXE
3. <SYSTEM>DLUSER.EXE
4. DLUSER data files
5. <SUBSYS>DUMPER.EXE
6. DUMPER save sets containing the directories:

```
<SYSTEM>  
<SUBSYS>  
<NEW-SYSTEM>  
<NEW-SUBSYS>  
<UETP>  
<GALAXY-SUBSYS>
```

Notice that the format of this tape is the same as the TOPS-20 Installation Tape that you used to install the TOPS-20 software.

7.5 MAKING A CRASH TAPE USING BATCH

You can create a batch job to make your crash tape or type the commands at the operator's terminal. Example 1 shows the standard control file that you can submit as a batch job to create this tape. In the example, PUB: is the name of the public structure.

EXAMPLE 1

SYSTAP Control File

```
@TYPE(FILE) SYS:SYSTAP.CTL<RET>
```

```
! Obtain a tape drive  
@MOUNT TAPE TAPE:/WRITE/LABEL:UNLABELED
```

```
!Systems not using Tape Drive Allocation must replace the  
!MOUNT TAPE command with @ASSIGN MTAO: and @DEFINE TAPE:  
!(AS) MTAO: commands.
```

```
@ENABLE (CAPABILITIES)  
@REWIND (DEVICE) TAPE:
```

```
!Save the monitor  
@GET (PROGRAM) PUB:<SYSTEM>MONITR.EXE  
@SAVE (ON FILE) TAPE:
```

```
!Save the TOPS-20 Command Language Interpreter
```

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```
@GET (PROGRAM) SYSTEM:EXEC.EXE
@SAVE (ON FILE) TAPE:
```

```
!Save the DLUSER program
@GET (PROGRAM) SYS:DLUSER.EXE
@SAVE (ON FILE) TAPE:
```

```
!Run the same DLUSER program, saving the directory structure
!on tape
@START
*DUMP (TO FILE) TAPE:
*EXIT
```

```
!Save DUMPER
@GET (PROGRAM) SYS:DUMPER.EXE
@SAVE (ON FILE) TAPE:
```

```
!Run the same DUMPER, saving SYSTEM: and SYS:
@START
*TAPE (DEVICE) TAPE:
*LIST (LOG INFORMATION TO FILE) SYSTAP.LPT
*SSNAME SYSTEM-FILES
| *SAVE (DISK FILES) PUB:<NEW-SYSTEM>,PUB:<SYSTEM>
| *SSNAME SUBSYS-FILES
| *SAVE (DISK FILES) PUB:<NEW-SUBSYS>,PUB:<SUBSYS>
*EXIT
```

```
!Print the DUMPER log file
@PRINT SYSTAP.LPT/NOTE:BACKUP TAPE
```

```
@DISMOUNT TAPE:
@
```

```
!Systems not using Tape Drive Allocation must replace the
!DISMOUNT TAPE: command with @UNLOAD (DEVICE) TAPE: and
!@DEASSIGN TAPE: commands.
```

To run SYSTAP, submit the batch control file using the TOPS-20 SUBMIT command.

| In the event the public structure becomes unusable, the crash tape can
| now be used by following the instructions in the TOPS-20 KL Model B
| Installation Guide.

HINT:

| Before you store the crash tape, verify that you have
| made a usable tape. That is, mount the new crash
| tape, follow the instructions in the TOPS-20 KL Model
| B Installation Guide to load the monitor, and use
| DUMPER to get a listing of the tape's contents.

SYSTEM BACKUP PROCEDURES

7.6 SAVING THE CONSOLE FRONT-END FILE SYSTEM

The DUMPER program does not save the contents of the console front-end file system. You can, however, make a backup copy of the file system by copying your floppy disks using the front-end program COP (for copy). You should make at least one backup copy of your console front-end file system (refer to Section 3.4).

To run the COP program, follow the steps outlined below. You need not stop timesharing when following these steps.

1. At the operator's console, type CTRL/backslash; the system prints PAR>.

```
CTRL/backslash
```

```
PAR>
```

2. Type MCR COP and press the RETURN key; the system prints the COP prompt.

```
PAR>MCR COP<RET>  
COP>
```

3. Place the floppy disk to be copied in drive 0 and the floppy to contain the new files in drive 1. Be sure to mount the floppy disks correctly; this includes checking that the paper containing the floppy directory is not accidentally attached to the back of the floppy disk.

4. Type DX1:=DX0: and press the RETURN key; the system starts the copying, which takes a few minutes. After the copying is complete, the system verifies the copy and prints a message. Type CTRL/Z to exit COP.

```
COP>DX1:=DX0:<RET>  
COP - STARTING VERIFY
```

```
COP>^Z
```

5. To return to TOPS-20 Command Level, type a CTRL/backslash; the system prints PAR>; type another CTRL/Z, or type QUIT and press the RETURN key.

```
CTRL/backslash
```

```
PAR>^Z
```

@

CHAPTER 8

TAPE STORAGE

Chapters 1 through 6 deal primarily with setting up and using your disk resources. Chapter 7, System Backup, describes how to save all the data from your disk structures onto magnetic tape. These tapes are the backup tapes that you use to restore directories and perhaps entire disk structures if something happens to the disks (refer to Chapter 9). In addition to using magnetic tapes for system backup tapes, you can use magnetic tapes to store other types of data and save valuable disk space.

This chapter describes two other uses for magnetic tapes, File Archiving and File Migration. It also describes how you can allow the system and the operator to control all tape drive assignments, Tape Drive Allocation, and how you can set up some or all of your tapes to contain labels, Tape Labeling. These uses are described in the following order.

- o FILE ARCHIVING
- o FILE MIGRATION
- o TAPE DRIVE ALLOCATION
- o TAPE LABELING

| In addition, the last section of the chapter discusses how to set up
| two DECSYSTEM-20s to share a TX02 tape subsystem.

File archiving provides you and users of the system with a voluntary way to move important files from the disk to magnetic tape for long-term storage. These tapes are stored separately from your system backup tapes. Users can access these tape files as easily as they access files on the disk. When users want to restore archived files to disk, they give a command to the TOPS-20 command processor. The system then tells the operator which tapes to mount and proceeds to restore the files. Section 8.1 describes why you would use the file archiving facility, and how to set up your system to archive files to magnetic tape.

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File migration provides you with a means of controlling the use of disk space. File migration is especially useful if your disk space is very low on a particular structure, for example, the public structure. This type of disk space control is, for the most part, involuntary on the part of the user. Old unused disk files are periodically moved (migrated) to magnetic tape by the system operator. Again, you should store these tapes separately from your system backup tapes. Users still maintain easy access to these files and retrieve them the same way as they retrieve archived files. Section 8.2 describes why and when you would use the file migration facility and how to set up your system to migrate files to magnetic tape.

If you use the file archiving or file migration facilities, or both, remember that these tapes are in addition to your system backup tapes. They are not replacements. You must continue to run the DUMPER program and create full and incremental system backup tapes.

Tape drive allocation provides the system and computer operator with complete control over tape drive usage. This means that it prevents users from issuing the ASSIGN command and reserving tape drives for their jobs. When users issue the MOUNT command, the TOPS-20 Tape Drive Allocation system and the operator control the allocation of tape drives. You must use the tape drive allocation facility if you use tape labeling; however, using tape drive allocation does not restrict you to using labeled tapes.

Tape labeling provides a means of storing label information on the tape itself that identifies the tape and describes the data on the tape. This label information is in an industry standard format so you can read and write tapes to be used with different computers. Tape labels can also add more security and reliability to your tape system. Section 8.4 describes why you would use tape labels, and also how to set up your system to begin labeling tapes.

There are no dependencies among file archiving, file migration, and tape labeling. For example, you can use the file archiving facility without using file migration or tape labeling. Each tape facility can be used separately. There is, however, the dependency that tape drive allocation must be turned on to use tape labels.

8.1 FILE ARCHIVING

File archiving provides a means of storing data on magnetic tape and freeing valuable disk space. This type of off-line storage allows users to store (archive) important files on tape, keeping their disk space below their permanent allocation, and still have easy access to those files.

If your installation has more than one computer system, the archive tapes can be common to all systems. You can put files on tape from

TAPE STORAGE

one system, move a directory and its files to another system, and still retrieve files from the tape in the ordinary manner.

Unlike general system backup tapes, the tapes that contain archived files are usually kept for a much longer time, for example, seven to ten years.

8.1.1 Setting Up the System to Use File Archiving

When you receive the TOPS-20 Installation Tape and have brought up the TOPS-20 monitor, your system contains a built-in default of 3650 days for recycling archived tapes. To change the 3650 day (10 year) default, you can enter a command in the n-CONFIG.COMD file. The command you use is:

```
ARCHIVE-TAPE-RECYCLE-PERIOD days
```

Select a length of time that is appropriate for your installation. Place the ARCHIVE-TAPE-RECYCLE-PERIOD command in the n-CONFIG.COMD file during software installation, or edit the file at a later date when you are planning to reload the system.

Each time the DUMPER program copies an archived file to tape, it places the expiration date argument in the FDB of the file. The MAIL program notifies users when a file on tape has reached its expiration date. If the file is no longer needed, the user can discard (using the DISCARD command) the information in the file's FDB that points to the file on tape. After all the files on a tape have passed their expiration dates and no users have FDBs in their directories that point to that tape, the tape can be recycled. Refer to Section 8.2.5 for additional information on how to recycle tapes.

8.1.2 What Happens When Users Archive Files

Users archive files voluntarily by giving the ARCHIVE command. After a specific generation of a file has been archived (e.g., MYFILE.CBL.6), it cannot change. Users can obtain copies of archived files by using the RETRIEVE command, but cannot alter those files. The TOPS-20 User's Guide describes the ARCHIVE and RETRIEVE commands.

When you establish your installation's policy for file archiving and notify users of its availability, you may want to instruct users to archive source files only. For example, files with a file type

```
.CBL, .MAC, .TXT, .RNO, or .FOR
```

should be archived; but, files with the file type

TAPE STORAGE

.REL, .EXE, or .MEM

should not be. This restriction saves space on your magnetic tapes.

To completely archive a file, two copies must exist in the archives. This means that each archived file is stored on two tapes. Having the archived file on two tapes provides you with a backup tape if later you cannot retrieve a file off one of the tapes. The DUMPER program, which is used to archive files, records both tape identifying numbers in the FDBs of the files being archived.

The diagrams below illustrate what happens when a user archives a file.

First, the user creates a file. The File Descriptor Block (FDB), among other file information, contains a pointer to the location of the file on the disk.

The user gives the ARCHIVE command for this file. The first or next time the operator runs DUMPER with the ARCHIVE command, the system locates all files that have been marked for archival by the ARCHIVE command and copies these files to tape. The FDB now contains pointers to the file on the disk and to the file on the tape.

The second or subsequent time the operator runs DUMPER with the ARCHIVE command (remember that archived files are contained on two tapes), DUMPER copies the file again to the second tape. DUMPER then deletes the pointer to the location of the file on the disk. DUMPER places another pointer in the file's FDB to the second tape that contains the file and deletes the contents of the file on disk. After a user archives a file, the file name no longer appears in the user's directory list. The user must give the DIRECTORY command with the ARCHIVE or INVISIBLE subcommand to see the file name.

8.1.3 What Happens When Users Retrieve Files

Users request files be returned to disk (retrieved) by using the RETRIEVE command. When the operator runs DUMPER to process retrieval requests, DUMPER notifies the operator of the second tape that contains the file. If the file cannot be copied from the tape (e.g.,

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the tape is bad), DUMPER notifies the operator of the first tape that contains the file. When DUMPER returns a file to disk, the FDB of that file now contains two pointers to tape and one to the disk. The pointer to the file on the disk remains in the FDB until the file is deleted from disk.

8.1.4 When To Create Archive Tapes

You can select how often the operator runs DUMPER to archive files. However, running DUMPER (with the ARCHIVE command) every day before or after your general system backup procedure is probably closest to your present schedule.

The steps below provide an example of a typical procedure. These steps assume that this is the first time you are archiving files. The diagrams that accompany the steps show you what information is on the archive tape after each DUMPER operation. Although you do not have to use this procedure, it is one that best utilizes your tape resources. (The TOPS-20 Operator's Guide describes the procedure for running DUMPER with the ARCHIVE command.)

Procedures

1. The operator runs DUMPER and performs the normal (incremental or full) backup procedures for the entire system. (Refer to Chapter 7, System Backup Procedures.)
2. The operator mounts a brand new tape (a tape that has been initialized if you are using tape labels; refer to Section 8.4.3) to contain the archived files, for example, TAPE 1.
3. The operator runs DUMPER with the ARCHIVE command. DUMPER locates all files marked for archival and copies them to tape.

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4. The next evening (or the next time system backup is performed), the operator mounts a brand new tape, e.g., TAPE 2. He does NOT mount the tape used the first time.

5. The operator runs DUMPER with the ARCHIVE command. This time DUMPER finishes the archival run of the previous night by making a second copy of those files. In addition, DUMPER locates all the files newly marked for archival and copies them to tape for the first time.

6. The operator repeats this process every day until the tapes are full.
7. For example, the third night, the operator mounts the first tape, TAPE 1.
8. The operator runs DUMPER. DUMPER finishes the archival run of the previous night by making a second copy of the previous night's files. It also locates all the files newly marked for archival and copies them to tape.

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9. The fourth night, the operator mounts the second tape, TAPE 2. Again, DUMPER finishes the archival run of the previous night by making a second copy of those files. It also locates all the files newly marked for archival and copies them to tape.

NOTE

DUMPER checks tapes for duplicate files. It does not write both copies of the same file on the same tape. If the wrong tape is mounted, DUMPER outputs an error message.

8.1.5 Processing Retrieval Requests

When a user gives the RETRIEVE command to request an archived file, the request is stored in a queue. You must establish a policy for how often the operator should process the retrieval requests contained in the queue. (The TOPS-20 Operator's Guide describes how to process retrieval requests.) If you have encouraged users to archive their files, you should instruct the operator to process the request queue frequently.

8.2 FILE MIGRATION

Some installations must control the use of disk space by periodically

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migrating files to magnetic tape. This forced file migration allows the management of an installation to move old unused disk files to a less expensive storage medium. Similar to archived files, migrated files are still easily accessible to the user. File migration also allows you to keep users' directories below their permanent allocation. (Refer to Section 5.5 for a description of permanent and working storage allocations.)

Whether you use the file migration facility depends almost entirely on your disk space resources. If users are archiving files regularly, if their directories are usually below their allowed permanent disk allocation, and your system is not continuously interrupted with "disk space low" messages, you may choose not to migrate files. Otherwise, if you are constantly receiving the [CAUTION - DISK SPACE LOW ON structure name] message, you may want to forcibly migrate files from the disk.

Sections 8.2.1 through 8.2.3 describe using file migration. They include:

- o the program you must run before migrating files to tape
- o the command that can be placed in the n-CONFIG.COMD file to change the default tape recycle period
- o when to run the REAPER program that marks files for migration and marks for deletion the contents of archived and/or migrated files
- o a sample of the REAPER.COMD file that you can use as a default file to be read by the REAPER program
- o when to run the DUMPER program that locates files marked for migration and copies them to tape
- o when to process retrieval requests for migrated files
- o when to recycle migrated (and archived) tapes

8.2.1 Setting Up the System to Use File Migration

When you receive the TOPS-20 Installation Tape and have brought up the new TOPS-20 monitor, your system contains a built-in default of 180 days for recycling migrated tapes. This default is placed in the FDB of each file as it is migrated to tape.

To change the 180-day default, you can enter a command in the n-CONFIG.COMD file to inform the system when you plan to recycle your migrated tapes. This command is:

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TAPE-RECYCLE-PERIOD days

Select a length of time that is appropriate for your installation. The default of 180 days, however, is a standard time period. You can place the TAPE-RECYCLE-PERIOD command in the n-CONFIG.COMD file at the time you install the system (refer to the TOPS-20 KL Model B Installation Guide). Or, you can edit the n-CONFIG.COMD file at a later date. Remember that if you edit the file at a later date, you must reload the system to process the commands in the n-CONFIG.COMD file.

CAUTION

If you decide to change the 180 day default, place the TAPE-RECYCLE-PERIOD command with the new argument in the n-CONFIG.COMD file and reload the system. Otherwise, the default recycling period does not change until the next system reload.

8.2.2 Using the REAPER Program

The REAPER program is the tool used to free disk space. It performs the following functions:

- o Marks for migration the files that have not been referenced for a specified period of time
- o Marks for deletion the disk contents of archived or migrated files, either after they have been successfully copied to tape, or after they have been returned to disk with the RETRIEVE command, and have not been referenced for a specified period of time
- o Trims directories that are over permanent disk allocation by marking files in those directories for migration
- o Deletes (purges) the tape pointers in FDBs on the disk that have reached their tape storage expiration date. That is, the file's FDB will no longer contain a pointer to the contents of the file on tape.

You can instruct the operator to run the REAPER program and perform one, several, or all of these functions. The operator can give a list of commands to REAPER or use the TAKE command with the default argument SYSTEM:REAPER.COMD. After the system is installed, the directory <SYSTEM> contains a default REAPER.COMD file. You can use this file as it is or use an editor and change the default parameters. The default SYSTEM:REAPER.COMD file appears similar to the following.

```
$TYPE (FILENAME) SYSTEM:REAPER.COMD<RET>
```

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! Sample REAPER policy file

! Directories not to be considered (specify the structure and directory)

| SKIP PUB:<NEW-SUBSYS>,PUB:<NEW-SYSTEM>,PUB:<SYSTEM>,PUB:<SUBSYS>

PERIOD 60 !specifies the age limit on
!files

MIGRATE !Files older than PERIOD days

DELETE-CONTENTS !Of unreferenced files older than
!PERIOD with tape backup

TRIM !Directories over perm allocation
!back to perm allocation

ORDER *.TMP,*.LST,*.REL !The order to take files during TRIM

Note that the SKIP command includes a list of directories that are not to be touched by the REAPER program. You can add other system or user directories to this list. The list can contain approximately 75 directories. Be sure that the operator always includes this command when running the REAPER program; otherwise, you may accidentally migrate some very important files from the disk. You can use more than one SKIP command to specify additional directories to be skipped, rather than list them all in one command. That way, if there is an error in processing one command, it will not affect the processing of the other commands. This is especially useful when SKIP commands are included in a file.

The REAPER program accepts the following commands.

BEGIN (Processing files)
DELETE-CONTENTS (Of old offline files)
EXIT (To monitor)
LIST (Output to file)
MIGRATE (Old files to offline storage)
ORDER (For trimming)
PERIOD (For migration)
PURGE (Expired FDBs from disk)
SCAN (Only)
SKIP (Directories)
TAKE (Commands from file)
TAPE (Check of tapes in use)
TRIM (Directories over allocation)

The TOPS-20 Operator's Guide provides a complete description of all the commands that can be given to the REAPER program or placed in the REAPER.CMD file. Typically, you give a number of commands to REAPER, one for each operation you want performed.

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The availability of disk space determines how often you run the REAPER program. If your disk space is low, you may want to run the REAPER program daily to free up as much disk space as possible. Other installations may run it once a month or less.

8.2.3 Using the DUMPER Program

After the REAPER program marks files for migration, the operator runs the DUMPER program to copy the files to tape. Similar to an archived file, a migrated file is not completely migrated until two copies of the file exist on magnetic tape. Section 8.1.4 describes a procedure for copying archived files to tape. You can use this same procedure for migrated files, by using the MIGRATE command instead of ARCHIVE.

If you use both the file archiving facility and the file migration facility, do not merge archived and migrated files on the same tapes. The expiration dates for migrated files differ greatly from the expiration dates on archived files. If you put them on the same tape, you will end up saving migrated files for approximately ten years and use up all your tape resources very quickly.

8.2.4 Processing Retrieval Requests for Migrated Files

When a user gives a DIRECTORY command, the files that have been migrated to tape still appear in the directory list; however, each file has a notation (;OFFLINE) beside the filename to indicate that the file is contained on tape and not on the disk. The versions of migrated files that have been copied to tape can be returned to disk, and unlike archived files, they can be altered and/or renamed in the ordinary manner. The user requests that a migrated file be returned to disk with the RETRIEVE command. These requests are stored in the same queue as archive requests until the operator processes the queue. The TOPS-20 Operator's Guide describes how to process retrieval requests. Retrieval requests for migrated or archived files should be processed frequently.

8.2.5 Recycling Migration (and Archive) Tapes

When all the migrated or archived files on a tape have passed their expiration dates and all pointers to these files on the disk have been deleted, you can recycle the tape.

The PURGE command to REAPER checks tape expiration dates and notifies users by the MAIL program when migrated or archived files on tape are about to expire. Users can retrieve the file to disk again or discard the tape pointer on disk if they no longer need the file.

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The operator can determine if a tape can be recycled by giving the TAPE command to REAPER. If a tape is not mentioned in the TAPE output list, this means that none of the disk structures that are on-line at this time and specified to REAPER contain FDB pointers to that tape. However, be sure that you check all possible places for on-line (disk) pointers to this tape. That is, run REAPER with the TAPE command on all the disk structures on all systems that may contain pointers to this tape. If files have passed their expiration date and pointers to them still exist on the disk, the operator can run REAPER with the PURGE command to delete these pointers. The operator should be certain that files are no longer needed before using the PURGE command.

HINT

When a migration tape is full, have the operator use the PRINT command to DUMPER to obtain a hard-copy listing of the tape contents.

8.3 TAPE DRIVE ALLOCATION

Tape drive allocation provides the system, and not the user, with complete control over tape drive usage. When accessing a magnetic tape, the user must give a MOUNT command to request that the operator mount the tape on a drive. Once the operator responds to the user's request, the user can access the tape. When the user is finished with the tape, the user gives the DISMOUNT command to release the tape drive back to the system. From the user's point of view, the MOUNT and DISMOUNT commands replace the ASSIGN and DEASSIGN commands. The operator selects the drive for the user, and the system informs the user how to access the tape. Using tape labeling requires that you use tape drive allocation; however, this does not restrict you to the use of labeled tapes only.

8.3.1 When to Use Tape Drive Allocation

Table 8-1 lists the differences between using and not using tape drive allocation.

Table 8-1: Tape Drive Allocation

Tape Drive Allocation	No Tape Drive Allocation
You must make an entry in the n-CONFIG.COMD file to use tape drive allocation.	No entry required in the n-CONFIG.COMD file.

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Tape Drive Allocation

Users can use labeled and unlabeled tapes.

Users cannot give the ASSIGN and DEASSIGN commands for allocated tape drives, but must give the MOUNT and DISMOUNT commands.

The operator should not use the UNLOAD button on tape drives, but should use the DISMOUNT command to OPR.

No Tape Drive Allocation

No support for labeled tapes. This means that all tapes, whether they contain labels or not, are treated as unlabeled.

Users can give the ASSIGN and DEASSIGN commands for allocated tape drives and cannot use the MOUNT and DISMOUNT commands.

The operator may unload tapes using the UNLOAD button on the tape drive.

8.3.2 How to Enable/Disable Tape Drive Allocation

To use tape drive allocation enter the command

ENABLE TAPE-DRIVE ALLOCATION

in the n-CONFIG.COMD file.

You can disable tape drive allocation on a tape drive by using the SET TAPE-DRIVE MTAn: UNAVAILABLE command.

8.3.3 Tape Mounting Policy

Occasionally, you may mount a tape that the system cannot read. For example, the operator mounts a tape that has a density of 800 bits per inch (bits/in) on a drive that does not support this density. The system checks tapes for labels; even if this tape contains labels, the incorrect density prevents the system from recognizing them.

With such errors, the system can be set up to immediately unload the tape and protect it from being accidentally erased, or it can treat the tape as unlabeled and continue processing.

If you do not want the system to classify these tapes as unlabeled, you can place the TAPE-RECOGNITION-ERRORS command in the n-CONFIG.COMD file with the appropriate argument. The format of this command follows:

REGARD-AS-UNLABELED

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TAPE-RECOGNITION-ERRORS

UNLOAD

The system uses REGARD-AS-UNLABELED if no entry is made in the n-CONFIG.COMD file. If REGARD-AS-UNLABELED is in effect, you should instruct operators to be especially careful when mounting tapes with write rings. The tape's contents cannot be overwritten if the write ring is not inserted.

8.4 TAPE LABELING

This section describes what tape labels are and how, as system manager, you can initiate using them.

Magnetic tape labels are records that are interspersed with user-defined data on a tape. They are informational records that describe the user data in a standard fashion that is recognized by many computer systems.

The TOPS-20 tape labeling system allows you to read and write tape labels that conform to ANSI (American National Standards Institute) and DEC standards. The tape labeling system also allows you to read tapes that are labeled according to IBM labeling standards.

Tape labeling is an option. You can start or continue to run your system using unlabeled tapes. If you have hundreds of unlabeled tapes at your installation, you may decide not to convert entirely to a labeled shop. Instead, you may have a combination of labeled and unlabeled tapes.

Sections 8.4.1 through 8.4.3 describe the advantages of using tape labels and how to set up your system to begin labeling tapes. The TOPS-20 Tape Processing manual provides a complete description of the ANSI, DEC, and IBM standard label formats and how to use them. It also describes the interface between the operator and magnetic tapes and the user and magnetic tapes.

8.4.1 Why Tape Labels?

An unlabeled tape has a gummed label on the outside of the reel that identifies the contents of the tape. When the operator selects, mounts, and types the identity of an unlabeled tape, the system assumes that the mounted tape is the one that the user (or job) requested. No checking is performed by the system.

A labeled tape, however, contains standardized information on the tape itself that identifies and describes the data on the tape. This internal label information is in addition to the gummed label on the

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outside of the reel. With labeled tapes, the operator selects a tape (by looking at the outside gummed label), mounts the tape on any available drive, but does not type in any identifying information at the terminal. When a user issues a MOUNT request for a labeled tape that is already mounted, the system automatically locates the drive containing the tape requested, and checks to ensure that the correct tape has been mounted. This facility for automatically locating and checking tapes is described further below.

A labeled tape consists of a volume label group, followed by one or more files. (A volume is a reel of magnetic tape.) The volume label group is a set of one or more records at the beginning of the tape. It contains a volume identifier, commonly referred to as a VOLID, and other identifying information. (See Figure 8-1.) You, as system manager, select the VOLIDs to be used at your installation. The VOLID is a name containing from one to six alphanumeric characters. A user requests access to a specific volume by specifying its VOLID to the system.

Each file on a labeled tape contains a file header label group, the file data (written by the user program), and a file trailer label group. (See Figure 8-1). Optionally, the file can contain user labels, whose contents are specified and examined only by user programs. Volume labels, header labels, trailer labels, and user labels are described in the TOPS-20 Tape Processing manual.

Figure 8-1: Organization of Labeled Tapes

Because every labeled tape contains a unique identifier, or VOLID, the system can read this VOLID and ensure that the correct tape has been mounted. This automatic checking improves the reliability of your tape system. It eliminates the possibility of an operator mounting the wrong tape.

Also, some or all of your tape drives can be set to automatically recognize tape volumes as they are mounted. This process is called automatic volume recognition (AVR). Setting AVR means that after the operator mounts a tape, the system automatically reads the first record and inspects it for label information. If the tape contains no labels, the system classifies it as unlabeled and the operator must key in a volume identifier for the tape. If a request for the tape is pending, the system readies the tape for use by the requesting job. If a request for the tape is not pending, the system stores the VOLID in a table and waits for a request. Therefore, automatic volume recognition provides the following benefits.

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- o The operator does not have to type tape-identifying information to the system when mounting a labeled tape.
- o It provides a faster connection between a user's job and the tape requested.
- o The operator can mount a tape long before it is needed. When a job requests the tape, the system locates the drive that contains the requested tape and readies it for use.

Tape labels also improve the security of your tape system. DEC-standard labels identify the owner, as well as the volume, in the volume label. The file labels specify protection codes for the individual files. These labels protect a tape from being inadvertently written on and valuable data destroyed by a user who does not have the appropriate access rights to the tape or its files.

In addition to the added reliability, security, and volume recognition, labeled tapes provide you with a means of interchanging tapes between DECSYSTEM-20s and other computers. This interchange capability extends the mobility of data between different systems. You can write ANSI- and DEC-standard labeled tapes and mount these tapes on other systems using ANSI- or DEC-standard labels, and vice versa. You can mount a labeled tape that was written in EBCDIC with labels conforming to IBM's OS standards, and read it on a DECSYSTEM-20 as if it were ANSI-standard labeled.

Finally, if you are using the TOPS-20 tape drive allocation facility, you can charge users for their tape usage. Note that you must use tape drive allocation with labeled tapes, but you can use it with unlabeled tapes also. The accounting usage file contains entries for all tape-mount requests. The TOPS-20 USAGE File Specification describes the formats of these entries and how they are used in reports and billing.

8.4.2 Setting Up the System to Use Tape Labels

To use tape labels, you must have at least one tape drive that is 9-track and has the capability of using tapes at a density of 800, 1600, or 6250 bits per inch (bits/in). There is no restriction on the number of these drives you use. The TOPS-20 Tape Labeling system can be used with as many drives as are allowed for your system.

Also, you must enter the ENABLE TAPE-DRIVE-ALLOCATION command in the n-CONFIG.COMD file. The TOPS-20 KL Model B Installation Guide describes the format of this command and how to enter it into the n-CONFIG.COMD file at the time you install the system. If you do not enter this command during software installation, you can edit the n-CONFIG.COMD file at a later date. However, if you edit the file at a later date, you must shut the system down and bring it back up again

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to process the commands in the n-CONFIG.COMD file.

8.4.3 Initializing Tapes and Drives to Use Labels

Tapes must be initialized before they can contain labels. An initialized tape contains a volume label set followed by an empty file. The operator issues commands to OPR to initialize tapes for use by the TOPS-20 Tape Labeling system. All the necessary volume labels are then created on a tape. (Refer to the TOPS-20 Operator's Guide for a description of using OPR to initialize tapes.)

You should initialize as many scratch tapes as you will need to store your system's data before users start issuing MOUNT requests for tapes. Then, when a user issues a MOUNT command without specifying a VOLID, the operator mounts an initialized scratch tape of the appropriate label type. TOPS-20 then readies (loads) the tape for write access by the user program.

In addition to initializing tapes, you can set some or all of your tape drives to use the automatic volume recognition facility (AVR). As described earlier, AVR sets your tape drives to automatically recognize tape volumes as they are mounted. To turn on automatic volume recognition, have the operator enter the following command in the <SYSTEM>SYSTEM.COMD file:

```
ENABLE AUTOMATIC-VOLUME-RECOGNITION (FOR) object
```

Where object is either TAPE-DRIVE MTAn: or TAPE-DRIVES.

You can turn off AVR by entering the following command in the <SYSTEM>SYSTEM.COMD file:

```
DISABLE AUTOMATIC-VOLUME-RECOGNITION (FOR) object
```

These commands can be given to OPR at any time to enable or disable AVR for any or all drives on the system.

It is generally a good practice to enable AVR for all drives.

8.5 SHARING TAPE DRIVES BETWEEN TWO SYSTEMS

If you have two DECSYSTEM-20s, you can set up the systems to share a TX02 tape subsystem by use of the TX03 option, as Figure 8-2 shows:

Figure 8-2: TX02 Tape Subsystem

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Note, however, that use of the drives must be under strict operator control. Without this control, it is likely that two users, on different systems, will eventually end up using the same tape.

Operator control is required because:

- o Unlike disk drives, there is no mechanism to control the porting of a tape drive between systems. If the tape drive is available to the TX02, then it is available to any system to which the TX02 is connected.
- o Furthermore, the MOUNTR programs on the two systems do not communicate, so they cannot coordinate access to the drives. Thus, the MOUNTRs on the two systems would allow two users access to the same physical tape drive.

Operator Procedures

1. All drives that are not to be used by a particular system should be set unavailable to MOUNTR with the OPR command:

```
OPR> SET TAPE-DRIVE MTax: UNAVAILABLE
```

This command takes away control of the tape drive from MOUNTR and writes an entry in the DEVICE-STATUS.BIN file. During system reloads, MOUNTR reads this file, and if a tape drive has been set unavailable, will never try to access or assign the drive. Note that if DEVICE-STATUS.BIN is ever damaged, then a new file is created at system startup. However, all data and settings will have been lost, including data for the drives that have been set unavailable. Therefore, the operator will need to repeat this step.

2. Setting the drive unavailable to MOUNTR does not prevent a user from reserving the drive with the ASSIGN command. To prevent a user from assigning a tape that is set unavailable to MOUNTR, a program under control of the operator will have to run that assigns to itself all of the "unavailable" drives. This program should be run at system startup, before any users are allowed to log in.

You could also control the assignment of tape drives with an access control program. Refer to Section 11.1, Access Control Program.

An example of re-reporting a tape drive from system A to system B follows. The operator:

1. Removes the tape (if any) from the tape drive that is to be ported over to system B.

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2. Sets the drive unavailable to MOUNTR on system A.
(OPR> SET TAPE-DRIVE MTAx: UNAVAILABLE)
3. Assigns the drive to a process under control of the operator on system A.
4. Deassigns the drive from the process that is under operator control on system B.
5. Sets the drive available to MOUNTR on system B.
(OPR> SET TAPE-DRIVE MTAx: AVAILABLE)

CHAPTER 9

SYSTEM PROBLEMS/CRASHES

This chapter describes the actions to take when you are faced with various system problems. You may have to correct a problem with the file system, act immediately after a power failure, or remove the CI from system use. There may be times when you cannot trace a problem. At such times, Digital Field Service can remotely run diagnostic programs on your system. The following sections address these topics.

Errors that require you to correct a problem in the file system seldom occur. However, if a problem of this nature arises, you can perform four classes of file system corrections. From the least to most severe, they are:

- o Restore a single file in a directory
- o Restore a single directory (other than <ROOT-DIRECTORY>)
- o Restore <ROOT-DIRECTORY>
- o Restore the entire file system

The TOPS-20 Operator's Guide provides all the necessary information for the operator to correct these types of problems. Sections 9.1 through 9.4 provide you with an overview of how these problems are solved.

9.1 RESTORING A SINGLE FILE

If you receive a request to restore a file for a user, you can use the following procedure.

1. Look in the binder that contains the listing of the DUMPER log files. (Chapter 7 describes creating DUMPER log files.)

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2. Write down the file specification (including the structure and directory) to be restored, and the date and number of the tape containing the file. Be sure to indicate the destination structure and directory if one or both are different from the structure and directory from which the file was saved.
3. Submit a request to the operator to restore the file.

9.2 RESTORING A SINGLE DIRECTORY

If you receive a request to restore a directory, you can use the following procedure.

1. Determine the structure that contains the directory.
2. Make sure you have a copy of the files in this directory on a DUMPER tape. (Check the log files.)
3. Give the ^ECREATE command with the LIST subcommand. Write down the list of parameters, for example, the directory number, allocation, etc. You may need this information when you re-create the directory.
4. Give the ^ECREATE command with the KILL subcommand for the directory. (The TOPS-20 Operator's Guide provides additional procedures for deleting a single directory if the ^ECREATE command with the KILL subcommand is unsuccessful.)
5. Using your DUMPER backup tapes, first restore the files from the last FULL-INCREMENTAL DUMPER operation. Then, restore files from each INCREMENTAL tape until the time when the files were lost. Be sure the operator gives the CREATE command to DUMPER to restore the directory parameters.

If the directory contains unreproducible information and it is not backed up on tape, call Digital Software Services for assistance. It may be possible to reconstruct the directory without losing the valid information in it.

9.3 RESTORING <ROOT-DIRECTORY>

Each structure has its own <ROOT-DIRECTORY> and a backup <ROOT-DIRECTORY> that is used by the system if the primary <ROOT-DIRECTORY> is bad. The directory <ROOT-DIRECTORY> contains a pointer to each first-level directory on a structure, as well as several important system files. (Chapter 5 illustrates how <ROOT-DIRECTORY> points to directories.) If <ROOT-DIRECTORY> is lost

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on the public structure, users cannot access any files in the system. If <ROOT-DIRECTORY> is lost on a mountable structure, users cannot access files on that structure.

You can tell that the <ROOT-DIRECTORY> on the public structure is bad if the operator's console prints any one of the BUGHLTs listed in Table 9-1. When a BUGHLT appears on the console, the system stops. A BUGHLT appears in the form:

```
*****  
*BUGHLT name AT dd-mm-yy hh:mm:ss  
*JOB:n, USER: user-name  
*ADDITIONAL DATA: data,data,data  
*****
```

The lines beginning with JOB: or ADDITIONAL DATA: may not appear.

Table 9-1: <ROOT-DIRECTORY> BUGHLTS

BUGHLT	Meaning
BADROT	<ROOT-DIRECTORY> is invalid
FILIRD	The system could not initialize <ROOT-DIRECTORY>
FILMAP	The system could not map <ROOT-DIRECTORY> into memory
BADXT1	The index table is missing and cannot be created

<ROOT-DIRECTORY> may also be bad if you get the BOOT error ?FIL NOT FND. If this error appears, be sure you have mounted all devices correctly.

To recover from a bad <ROOT-DIRECTORY>, first determine which structure contains the bad directory. If the bad <ROOT-DIRECTORY> is on a mountable structure, you can run CHECKD with RECONSTRUCT ROOT-DIRECTORY and specify the proper structure. The TOPS-20 Operator's Guide details the procedure for determining the structure and using CHECKD for reconstructing <ROOT-DIRECTORY> on mountable structures.

If the bad <ROOT-DIRECTORY> is on the public structure, you can instruct the system to use the backup public structure <ROOT-DIRECTORY> and rebuild this directory. Section 9.3.1 describes this procedure.

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NOTE

If your first attempt to rebuild <ROOT-DIRECTORY> fails, call your DIGITAL Field Service Representative. NEVER try to rebuild this directory twice on any structure.

9.3.1 Rebuilding the Public Structure <ROOT-DIRECTORY>

To rebuild <ROOT-DIRECTORY> on the public structure, halt the central processor and perform Steps 7 through 18 and Steps 36 and 37 in Chapter 2 of the TOPS-20 KL10 Model B Installation Guide. The steps are shown below for reference.

1. Type CTRL/backslash on the operator's console; the system prints PAR>.
2. Type SHUTDOWN and press the RETURN key; the system prints a few message lines.

```
PAR>SHUTDOWN<RET>  
**HALTED**
```

```
%DECSYSTEM-20 NOT RUNNING
```

3. Mount System Floppy A in drive 0 (Step 7).
4. Mount System Floppy B in drive 1 (Step 8).
5. Mount the TOPS-20 Installation Tape on MTA0: (Step 9).

If the TOPS-20 Installation Tape is not your most recent system backup tape, mount your SYSTEM BACKUP TAPE that contains the monitor, TOPS-20 Command Processor, DLUSER, DLUSER data, DUMPER, and save sets containing <SYSTEM> and <SUBSYS>. (Refer to Section 3.2 for a description of special system directories.)

6. Place the front-end HALT switch in the ENABLE position (Step 10).
7. Set the front-end switch register to 000007 (octal) (Step 11).
8. Press the ENABLE and SWITCH REGISTER switches simultaneously (Step 12).

```
RSX-20F YB14-45 8:55 1-JAN-81
```

```
[SYO: REDIRECTED TO DXO:]
```

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```
[DX0: MOUNTED]
[DX1: MOUNTED]
KLI -- VERSION VB12-26 RUNNING
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>
```

NOTE

The version and edit numbers in this manual may differ from the numbers printed on your console. The numbers on your console must be equal to or greater than the numbers in this manual.

9. Type YES and press the RETURN key (Step 13).

```
KLI>YES<RET>
KLI -- KL10 S/N: 2136., MODEL B, 60 HERTZ
KLI -- KL10 HARDWARE ENVIRONMENT
      MOS MASTER OSCILLATOR
      EXTENDED ADDRESSING
      INTERNAL CHANNELS
      CACHE
KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?
KLI>
```

10. Type YES and press the RETURN key (Step 14).

```
KLI>YES<RET>
KLI -- MICROCODE VERSION 275 LOADED
```

NOTE

If your system has cache memory, the following question appears previous to the question in Step 11. (Step 15.)

```
KLI -- RECONFIGURE CACHE (FILE,ALL,YES,NO)?
```

Type ALL and press the RETURN key (Step 16).

```
KLI>ALL<RET>
KLI -- ALL CACHES ENABLED
```

11. Type ALL and press the RETURN key (Step 17).

```
KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,FORCE,YES,NO]?
KLI>ALL<RET>
LOGICAL MEMORY CONFIGURATION
```

ADDRESS	SIZE	RQ0	CONTROLLER			CONTYPE	INT
			RQ1	RQ2	RQ3		
00000000	256K	00	01	00	01	MB20	4

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KLI -- LOAD KL BOOTSTRAP [YES,NO,FILENAME]?
KLI>

12. Type MTBOOT and press the RETURN key (Step 18).

KLI>MTBOOT<RET>
KLI -- CONFIGURATION FILE ALTERED
KLI -- WRITE CONFIGURATION FILE [YES,NO]?
KLI -- NO
BOOTSTRAP LOADED AND STARTED

BOOT V10.0(151)

MTBOOT>

13. Type /L and press the RETURN key (Step 36).

MTBOOT> /L<RET>
[BOOT: STARTING CHN:n DX20x:0 MICROCODE Vn(n)] [OK]
[BOOT: LOADING RESIDENT MONITOR] [OK]
MTBOOT>

NOTE

The message CHN:2DX20:0 MICROCODE VERSION
1(0) LOADED, VERIFIED, AND STARTED appears
only if you have a DX20 Tape Controller.

14. Type /G143 and press the RETURN key (Step 37).

MTBOOT> /G143<RET>

[FOR ADDITIONAL INFORMATION TYPE "?" TO ANY OF THE
FOLLOWING QUESTIONS.]
DO YOU WANT TO REPLACE THE FILE SYSTEM ON THE SYSTEM
STRUCTURE?

NOTE

Read Step 15 carefully before answering this
question.

15. Type N and press the RETURN key. You DO NOT want to clear
all the information on the disk packs. If you want to retain
all the information in the file system, always type N.

DO YOU WANT TO REPLACE THE FILE SYSTEM ON
THE SYSTEM STRUCTURE? N<RET>

[PS MOUNTED]
[BOOT: LOADING SWAPPABLE MONITOR, PASS1] [OK]

SYSTEM PROBLEMS/CRASHES

RECONSTRUCT ROOT-DIRECTORY?

16. Type Y and press the RETURN key. This causes the backup copy of <ROOT-DIRECTORY> to be used.

RECONSTRUCT ROOT-DIRECTORY? Y<RET>

[RECONSTRUCTION PHASE 1 COMPLETED]

%%NO SETSPD

System restarting, wait...
ENTER CURRENT DATE AND TIME:

The system restarts and runs CHECKD to reconstruct the bit table. The bit table contains one bit for every page in the file system. If the bit is on, the page is available; if the bit is off, the page is in use.

17. Type the date and time and press the RETURN key. Type Y and press the RETURN key to confirm the date and time.

ENTER CURRENT DATE AND TIME: 1-JAN-81 0931<RET>

YOU HAVE ENTERED THURSDAY, 01-JANUARY-1981 9:31AM,
IS THIS CORRECT (Y,N) Y<RET>
WHY RELOAD?

18. Type OTHER and press the RETURN key.

WHY RELOAD? OTHER<RET>
[REBUILDING BIT TABLE]

NOTE

You should type a response to WHY RELOAD?, that reminds you of why you did this procedure. This response is stored in the <SYSTEM-ERROR>ERROR.SYS file. Refer to the TOPS-20 KL10 Model B Installation Guide for a complete list of valid abbreviations.

19. The system prints some standard messages, the output from CHECKD, RUNNING DDMP, and the output from SYSJOB and PTYCON.

[REBUILDING BIT TABLE]

[WORKING ON STRUCTURE - PS:]

output from CHECKD

RUNNING DDMP

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output from SYSJOB and PTYCON

Refer to the TOPS-20 Operator's Guide for samples of the output from CHECKD, SYSJOB and PTYCON.

20. Log in as user OPERATOR.

```
TOPS-20 MEDIUM SYSTEM, TOPS-20 Monitor 4(2644)
@LOGIN (USER) OPERATOR (PASSWORD) --- (ACCOUNT) OPERATOR<RET>
Job 1 On TTY1 1-JAN-79 10:33:32
```

9.4 RESTORING THE ENTIRE FILE SYSTEM

If you are still receiving random errors and cannot use the system, you may have to restore the entire file system on the public structure. Before doing this, you should contact your software specialist to ensure that resorting to this procedure is necessary. The procedure requires shutting down the system and reinstalling the file system.

9.4.1 Re-creating the File System on the Public Structure

The following steps outline the procedure for restoring the file system on the public structure.

1. Type CTRL/backslash to start the front-end command parser.

```
CTRL/backslash
```

```
PAR>
```

2. Type SHUTDOWN to stop the central processor; the system prints a few messages.

```
PAR>SHUTDOWN<RET>
```

```
**HALTED**
```

```
%DECSYSTEM-20 NOT RUNNING
```

3. Start at Step 9 in Chapter 2 of the TOPS-20 KL Model B Installation Guide and follow all the steps through Step 60.

In Step 9, instead of mounting the TOPS-20 Installation Tape, mount your public structure SYSTEM BACKUP TAPE that contains the monitor, TOPS-20 Command Processor, DLUSER, DLUSER data, DUMPER, and save sets containing <SYSTEM> and <SUBSYS>.

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4. After performing Step 60, restore your entire file system using DUMPER. First run DUMPER, then mount your first reel of the most recent full DUMPER tape and follow the procedures in the TOPS-20 Operator's Guide.
5. Re-create the front-end file system by following the directions in Chapter 4 of the TOPS-20 KL Model B Installation Guide.
6. Finally, restart the system by following the directions in Chapter 5 of the TOPS-20 KL Model B Installation Guide.

NOTE

Restore the incremental saves to obtain the most recently saved files. Before restoring each incremental tape, type DUMPER>CREATE to restore all the directories that were created since the last time you ran the DLUSER program.

9.4.2 Re-creating Mountable Structures

If, after your efforts to correct errors on a structure other than the public structure (using the command RECONSTRUCT ROOT-DIRECTORY to CHECKD), you still cannot use the structure, you can re-create that structure and restore all the directories and files. You can restore structures other than the public structure during timesharing.

To restore a mountable structure you must:

1. Give the SET STRUCTURE IGNORED command to the OPR program to prevent other users from mounting the structure while you are re-creating it.
2. Run CHECKD to create the structure.
3. Run DUMPER using the backup tapes for this structure. Give the CREATE and RESTORE commands to DUMPER to restore all the directories and files.

The TOPS-20 Operator's Guide details the procedures for running CHECKD and DUMPER to re-create a structure.

9.5 POWER FAILURES

Unfortunately, power failures and brown-outs sometimes occur at installations. You should be aware of the immediate steps to perform and transmit this information to your operations people. The kind of

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attention you should direct to this type of problem depends on the type of outage you have. These steps can protect your system from physical damage and perhaps unnecessary loss of files.

If your system experiences a total power failure, you should:

1. Immediately power-off all components of the system.
2. Inform your DIGITAL Field Service representative as to when you expect to resume power. The field service representative may ask to be present while you bring your system back up.

If your system experiences a short instance of a power failure or brown-out, the system may recover on its own. You may not have any problems and, usually, all your data remains intact. If you notice a problem, call your Field Service representative.

High performance computer systems are sensitive to the quality of the electrical power supply. An investment in a power conditioner or an uninterruptible power supply may more than repay itself in improved system reliability and availability. Your Field Service representative may be able to assist you in evaluating the need for such equipment.

9.6 REMOTE DIAGNOSTIC LINK (KLINIK)

You may occasionally have a problem with your system and cannot determine the cause. The remote diagnostic link, available on all systems, allows a DIGITAL Field Service engineer to access your system from a remote location and run diagnostic programs. This capability is called KLINIK. The DIGITAL engineer accesses KLINIK through a terminal and telephone line at the DIGITAL Service Center. The TOPS-20 Operator's Guide describes when and how to use the KLINIK capability.

9.7 MAKING THE CI UNAVAILABLE ON NON-CFS SYSTEMS

The CI, a computer-interconnect bus, is a key piece of hardware for connecting systems in a CFS-20 configuration and for connecting HSC50-based disks (RA81s and RA60s) to a system. Ordinarily, you need do nothing at all to operate the CI. However, you may need to disengage the CI so Field Service personnel can correct problems with the CI-20 or the HSC50. At those times, you should instruct the operator to make the CI unavailable by means of the SET PORT CI UNAVAILABLE command. (Refer to the TOPS-20 Operator's Guide for details.)

When the CI is unavailable to a system, users cannot access

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HSC50-based disks, which rely on the CI to transmit data. The procedure calls for the operator to dismount any structures that the system indicates are mounted on these disk drives.

To put the CI back in operation, the operator gives the command:

SET PORT CI AVAILABLE

Structures that were affected must then be remounted.

Refer to Chapter 12, THE COMMON FILE SYSTEM, for information on disengaging the CI on CFS systems.

CHAPTER 10

SYSTEM PERFORMANCE

The configurations of systems running TOPS-20 and the mix of jobs on these systems vary from installation to installation. TOPS-20 is designed to provide better response to interactive users than to provide higher throughput to computational tasks. On systems with a typical mix of interactive and batch jobs, this design provides both good response and adequate throughput. Therefore, if your system has many timesharing users and an average amount of batch processing jobs, you will find that your system's response is good and most users are satisfied.

If you have a mix of jobs or a configuration different from a typical system, you may want to change the response of your system to provide better service to specific users. TOPS-20 provides several tuning mechanisms that allow you to experiment with and change the behavior of your system. One mechanism allows you to favor classes of users by allocating each class a specified percentage of the CPU. Another mechanism allows you to favor computational jobs over interactive jobs. A third mechanism allows you to disable features that normally provide better performance, but that may not be applicable at your installation.

This chapter describes the mechanisms for tuning your system's response and provides guidelines for using these mechanisms. Because the response of your system can be felt during actual use only, you can expect system tuning to be an experimental and iterative process. By analyzing the statistics from the WATCH program (or, optionally, AMAR-20, if you have chosen to purchase it) and by gathering inputs from your users, you can determine the best way to tune your system.

The tuning mechanisms include:

- o The class scheduler, which allows you to divide the central processor (CPU) resource among groups of users
- o Assigning low priority to batch jobs for installations that do not use the class scheduler

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- o Bias controls, which allow you to favor either interactive or compute-bound jobs on your system
- o The program name cache for improving the startup time of frequently used programs
- o Reinitializing disk packs in heavily used structures for improving file processing time

Each mechanism can be used independently. Unless otherwise noted, there is no interrelationship among them.

10.1 THE CLASS SCHEDULER

Occasionally, certain jobs monopolize the central processor's time while other more critical jobs wait for the CPU. You may want to control the amount of CPU time a job receives. You can use the class scheduler to provide an even distribution of CPU time or to provide more CPU time to critical jobs on the system. Some system managers may want to allocate a larger amount of processor time to special users than to other system users. Sections 10.1.1 through 10.1.9 describe:

- o an overview of the class scheduler
- o who should use the class scheduler
- o how to begin using the class scheduler
- o turning on the class scheduler
- o changing class percentages
- o disabling the class scheduler
- o getting information about class scheduler status
- o a sample session using class scheduler commands
- o an alternative to using the class scheduler with accounts.

10.1.1 Overview

The class scheduler allows you to allocate percentages of the central processor's time to individual classes of users. Each job in a class receives a portion of the class percentage. Therefore, by using the class scheduler, you can provide a consistent service to predefined groups of users.

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The diagram below illustrates the concept of classes and percentages of CPU time allocated to each class. Note that you can set up a class to include all batch jobs. This allows you to control batch jobs separately from timesharing jobs. The batch class is given a high percentage or a low percentage. Now, each time a user submits a batch job, the scheduler uses the batch class and not the user's class. Section 10.1.4, Step 5, describes how to create a batch class.

You can define class memberships by using the TOPS-20 accounting facility or by writing your own access control program. Section 10.1.9 provides an overview of using an access control program to define classes. The following description applies to using the class scheduler with the accounting facility.

Using the accounting facility, you can associate a class number with each account on the system. Each account has only one class associated with it. Therefore, only a user who has access to more than one account can have access to more than one class. The user changes classes by changing accounts. To use this method, you must enable account validation so that users are required to use a valid account. Section 10.1.4 describes the accounting file entries.

The scheduler periodically computes the time used by classes and individual jobs within a class. The scheduler's first concern is that a class receive its share of the CPU time. The scheduler gives a greater percentage of time to the class that is the farthest away from its target (the total percentage allocated to the class). The scheduler's second concern is that each job within a class receive its fair share. Periodically, the scheduler computes the average amount of CPU time that a job has accrued. This quantity determines the job's priority within the class. A job that is requesting the CPU and is farthest way from receiving its fair share within the class receives a greater percentage of time within that class.

Generally, the CPU has unused time. This unused time is called windfall. Windfall occurs if one or more classes has no logged-in jobs, or if one or more classes has an insufficient demand for the CPU

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to use all of its class percentage.

You can handle windfall in one of two ways: allocate it or withhold it. Allocating windfall means that the excess CPU time is awarded proportionately to the active classes. (In this discussion, the term active class refers to a class that has logged-in users requesting CPU time.) Higher percentage classes receive proportionately more of the available windfall than lower percentage classes. This means classes can receive slightly more than their allowed percentages when there is windfall available. Note that windfall is distributed proportionately to each class and not to each job within a class.

Withholding windfall means that the excess CPU time is idle time and it is not distributed to the active classes. It also means that classes do not receive more than the percentage allowed for them. Usually, it is better to allocate windfall, and not withhold it so you don't throw away valuable computer time.

10.1.2 Who Should Use the Class Scheduler?

As mentioned earlier, the class scheduler allows you to divide the user community into defined classes and allocate a percentage of CPU time to each class. This intended use may not be beneficial or practical for some systems. Tradeoffs do exist and some installations do not require class scheduling. Therefore, read the following paragraphs and determine if your system needs this type of control. Several instances that can benefit from using the class scheduler are:

- o You can elect to sell portions of CPU time. For example, customer X can purchase some percentage of computer time at a proportional cost. You should, in this case, invite customer X to your installation and provide an environment that simulates the kind of response this customer can expect at this percentage. Because it is impossible to create the environment exactly as the customer will experience it at all times, customer X may decide later to change the purchase to a different percentage.
- o If you have a natural division among the users of the system, you can divide these users into classes, then distribute CPU time to these classes with respect to their importance on the system. For example, in an educational environment, you may have administrative users (doing payroll, grades, etc.), faculty users (perhaps working on a funded research project), and student users (who are computer science majors). Using the class scheduler, you can establish three classes and distribute the CPU time according to the importance or pay rate of each class.

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- o If you wish to give preference to batch jobs, you can use the class scheduler to give the batch class a high percentage of the CPU.

Conversely, you may not want to use the class scheduler for some of the following reasons:

- o If you have not realized a need in the past for class scheduling, or if you have a new system and do not see an immediate requirement for class scheduling, you should not set it up.
- o Systems with minimal amounts of memory may experience an increase in swapping. This additional overhead may offset any advantage gained by using the class scheduler.
- o In addition to other tasks, the scheduler constantly maintains usage values for each class and job. Because of this extra overhead, the overall system throughput decreases. Therefore, use the class scheduler if allocating percentages to individually defined classes outweighs the throughput depreciation.
- o To give batch jobs a low priority on the system, you do not have to use the class scheduler. Section 10.2 describes placing the BATCH-BACKGROUND command in the n-CONFIG.COMD file to place all batch jobs in a low priority (or background) queue.

10.1.3 How to Begin Using the Class Scheduler

If you elect to use the class scheduler, first divide the system users into classes. Next, determine the amount of CPU time each class should receive. Percentages given to classes are typically in units of 5, that is, 5%, 10%, 15%, ...100%. The sum of the percentages given to all classes cannot exceed 100 percent. The result of these two steps depends on the reason you elected to use the class scheduler, and how you plan to use it at your installation. Because of this system dependency, step-by-step procedures for selecting classes and allocating the CPU cannot be given. The following discussion provides you with guidelines for setting up the class scheduler to meet your system's needs.

- o Start with as few classes as possible, three or perhaps four. The class scheduler allows eight. Later, you can divide classes further, if necessary.
- o Determine the number of logged-in users you expect in each class. Be sure that you do not overload a class, making it impossible to give a sufficient percentage of the CPU to each

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job in the class. Also, you can limit the number of users in a class, but you cannot limit the number of jobs. For example, the SUBMIT command creates an additional job. Therefore, consider the type of work that users in a class perform.

- o Estimate the percentage of CPU time (or time purchased) each class should receive. This is a difficult step; however, you can experiment with and later alter the percentages you choose. (Section 10.1.5 describes how you can change class percentages.) If a class consists of a large number of users who are generally logged in at the same time, be sure to give this class sufficient CPU time. For example, using the diagram below, class 2 has 60 members. It also has 60 percent of the CPU. This means that if approximately 60 jobs in class 2 are demanding the CPU, each job will receive approximately 1 percent. (It may be slightly greater than 1 percent if you allocate windfall.) This also means that on a per-job basis, users in class 2, with the higher percentage, may not get as much of the CPU as users in class 0 or class 1.

- o The above diagram illustrates that you can allocate less than 100 percent of the CPU to classes. However, the total percentage for all classes cannot exceed 100 percent.
- o The system uses class 0 as a default for any account that does not have a valid class assigned to it. Therefore, you can divide a portion of the system into well-defined classes and have all other users receive the percentage given to the default class.
- o You can set up the class scheduler so that one class, perhaps the default class, receives only windfall. For example, suppose you allow some users to log into an account that is not yet assigned a class. These users are assigned to the default class 0. Or, suppose several users log in

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job in the class. Also, you can limit the number of users in a class, but you cannot limit the number of jobs. For example, the SUBMIT command creates an additional job. Therefore, consider the type of work that users in a class perform.

- o Estimate the percentage of CPU time (or time purchased) each class should receive. This is a difficult step; however, you can experiment with and later alter the percentages you choose. (Section 10.1.5 describes how you can change class percentages.) If a class consists of a large number of users who are generally logged in at the same time, be sure to give this class sufficient CPU time. For example, using the diagram below, class 2 has 60 members. It also has 60 percent of the CPU. This means that if approximately 60 jobs in class 2 are demanding the CPU, each job will receive approximately 1 percent. (It may be slightly greater than 1 percent if you allocate windfall.) This also means that on a per-job basis, users in class 2, with the higher percentage, may not get as much of the CPU as users in class 0 or class 1.

- o The above diagram illustrates that you can allocate less than 100 percent of the CPU to classes. However, the total percentage for all classes cannot exceed 100 percent.
- o The system uses class 0 as a default for any account that does not have a valid class assigned to it. Therefore, you can divide a portion of the system into well-defined classes and have all other users receive the percentage given to the default class.
- o You can set up the class scheduler so that one class, perhaps the default class, receives only windfall. For example, suppose you allow some users to log into an account that is not yet assigned a class. These users are assigned to the default class 0. Or, suppose several users log in

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- infrequently, read mail, and perform little computing. These users may log into an account that is not assigned a class (and, therefore, are assigned the default class, 0), or an account that is associated with class 0. You subsequently assign a zero percentage to class 0. These users may receive enough windfall to get their job done. However, they are not allocated CPU time and can have periods of extremely slow or no response. You may find, after experimenting with this type of procedure, that it is better to associate each account with a class and give the class a very low percentage of the CPU.
- o Situations may arise that affect the scheduler's ability to give a class its percentage of the CPU. For example, the members of a class cannot use the amount of CPU time allocated to the class. Also, a situation may arise where the demands of the class exceed the percentage of CPU time given the class, and windfall is available but not allocated. In either case, you should reevaluate both the percentages given to classes, and whether or not you want to continue withholding or allocating windfall.

10.1.4 Procedures to Turn On the Class Scheduler

After dividing users into classes and estimating the amount of CPU time, follow these steps to set up classes and turn on the class scheduler.

STEP

PROCEDURE

1. Edit the <ACCOUNTS>ACCOUNTS.COMD file on the public structure (and the subaccount files, if any, that contain all your accounting data). Follow the procedure in Chapter 6, Creating Accounts, for modifying or creating each account with the /CLASS:n switch. For example,

```
ACCOUNT COMP1/CLASS:1
USERS KOHN,HOLLAND,MILLER
```

means that when users Kohn, Holland, and Miller log into or change their account to COMP1, they are placed in class 1. Each account has only one class associated with it. Therefore, only the user who has access to more than one account can have access to more than one class. A job can be in only one class at any one time.

2. Run the ACTGEN program. Give the TAKE command and specify the <ACCOUNTS>ACCOUNTS.COMD file (or the file containing the accounting data).

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3. When ACTGEN returns its prompt, give the INSTALL command. This command updates the ACCOUNTS-TABLE.BIN file that the system uses to validate accounts.
4. Edit the n-CONFIG.CMD file to include the CREATE commands that specify the classes. Be sure account validation is enabled. That is, check that the DISABLE ACCOUNT VALIDATION command is NOT in the file. (The system default is ENABLED.) If account validation is disabled, users can use any account and therefore any class they choose. Enter the following commands in the order shown below.

The CREATE command defines the class number and the percentage of CPU time the class should receive. For example,

```
CREATE 0 .40
```

means that the default class, 0, should receive 40 percent of the CPU. Enter the CREATE command for each of the classes that you defined in the ACCOUNTS.CMD file. For example,

```
CREATE 0 .40
CREATE 1 .20
CREATE 2 .30
```

NOTE

Remember that class 0 is the default class. Any user whose account (this includes subaccounts) is not associated with a specific class is placed in class 0.

5. Next, if you have decided to place all batch jobs in a separate class, enter the BATCH-CLASS command. For example,

```
BATCH-CLASS 2
```

means that all batch jobs will be placed in class 2 regardless of the user's associated class. You must use the CREATE command to define the percentage of CPU time that the batch class should receive. Note that timesharing users can be in the same class as well, if the account they use is associated with that class. The CREATE command in step 4 defines class 2 to receive 30 percent of the processor. If you do not place a BATCH command in the n-CONFIG.CMD file, the scheduler treats all batch jobs the same as timesharing jobs.
6. Finally, enter the ENABLE CLASS-SCHEDULING command. Be sure this is the last command entered. If you reverse the order,

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that is, you enter ENABLE CLASS-SCHEDULING before the CREATE commands and BATCH command, all users will receive zero percent of the CPU.

The ENABLE CLASS-SCHEDULING command turns on the class scheduler at the next system reload. It also specifies if you are using accounting or an access control program (policy program) for class scheduling and if you are allocating or withholding the windfall. The format of this command is:

```
ENABLE CLASS-SCHEDULING ACCOUNTS          WITHHELD
                                POLICY-PROGRAM  ALLOCATED
```

For example,

```
ENABLE CLASS-SCHEDULING ACCOUNTS ALLOCATED
```

means turn on the class scheduler, use the accounting method, and allocate the windfall. Always allocate the windfall. Do not withhold windfall unless you have a very good reason to do so, and you are sure that your class scheme works.

The entry,

```
ENABLE CLASS-SCHEDULING POLICY-PROGRAM ALLOCATED
```

means turn on the class scheduler, use the policy (access control) program, and allocate the windfall.

7. At the next system reload (the system is brought down and back up again) the new commands in the n-CONFIG.COMD file take effect.

10.1.5 Changing Class Percentages During Timesharing

During timesharing, you can change the percentage that a class receives by using the SET command to OPR. This change lasts until either the next system reload, or you make another change using the SET command. The format of the SET command appears:

```
SET SCHEDULER CLASS (number) m (to percent) n
```

n can be from 0-99 inclusive. Note that the decimal point required in the CREATE command is not allowed in this command.

To make the percentage that a class receives permanent, edit the CREATE commands in the n-CONFIG.COMD file. For example, you can edit the commands

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```
CREATE 0 .60  
CREATE 1 .30  
CREATE 2 .10
```

to

```
CREATE 0 .10  
CREATE 1 .05  
CREATE 2 .80
```

Next, reload the system to process the commands in the n-CONFIG.CMD file. The classes that received a low percentage before you made the change now receive a higher percentage of CPU time.

Changing class percentage may be useful if you decide that users in one or two classes should receive a greater percentage of CPU time than other classes during the day. However, these high-percentage classes may not require this time during the evening shift. If you have a recurring need for such changes, you may want to put the appropriate commands into files for use with the TAKE command in OPR.

10.1.6 Disabling the Class Scheduler During Timesharing

You can turn the class scheduler off and back on during timesharing by using the DISABLE and ENABLE commands to OPR. The class scheduler remembers the class percentages that were in effect before the DISABLE command was given. For example, suppose you use the SET command to change the percentage that class 1 should receive from 05 to 15 percent. Then, you give the DISABLE CLASS-SCHEDULER command, and later give the ENABLE CLASS-SCHEDULER command. The class scheduler uses 15 percent for class 1. If you reload the system after disabling the class scheduler, the class scheduler is enabled again and uses the percentages given in the n-CONFIG.CMD file.

10.1.7 Getting Information About Class Scheduler Status

Several TOPS-20 commands provide information about different class scheduler statistics.

The INFORMATION (ABOUT) SYSTEM-STATUS command informs you if:

- o the class scheduler is enabled or disabled
- o the accounting method or an access control program is being used

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- o windfall is allocated or withheld
- o the system's batch jobs are in a separate class.

For example

```
@INFORMATION (ABOUT) SYSTEM-STATUS<RET>
```

```
CLASS SCHEDULING BY ACCOUNTS ENABLED, WINDFALL ALLOCATED, BATCH CLASS 1.
```

The INFORMATION (ABOUT) MONITOR-STATISTICS command provides a table that shows each active class, its target use of the CPU, its current use of the CPU, and the load averages for that class. For example,

```
@INFORMATION (ABOUT) MONITOR-STATISTICS<RET>
```

Class	Share	Use	Loads		
0	0.80	0.79	6.56	4.36	3.57
1	0.15	0.21	5.46	1.38	.95
2	0.05	0.00	0.00	0.00	0.00

The SYSTAT command outputs load averages for either the entire system or a specific class. When the class scheduler is disabled, these averages represent the load of the entire system. For example,

```
@SYSTAT<RET>
```

```
Wed 11-Jul-84 10:17:09 Up 11:38:12  
52+16 Jobs Load av 5.30 4.03 4.86
```

The last three numbers following Load av indicate the average number of runnable processes over a period of one minute, five minutes, and fifteen minutes. These numbers start at zero. The higher the numbers the longer a job has to wait for CPU time. Using the example, over a fifteen minute period, a given job demanding the CPU waits approximately 4.86 times longer to run than it would if it were the only job running on the system.

When the class scheduler is enabled, these load averages represent the status of the job doing the SYSTAT command and not the entire system. For example,

```
@SYSTAT<RET>
```

```
Wed 11-Jul-84 10:28:07 Up 11:49:12  
52+10 Jobs Load av (class 1) 1.79 2.36 2.88
```

The last three numbers following Load av indicate the load averages of the class that the job giving the SYSTAT command is in. The SYSTAT command with the CLASS argument provides a breakdown of each job on the system. This breakdown includes the class each job is in, the average share of the class percentage that this job can receive, and how much CPU time the job is currently using.

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The TOPS-20 Commands Reference Manual describes these commands in detail.

10.1.8 A Sample Session

The following examples show:

- o The ACCOUNTS.CMD file after associating classes with accounts.
- o The procedures that you follow after editing all your accounting files.
- o A sample of the class scheduling commands that are placed in the 6-CONFIG.CMD file.

!The <ACCOUNTS>ACCOUNTS.CMD file has been edited.

\$TYPE (FILE) MAIN:<ACCOUNTS>ACCOUNTS.CMD<RET>

ACCOUNT MYBANK/CLASS:2
USERS BLOUNT,KONEN,ENGEL

ACCOUNT TRUST/CLASS:1
USERS BRAITHWAITE,HURLEY,HALL,CRISS

ACCOUNT OVERHEAD
USERS SAMBERG,BERKOWITZ,TAYLOR

ACCOUNT PROG/CLASS:3
USERS BLOUNT,KOHN,HOLLAND

\$

!Notice that account OVERHEAD uses the default class, 0.

!Next, run the ACTGEN program.

\$RUN ACTGEN<RET>

ACTGEN>TAKE (COMMANDS FROM) MAIN:<ACCOUNTS>ACCOUNTS.CMD<RET>

!After ACTGEN finishes and returns its prompt, give the
!INSTALL command to create a new version of the
!<SYSTEM>ACCOUNTS-TABLE.BIN file

ACTGEN>INSTALL<RET>

!After ACTGEN finishes and returns its prompt, give the
!EXIT command

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ACTGEN>EXIT<RET>

\$

| \$TYPE SYSTEM:6-CONFIG.CMD<RET>

!Terminal Speeds

TERMINAL 1 SPEED 2400

TERMINAL 2 SPEED 9600

TERMINAL 3 SPEED 2400

TERMINAL 4 SPEED 2400

TERMINAL 5 SPEED 300

TERMINAL 6 SPEED 300

DEFINE SYS: MAIN:<SUBSYS>

DEFINE SYSTEM: MAIN:<SYSTEM>

DEFINE NEW: MAIN:<NEW>,SYS:

DEFINE OLD: MAIN:<OLD>,SYS:

DEFINE HLP: MAIN:<OLD>,SYS:

MAGTAPE 0 24

MAGTAPE 1 25

PRINTER 0 VFU SYS:NORMAL.VFU

PRINTER 0 LOWERCASE RAM SYS:LP96.RAM

TIMEZONE 6

!Commands for the class scheduler

CREATE 0 .05

CREATE 1 .45

CREATE 2 .25

CREATE 3 .15

BATCH 3

ENABLE CLASS-SCHEDULING ACCOUNTS ALLOCATED

\$

| To start the Class Scheduler, either reload the system, or give the ENABLE CLASS-SCHEDULER command to OPR. If you edited the n-CONFIG.CMD file to remove the DISABLE ACCOUNT VALIDATION command, you must reload the system so you can start validating accounts.

10.1.9 An Alternative to Using Accounts

Chapter 11 describes the access control program that is used to grant and restrict access to various system hardware and software. This same program can also include the appropriate monitor calls to handle class scheduler decisions. Some of the requests it can define are:

- o classes

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- o class memberships
- o the batch class
- o class percentages
- o changing class percentages
- o windfall allocation per class

The monitor calls that are required in this program are described in the TOPS-20 Monitor Calls Reference Manual. DIGITAL distributes a sample Access Control Job program that includes class scheduler monitor calls.

This program is called ACJ.MEM and is located on the Distribution tape in the documentation area. The ACJ.MEM file provides you with a guide for writing your own access control program. Do not copy it and try to use it as is.

NOTE

You CANNOT run the access control program to implement class scheduler decisions at the same time you use the accounting method. You must use one or the other.

10.2 SCHEDULING LOW PRIORITY TO BATCH JOBS

The decision to favor batch jobs or to run them as background tasks depends on the type of batch environment you have at your installation. For example, if users submit batch jobs that are long and/or that do not require completion immediately, you can give batch jobs a low priority. Conversely, if batch jobs are the primary jobs on the system, you can give them a high priority.

Section 10.1 describes how to place batch jobs in either a high or low percentage class by including the BATCH n command in the n-CONFIG.COMD file. When a user submits a batch job, the scheduler uses the batch class and not the user's class.

You must use the class scheduler to give batch jobs a high priority. If you are not using the class scheduler, you can give batch jobs a low priority. To do this, enter the

BATCH-BACKGROUND

command in the n-CONFIG.COMD file. This command specifies that all batch jobs run on the lowest priority queue, also known as the background queue. This means that after processing all interactive jobs, the scheduler selects and runs batch jobs waiting in the queue.

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They receive left-over CPU time. You can enter the BATCH-BACKGROUND command into the n-CONFIG.CMD file. The command takes effect the next time you reload the system.

NOTE

The BATCH-BACKGROUND command is intended for those who are not using the class scheduler on their system but want to give the batch jobs a low priority. You should not use this command when you enable the class scheduler.

10.3 FAVORING INTERACTIVE VERSUS COMPUTE-BOUND PROGRAMS

This section describes how you can influence the scheduler to favor either interactive or compute-bound programs. You do this by using the bias controls, which is analogous to turning a knob over a range of settings (from 1 to 20). When you select a lower number, the scheduler favors users running interactive programs. When you select a higher number, the scheduler favors users running computational programs. Figure 10-1 illustrates this concept.

Figure 10-1: Bias Control 'Knob'

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NOTE

You can use bias controls with or without the class scheduler enabled. However, the effect of the bias control is less noticeable when used with the class scheduler.

After you install TOPS-20 software, the system uses the default bias control number 11. This setting distributes the scheduler's attention evenly to interactive and compute-bound programs.

New users of TOPS-20 can use the default setting until they need to favor particular types of programs. Previous users of TOPS-20 may want to experiment with new control settings. For example, the bias controls can serve as a good tool for favoring different types of users at different times of the day. For instance, you can set the bias to a low number during the day to favor on-line users and to a high number during the evening to favor batch users. The response you receive from your user community should determine the appropriateness of the selected settings.

Setting the bias toward interactive programs gives better response to the terminal user. Also, this setting may produce a higher system overhead, because the scheduler swaps jobs and switches from different tasks more often in its effort to favor interactive programs. Generally, setting the bias toward interactive programs is beneficial only if you have sufficient memory. Both the swapping rate and the scheduler overhead are likely to increase in small systems with too little memory. If your system has adequate memory, the scheduler overhead should be fairly constant over most of the bias settings.

Setting the bias toward computational programs should reduce system overhead and increase the total system throughput. However, the response to the terminal user may decrease slightly. In some cases, the improvement in system throughput more than compensates for the lessened response time, and users are more satisfied.

As you experiment with the bias settings, remember that setting the bias control to the extremes can prevent certain types of programs from running for long time periods.

After you select a bias control number that fits your system's operation, enter the BIAS CONTROL command in the n-CONFIG.COMD file or use the SET SCHEDULER BIAS-CONTROL command to the OPR program.

The format of the command in the n-CONFIG.COMD file is:

```
BIAS CONTROL m
```

The format of the command to OPR is:

```
SET SCHEDULER BIAS-CONTROL (TO) m
```

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where *m* is the bias control number.

You can change the bias setting during timesharing by using the SET SCHEDULER BIAS-CONTROL command. However, when you reload the system, the bias setting in the n-CONFIG.COMD file takes effect. If you want your change to be permanent, edit the n-CONFIG.COMD file at a convenient time before you reload the system.

Any time you are unsure of the current setting of the bias controls, give the INFORMATION (ABOUT) SYSTEM-STATUS command to determine its setting.

10.4 IMPROVING PROGRAM STARTUP TIME

Some of the programs on your system are run frequently. This involves constant searching for the same file on disk, bringing the program pages into memory, and allocating swapping space when the program is swapped out of memory. By storing these programs in an easy-to-access area, some of the startup time is saved. To improve the startup time of the frequently used system programs, TOPS-20 keeps a program name cache.

The <SYSTEM>PROGRAM-NAME-CACHE.TXT file is placed in the directory <SYSTEM> on the public structure automatically at installation time, and contains a list of programs and files to be copied into the program name cache. These are:

```
SYS:PA1050.EXE
SYS:MACRO.EXE
SYS:EDIT.EXE
SYS:TV.EXE
SYS:LINK.EXE
SYSTEM:ERRMES.BIN
```

Each time you reload the system, the <SUBSYS>MAPPER.EXE program runs under the SYSJOB program at the operator's console. <SUBSYS>MAPPER.EXE reads the <SYSTEM>PROGRAM-NAME-CACHE.TXT file and loads the program name cache. Now, when requests are made for these programs, the system looks first in the program name cache to see if it can retrieve the required pages quickly.

To further improve system performance, you can edit the PROGRAM-NAME-CACHE.TXT file and add the filenames of your own frequently accessed programs. For example, if your system uses the FORTRAN language, you may want to add the files:

```
SYS:FORTRA.EXE
SYS:FOROTS.EXE
SYS:FORLIB.REL
```

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Your list can contain the names of up to 16 executable files. Therefore, select the files to be placed in the program name cache carefully. You should consider only the executable files that are started frequently by a large number of users.

You can also add library files to the program name cache, for example, SYS:FORLIB.REL. However, these types of files use up swapping space. If you have too many or very large files, you may create a detrimental effect on your system's performance. The total library file pages that you cache should be no greater than 200 to 300. Give the VDIRECTORY command for the library files you want to cache and check the number of pages in each file.

If you edit the cache file, the revised file takes effect (MAPPER creates a new version of the cache) the next time you reload the system. Alternatively, you can create a new version of the cache immediately by entering the following commands at the operator's console.

```
^ESPEAK           !talk to SYSJOB
KILL MAPPER       !kill old version of cache
RUN SYS:MAPPER.EXE !read new file and create
                  !new version of cache
^Z               !exit
```

10.5 REINITIALIZING DISK PACKS

After many files are created, they may no longer be contiguous on the structure (disk(s)). This scattering of files may increase the time it takes to process them. You may decrease processing time by reinitializing the disk packs in your heavily used structures. For example, the public structure may be a likely candidate for reinitialization. This procedure places files into a contiguous format and can be scheduled as part of a backup procedure. How often you reinitialize your packs depends on the work load of the system and whether you notice a difference in system performance after following this procedure.

Reinitializing disk packs requires that you dump all the directories and files to tape, re-create the structure (and, in the case of the public structure, reinstall the system), and restore all the directories and files. Therefore, if you do not notice any appreciable difference in your system performance after doing this, don't schedule it on a regular basis, if at all.

The TOPS-20 Operator's Guide describes re-creating the public structure and other structures. Have the operator use this procedure for reinitializing disk packs. If possible, have the operator re-create the structure and restore the files to a different pack (or set of packs) from the structure that you dumped. This ensures that

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you do not lose your files should you have problems reading the tape back to disk. That is, you still have the original structure intact and can run DUMPER again to copy the files to another tape.

10.6 DYNAMIC DUAL PORTING

Dynamic dual porting refers to a disk drive that is dual-ported to one system only. When one of the channels is busy transferring data for another disk unit, input/output is automatically switched through the other disk channel. Dynamic dual porting improves the performance of input and output operations. It is activated automatically after field service properly sets up the RP04, RP06, or RP07 disk drive(s), and the operator places the drives' port switches in the A/B position. Figure 10-2 shows a typical configuration:

Figure 10-2: Dynamic Dual Porting

The DECSYSTEM-20 Technical Summary describes the hardware associated with input and output operations.

1

CHAPTER 11

ACCESS CONTROLS

TOPS-20 provides control mechanisms that help you:

- o Govern the access to many of your system's resources and services
- o Reduce or prevent unauthorized access to the system
- o Investigate occurrences of unauthorized access

The following sections discuss these topics.

11.1 ACCESS CONTROL PROGRAM

Previous chapters deal with administrative policies for allocating resources. For example, Chapter 10 describes the policy decisions you can make regarding the scheduler, and Chapter 8 describes the policy decisions you can make regarding tape drive allocation and labeled tape support.

In addition, you can make policy decisions that govern the access to specific system resources. For instance, TOPS-20 allows a user to change the speed of a terminal, assign a device, log in at any time of day, mount a magnetic tape, and mount a disk structure. However, you may want to restrict or disallow use of some of these facilities. You may want only specified users at specified times of the day and, perhaps, at specified terminals, to use certain facilities. A particular mechanism lets you control the access to such resources and services. With it, you have an additional means for collecting accounting or other information.

To use this access control mechanism, you must write an access control program that carries out your policy decisions. An access control program can control scheduling classes, the bias control, batch background queue, logging in, use of physical resources (tape drives, terminals, structures), and enabling capabilities. When a user

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requests a resource (like ASSIGN TTY34:), your program identifies the user, the user's controlling terminal, and the type of request being made. Your program can merely log this information in a file, or make a decision and tell the monitor to either grant or deny the request.

DIGITAL provides the necessary mechanisms (monitor calls) to implement a program at your installation. Your system programmer uses the appropriate monitor calls to write an access control program according to the requirements of your system. A sample access control program (ACJ.MEM) is distributed in the documentation area on the distribution tape. Your system programmer can use this program as a sample of the structure of an access control program and the parameters and decisions that can be controlled.

The following list defines the resources that an access control program can control and explains why you may want to control them.

Assign Devices

You can restrict users from assigning terminal lines or tape drives to their jobs. For example, if you have not enabled tape drive allocation (described in Chapter 8), you may still want to control which users are allowed to assign tape drives. Your program can also prevent one user from assigning all the available tape drives or terminals.

Enable Capabilities

You can allow users to enable their capabilities only in certain locations, or perhaps only at certain times of the day. For example, in a university environment, you may not want users enabling WHEEL capabilities in a terminal room used by students. In an environment where security is a major concern, you may want to allow a user to enable WHEEL capabilities only on a hard-copy terminal and only in a certain location. You can then collect the hard-copy output from the terminal. The access control program can also keep a file of the names of people who have enabled their capabilities.

Create Jobs

You can restrict the users who are able to write programs that create additional jobs via the CRJOB monitor call. You may want to limit this facility to certain applications only.

Allow Login

You can prevent users from logging in more than once, or permit a user to log in only at certain times of the day. For example, in a university environment, it may not be desirable to have students on the system during large production runs. Also, if you use your own accounting information (and not that provided with TOPS-20), you can use the access control program with the login function to recognize a

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user. In addition, the login function can be used to control the number of jobs that a user can create under PTYCON.

Create Processes (Forks)

You can prevent a user from creating more than a predefined number of processes. Also, you may want to charge users for using many processes.

Set Terminal Baud Rate

You can control the input and output speed settings on all terminals. This control prevents users from changing the baud rate to a speed that is unsupported by the terminal, and, as a result, rendering the terminal unusable until the operator resets the baud rate. You can also restrict the speed of a terminal to no more than a specified maximum, for example, 300 baud.

Logout

You can request the access control program to notify you or record information in an accounting file each time a user logs off the system. You may also want to keep track of the users who log out and are over their permanent disk page quota. The access control program can notify the operator that a migration-trim-run is needed for this directory to bring the directory back under its quota. If you use the login function with the logout function, you can give the user who is logging out information about time, resources, and perhaps money spent.

Set ENQ Quota

TOPS-20 allows enabled WHEELS to change to ENQ-DEQ quota. By using the ENQ quota function in your access control program, you can allow users other than WHEELS to change the ENQ-DEQ quota. (The TOPS-20 Monitor Calls Reference Manual describes the uses of ENQ-DEQ.)

Create Directory

You can prevent users from giving the BUILD, SET DIRECTORY, or ^ECREATE command to create directories or change parameters. Or, you may simply request the access control program to notify you of the people who have used these commands. You may want the operator to police these directories and check the parameter changes.

Mount a Structure

You can control access to certain structures by allowing only a select group of users to give the MOUNT command for a particular structure(s). This facility is used in conjunction with regulated structures. (The TOPS-20 Operator's Guide describes REGULATED and NON-REGULATED structures.) Also, information about structure mounts

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can be recorded in accounting files.

Enter MDDT

You can disallow privileged users from entering MDDT mode. For example, during certain times of the day, you may not want enabled WHEELS looking at or fixing a problem in the monitor. You may also want to keep a record of who has used MDDT.

Class Assignment

You can prevent users from changing to unauthorized scheduling classes. The access control program determines the classes a job can use.

Set Class at Login

The access control program can set a user's class at log in. Your program can contain (or access a file that contains) the list of users and their associated class.

MT Access Request

You can have the access control program decide whether a user should be allowed to access a restricted labeled tape from a non-TOPS-20 system. For example, if a non-TOPS-20 labeled tape is mounted with a nonblank access code in the access field, you can have your program decide if this user can use this tape. (The TOPS-20 Tape Processing Manual describes the access fields on labeled tapes.)

ACCESS/CONNECT Request

The access control program can determine if an ACCESS or CONNECT request to a directory should succeed in cases where the request is denied by the monitor. For example, the TOPS-20 monitor allows an ACCESS or CONNECT request to succeed when appropriate criteria are met. These are:

- o The requesting process has WHEEL or OPERATOR capabilities enabled.
- o The target directory is in the same group as the job's "accessed" directory.
- o The target structure is DOMESTIC and the target directory name matches the logged-in directory or the job.
- o The correct password is specified.

If all of the above criteria fail, the monitor denies the request. The access control program can be called to approve or override the denial.

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ATTACH Request

The access control program can prevent a user from attaching his terminal to another job. This function allows the access control program to control which terminals can attach to specific jobs.

11.2 PASSWORD ENCRYPTION

One way to violate system security is through unauthorized use of directory passwords. Having acquired someone's password, an intruder could log in or gain access to restricted system resources. The password encryption facility in TOPS-20, however, makes it hard to steal passwords.

With encryption enabled, passwords entered into the system are translated to an indecipherable cyphertext format before they are stored or otherwise used. Nowhere in the system is the original plaintext form of a password kept. As a further security measure, there is no TOPS-20 utility to convert the cyphertext to plaintext. And whether or not encryption is enabled, no command or utility, not even INFORMATION DIRECTORY or ULIST, displays passwords.

NOTE

Password encryption is irreversible. Therefore, before enabling encryption, be sure you will never need to revert back to an earlier version of the operating system.

To enable password encryption, use the CHECKD program. You can do this during or after system installation. (Refer to the TOPS-20 KL Model B Installation Guide for details.) With CHECKD, password encryption is enabled on a structure-by-structure basis; after the procedure, all passwords for a particular structure are encrypted as previously described. If you enable encryption after installation, run the KRYPTN program after CHECKD to convert existing plaintext passwords on a structure to cyphertext. The KRYPTN program is located on the tools tape, which is part of the TOPS-20 software installation package.

Encryption should be enabled for all structures except those that will be used on a TOPS-20 pre-Version 6 system. (Section 11.2.1 discusses this topic.)

You can add your own encryption algorithm to the system if you choose not to use TOPS-20's algorithm. Refer to Section 11.2.2.

Because the encryption algorithm is irreversible, care is required in the following areas:

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- o Remembering one's password
- o Working in a multiple-system environment
- o Adding new algorithms to the system
- o Using DUMPER

Mistakes in these areas could invalidate passwords so that they may need to be respecified with BUILD or ^ECREATE. These interrelated topics are discussed in the following sections.

11.2.1 Moving Structures Among Systems

If you are in a multiple-system environment, you may need to move structures from one system to another. Problems could arise, however, if some systems are running TOPS-20 pre-Version 6 software and others are running TOPS-20 Version 6. For example, when a structure containing encrypted passwords is taken to a TOPS-20 pre-Version 6 system, any access to files on the pack that requires a password to be supplied fails, because, in validating a password, the older monitor simply compares the entered plaintext to the cyphertext stored on disk. The older monitor is unfamiliar with the encryption process.

To avoid this problem, you should postpone encryption for relevant structures until all systems are upgraded.

Any TOPS-20 system can correctly handle unencrypted structures.

You could also encounter problems in moving structures to other systems if you use your own encryption algorithm. This topic is discussed below.

11.2.2 Adding Encryption Algorithms to the System

You can use one or more of your own encryption algorithms exclusively or in addition to TOPS-20's algorithm. For a description of the procedures involved, refer to the monitor module, STG.MAC.

Each time a password is encrypted and stored in a directory, the version number of the algorithm used to encrypt it is also stored. This allows new encryption algorithms to be added to the system with no impact on currently encrypted passwords, provided the old algorithms have not been removed from the monitor. Only passwords created since the installation of the new (current) algorithm will be encrypted with that algorithm. Older passwords invoke the appropriate algorithms during password-required accesses.

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If you also want existing passwords to use the new algorithm, the operator must individually respecify the passwords with BUILD or ^ECREATE. The operator does this after the new algorithm is installed. Note that KRYPTN cannot be used here to convert existing cyphertext to new cyphertext.

In using your own encryption algorithms, be aware that directories on structures and on DUMPER-created tapes include passwords that may be unusable at other sites. Other TOPS-20 monitors could consider the passwords' algorithm version numbers to be invalid. For example, these monitors may acknowledge only the standard TOPS-20 algorithm. Even if a site accepts the version numbers, its corresponding algorithms may be different from the algorithms at your site. Thus, on attempted password use, the cyphertext produced at this other site could never match the stored cyphertext.

To address these problems, you could:

- o Warn sites about the nature of the passwords on a tape or structure. A site could then avoid using certain directories or respecify a password with BUILD or ^ECREATE if necessary.
- o Refrain from saving directory information on tapes bound for other sites. That is, do not use DUMPER's CREATE command when creating such tapes.
- o Ship only directories that have null passwords. These "passwords" are considered unencrypted, and should cause no problem on any system.

11.2.3 Using DUMPER

Section 11.2.2 addressed using DUMPER with nonstandard algorithms. This section continues the discussion of DUMPER.

Care must be taken when restoring directories that were saved with DUMPER's CREATE command. Incompatible versions of tapes, DUMPER, and TOPS-20, when combined, can produce a number of password-related problems. Note the system's behavior during tape restoration for the combinations in Table 11-1. In the table, tape Version 4 is the version of tape that DUMPER Version 4.1 creates. Tape Version 5 is the version of tape that DUMPER Version 5 creates.

Tape Version	DUMPER	MONITOR	Result
5	5	6	OK
4	5	6	OK (N1)
5	4.1	6	E1

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Tape Version	DUMPER	MONITOR	Result
4	4.1	6	OK (N1)
5	5	5	E2
4	5	5	OK
5	4.1	5	E3
4	4.1	5	OK

Table 11-1: DUMPER Directory Restorations

Legend:

N1 Passwords are correctly encrypted for the first time using the monitor's current encryption algorithm.

E1 The tape version number is incompatible with this DUMPER. DUMPER reports this fact before restoring the tape data. If directories are restored from this tape, encrypted passwords are re-encrypted, causing all uses of these passwords to fail. The passwords will then have to be individually respecified with BUILD or ^ECREATE. However, if a password is unencrypted on the tape, then it will be encrypted for the first time, and will be usable.

Any files on this tape are restored correctly.

E2 Pre-version 6 monitors have no logic to handle encryption-related data that the tape may contain. Therefore, restored encrypted passwords will be unusable and must be respecified with BUILD or ^ECREATE. Note that directory blocks on the tape may contain password descriptor information, such as the encryption version number. This descriptor data is not restored.

Any files on this tape are restored correctly.

E3 The tape version number is incompatible with this DUMPER. DUMPER reports this fact before restoring the tape data. This incompatibility results in the same situation as E2.

If these problems occur often, users and operators could refrain from saving directory information on tapes, or they could use null passwords for directories that are to be saved. Null passwords are considered to be unencrypted and should cause no access problems.

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11.3 PASSWORD MANAGEMENT

Encryption is just one part of password management. You should also make sure that users at your site do not choose passwords that are too short or that are otherwise easy to figure out, such as one's name or initials. Also, it would be helpful for users to change their passwords regularly.

11.4 LAST LOGIN INFORMATION

When users log into the system, the dates and times they last logged in are displayed on their terminals. This information helps alert them to instances of illegal system or account entry. For example, if users keep track of their actual login times, they can compare those times to the ones displayed. Then, if there is a discrepancy, they will know the exact time that someone else logged into their directory using their password.

11.5 PREVENTING FAST LOGINS

By using the /FAST switch with the LOGIN command, users can bypass processing of their LOGIN.COMD and COMAND.COMD files. Managers sometimes set up these files to limit users' computing environments, however. For example, sets of users may be allowed only to read mail or run some other computer application. You can prevent fast logins at your site by entering the following command in the n-CONFIG.COMD file:

DISABLE FAST-LOGIN-OPTION

The ENABLE FAST-LOGIN-OPTION command is in effect by default. You can also enable and disable fast logins with the ^ESET privileged command.

Refer to the TOPS-20 User's Guide for information on the LOGIN.COMD and COMAND.COMD files. The TOPS-20 Commands Reference Manual describes the LOGIN command.

|

CHAPTER 12

THE COMMON FILE SYSTEM

12.1 OVERVIEW

The Common File System (CFS) is a feature of TOPS-20 that allows users from more than one system to simultaneously access shared files. Any structure in the CFS configuration can be made available to any user for reading or writing. Each TOPS-20 system in the CFS configuration is wholly self-contained, with its own operating system, main memory, public structure, console, and unit-record devices.

The main features of CFS are:

- o You can save disk space by minimizing duplication of files on different systems.
- o You can reduce the time that would be involved in maintaining duplicate sets of files.
- o You can adjust loads on systems by reassigning users as loads require. (Or, users themselves may be allowed to switch systems as they see fit.) These changes need not result in file-access limitations.
- o System availability is increased. For example, if a system is down for maintenance, users can log onto another system and still access all files that do not depend on the crashed system for access.

12.1.1 CFS HARDWARE

The following are typical CFS configurations:

Figure 12-1: Two Systems with Massbus Disks and HSC50-based Disks

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Figure 12-2: Two Systems with Massbus Disks

The CI-20 connects a TOPS-20 system to the CI.

The CI (computer interconnect), a 40-meter, high-speed bus, is the communications link used by CFS. The CI also connects systems to HSC50-based disks (RA60s and RA81s).

In addition, the CI provides paths to massbus disks that are not directly connected to a user's system, for example, another system's public structure. Such massbus disks are called "server disks" because TOPS-20's MSCP (Mass Storage Control Protocol) file-server facility makes this "outside" access possible. To enable an outside path to a massbus disk, that is, to make it a server disk, enter an ALLOW command in the n-CONFIG.CMD file, on a system to which the disk drive is connected, in the form:

```
ALLOW <drive type> serial number
```

The drive type is one of the following: RP04, RP06, RP07, or RP20.

To avoid the overhead of file-server activity in two-system CFS configurations, massbus disks that are to contain sharable structures should be dual ported between the systems (drive port switches in the A/B position). Note, however, that if a massbus disk drive is dual-ported between two DECSYSTEM-20s, the systems must be able to communicate with each other over the CI. Otherwise, neither system will be allowed access to the disk. Thus, the following configurations are not supported:

In the first two figures, systems G and H are not joined in a CFS configuration. The same applies to systems H and I in the third figure. TOPS-20 maintains the integrity of data on shared disks by ensuring that the systems can, over the CI, coordinate write accesses to those disks.

NOTE

Except for the front-end disk, all disks that make up the public structure must reside on single-ported massbus disk drives. If the dual-port hardware option is present, the drive must be switched to just one port (A or B).

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12.1.2 CFS SOFTWARE

Intersystem communication is an integral part of CFS. When TOPS-20 starts up, it makes a CFS connection with each TOPS-20 system that is already running. This establishes the contact necessary for intersystem file-system management.

In reality, only one system writes to a 256K section of a file at a time. When a system needs write access to a file section, it broadcasts a request for that resource to all systems it has established contact with. If another system already owns the desired write access, that system will respond negatively. Clearance will be granted to the requesting system only after the other system has completed the write operation by writing the data back to disk from its memory. Thus, systems negotiate for write access to files and keep each other informed of the state of the disks that they share. This ensures the integrity of data on those disks.

Because intersystem communication is vital to CFS operations, the systems stay alert to CI problems and to other indications that they may have lost contact with each other. Section 12.11.1, Communication Problems, discusses the actions that systems take when there is a breakdown in communications.

DATE and TIME

When a CFS system starts up, it takes the date and time from the systems that are already running. The operator is not prompted for this information. Instead, the system types a message similar to the following on the operator's terminal:

```
The date and time is: xxxxxxxxxx
```

This typeout serves as a check on the date and time. If no other system is running, the operator is prompted for the information.

When the date and time are changed on any CFS system, such as with the ^ESET command, all other systems are notified so that they can re-synchronize. This synchronization ensures that the creation date and time of files written from one system are consistent with the other CFS systems. Otherwise, many programs that use this information could malfunction.

12.1.3 CFS USERS

CFS is transparent to users:

- o Users are normally unaware that someone from another system may be accessing a file at the same time that they are. For example, a file being read on system "A" will prevent its

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being renamed on system "B."

- o Users are not required to know about the CFS configuration. Specifically, they do not need to know how massbus disks are ported. To access files, all they need to know are structure names, as on non-CFS systems.

12.1.4 CFS and DECnet

A CFS configuration differs from a DECnet network. Although a CFS configuration comprises multiple independent systems, the systems share in one unified file system and cooperate in its operation. If the optional DECnet-20 software is installed, each CFS system can be a DECnet network node with its own node name, provided a DN20 is attached to the system. With DECnet commands, data is transmitted over the DN20, not the CI.

Further, all systems in a CFS configuration must be TOPS-20 systems. In a DECnet network, other systems that support DECnet can be included.

12.1.5 CFS and TIGHTLY-COUPLED SYSTEMS

A CFS cluster also differs from tightly-coupled multiprocessing environments. Each CFS system has its own main memory, which is not shared with another system. It also has its own public structure for booting, logging in, and swapping. Also, CFS systems do not perform automatic load balancing. That is, the CPUs do not relieve each other of processing during high job loads. All jobs, including batch jobs, run only on the computer that the user logs onto.

12.1.6 Limitations

CFS does not coordinate use of the following facilities across systems: ENQUEUE/DEQUEUE, IPCF, OPENF OF%DUD, and DECnet. Attempts to cross systems using these methods will generate error messages. As an example, a DBMS application cannot span multiple systems, because DBMS uses the OPENF OF%DUD facility. Therefore, such applications should be restricted to a single system.

CFS allows for shared disk files only. It does not provide for shared magnetic tapes and line printers. Thus, for example, all of a user's printing will be done on a line printer that is attached to his system, even if he prints a file that resides on a server disk.

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12.2 PLACEMENT OF FILES

This section offers guidelines for arranging files on CFS systems for maximum performance and efficiency.

12.2.1 Update Files

Simultaneous shared writing to a file from multiple systems incurs the most overhead of any CFS file access operation. This is because systems involved in shared writing spend time seeking and granting write permission and coordinating their moves in other ways. Therefore, you might want to place the involved users on the same system.

12.2.2 Files on Server Disks

For optimum performance, you should not place on server disks files that require frequent access from multiple systems. This applies to both reads and writes. Server operations incur considerable overhead. Therefore, such files should reside on HSC50 disks or, in a two-system CFS configuration, on massbus disks dual ported between systems.

12.2.3 Mail Files

By default, users' mail files are created and updated in their logged-in directories on the public structure. To access this mail, users log in and issue appropriate mail commands. They must go through this login procedure for every system that contains mail for them (unless the DECmail/MS facility is used, in which case users still must take extra steps to retrieve each mail file). You can change this default arrangement and simplify matters for the CFS user who has accounts on multiple systems. By redefining the system-wide logical name POBOX:, as described in Section 3.3.9, you can establish a central location on a sharable structure for all mail files in the CFS configuration. Then, no matter where users log in, the mail facility sees an accumulation of mail that could have been addressed to them at any system in the configuration. Mail is no longer isolated on individual public structures.

An added advantage to redefining POBOX: is that public structures do not fill up with mail files.

You should create a directory on the structure defined by POBOX: for every user in the CFS configuration who is to receive mail.

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12.2.4 Sharing System Files

Most of the files that normally reside on public structures can be moved to a shared structure. Rather than duplicate files in such areas as SYS: and HLP: across systems, you can keep one set of these files on a shared structure. This saves disk space and eases the task of maintaining the files. Also, time and tape are saved during DUMPER backup and restore operations. Because system files are primarily read and not often updated, system performance does not suffer because of this file sharing, provided the structure is not on a server disk.

If you consolidate system files, remember to include in the definitions for the system-wide logical names the structures that contain the files. For example, if the SYS: files reside on the structure COMBO:, the definition for SYS: would be:

```
DEFINE SYS: (AS) COMBO:<NEW-SUBSYS>, COMBO:<SUBSYS>, MAIN:<NEW-SUBSYS>, MAI  
N:<SUBSYS>
```

where

MAIN: is the name of a public structure

You should define structures in this way on all the systems, giving the appropriate public structure name.

The drawback to sharing system files is that if there is trouble with the shared structure, users on all systems suffer.

Most of the SYSTEM: files must remain on the public structures, so sharing these files is not recommended.

START-UP FILES

Certain SYS: files must remain on each public structure. These files are involved in system start-up operations and are required before a non-public structure is made available to a system. The following is a sample of the files that should remain on public structures:

```
INFO.EXE  
MAPPER.EXE  
PTYCON.EXE  
PTYCON.ATO  
QUASAR.EXE  
ORION.EXE  
LPTSPL.EXE  
OPR.EXE  
CDRIVE.EXE  
SPROUT.EXE  
BATCON.EXE  
MOUNTR.EXE
```

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All the GALAXY files should remain in each SYS: area. These files come from the GALAXY saveset on the TOPS-20 Distribution Tape. (Refer to the TOPS-20 KL Model B Installation Guide.)

Command files that are used at your installation during start-up also should be kept on separate public structures. These files include SYSTEM.COMD and NETWORK.COMD.

12.3 LOAD BALANCING

This section discusses the distribution of jobs across CFS systems.

12.3.1 Dedicating Systems

One way to balance loads is to establish the types of jobs that will run on particular systems. For example, you might relegate batch jobs to one system, freeing other systems to run interactive jobs unimpeded. To encourage users to adopt this arrangement, you could give batch jobs the lowest priority on all but the batch-designated system. Users will have to wait a relatively long time for completion of batch jobs on non-batch systems. Refer to Section 10.2, SCHEDULING LOW PRIORITY TO BATCH JOBS, for further information.

Conversely, on the batch system, you could accord batch jobs the highest priority. Refer to Section 10.1.4, Procedures to Turn On the Class Scheduler, for details. Dedicating a system in this manner is especially useful when there are many long-running batch jobs at an installation.

Another suggestion is to put software development jobs on one system and production jobs on another. Also, you may want to keep one system lightly loaded for critical jobs.

DBMS applications, and programming applications requiring ENQUEUE/DEQUEUE or IPCF facilities must be confined to one system. These are other items to consider if you choose to establish certain uses for particular systems.

Keep in mind that users must log onto the systems that are to run their particular jobs. This applies to batch jobs also. Batch jobs must be submitted by a user logged in on the system where they are to run. The control and log files may reside on shared disks.

12.3.2 Assigning Users to Systems

In the CFS environment, much of the load balancing is expected to be

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performed by users. The systems, for example, do not detect that one CPU is overburdened and that another one is underutilized, and, accordingly, reassign users' jobs. Instead, users, themselves, determine whether or not they should log off a system and log onto another one when system response is slow. Such user tools as the SYSTAT and INFORMATION SYSTEM commands and the CTRL/T function can help users in this area. These tools report on the current state of a system. Among the items reported are the number of jobs running on a system, load averages, the current setting of the bias control "knob," and whether batch jobs are assigned to a special class. However, they report only on the user's logged-in system, not on others in the configuration.

To make this movement among systems possible, you should create directories for all users on all the public structures in the CFS configuration. Also, directory usernames should be unique throughout the configuration, as described below. Then, users can log onto any system with no problem.

USERNAMES

Directory usernames should be unique throughout the CFS configuration. For example, there should be only one user with the username <BROWN> at an installation. This lets users access system resources without encountering password-related obstacles or causing security breaches.

If two users on different systems have the same usernames but different passwords, their passwords will be invalid when they switch systems. If these same users should by chance have the same passwords, they will have complete access to each other's files when they switch systems. Also, if a structure is mounted on both systems as domestic, neither user will have to give a password when accessing the directory on that structure that has their username. (Refer to Section 4.5.7, Mounting Structures from Another Installation, for a discussion of foreign and domestic structures.)

12.4 STRUCTURE NAMES

Because the structures on all systems are part of a unified file system, structure names must be unique throughout the CFS configuration. For example, two systems cannot each have a public structure mounted with the name PS:.

If it is necessary to mount structures with duplicate names, the operator should mount one of the structures using an alias. (Refer to Section 4.5.2, Mounting Structures Having the Same Name.) The system recognizes a structure by its alias, which is the same as the permanent structure identification name, unless otherwise specified. Note that everyone throughout the CFS configuration must refer to a structure by the same alias.

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12.5 SYSTEM LOGICAL NAMES

Logical names are implemented differently from structure names and their aliases. Logical names are local definitions that need not be unique nor consistent throughout the CFS configuration. Thus, the same logical name on two different systems can refer to two completely different disk areas. However, because users are likely to be mobile, system-wide logical names should be consistent across systems. This will avoid confusion for users who switch systems.

Refer to Section 3.3, SYSTEM-LOGICAL NAMES, for further information.

12.6 SHARING STRUCTURES AMONG SYSTEMS

By default, all structures in the CFS configuration are accessible to all systems, provided outside paths have been established for massbus disks where necessary, using the ALLOW command (refer to Section 12.1.1, CFS HARDWARE). It is necessary to "mount" a structure on any system that is to access files on it, however. That is, the operator or a user on that system must issue a MOUNT command for the structure. (There can be up to 32 structures online on one system.) After a structure is mounted on a system, users can access it as on non-CFS systems. Users have automatic access to their public structure files, as on non-CFS systems.

If a structure has been restricted to a system through previous use of the operator command, SET STRUCTURE str: EXCLUSIVE, it can be made sharable again with the SET STRUCTURE str: SHARED command. The operator issues this command from an OPR terminal on the system that has exclusive use of the structure. Then, MOUNT commands can be issued for the structure that has been made sharable. The default setting for structures is sharable.

The operator command, SHOW STATUS STRUCTURE, indicates the shared or exclusive status for all structures known to a system.

STRUCTURE ATTRIBUTES

The operator specifies attributes for a structure with the SET STRUCTURE command, as described in the TOPS-20 Operator's Command Language Reference Manual. They are permanent settings that do not revert to default values after system crashes and reloads.

Note that all systems need not have the same attributes in effect for a structure. For example, one system can have a structure mounted as foreign and regulated, and another system can have the same structure mounted as domestic and unregulated. Except for SHARED and EXCLUSIVE, attributes are on a systemwide basis only.

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12.7 RESTRICTING STRUCTURES TO ONE SYSTEM

There may be times when you want to restrict use of a structure to a particular system. Such a structure might be used for DBMS applications (refer to Section 12.1.6, Limitations), or security measures may call for restricted use. For whatever reason, the operator restricts a structure with the following command:

```
OPR> SET STRUCTURE str: EXCLUSIVE
```

When the operator gives this command, the system first checks to see that the structure is not in use on another system. If it is, the operator must dismount the structure from the other system, using an OPR terminal on that system. The operator follows the normal dismount procedure of making the structure unavailable to new users and notifying existing users of the pending dismount. The structure should be kept unavailable for all systems except the exclusive one so that the structure will not be inadvertently shared when the owning system crashes.

After a structure has been dismounted from other systems, the SET STRUCTURE EXCLUSIVE command can take effect. It remains in effect on the system, as do all SET STRUCTURE specifications, throughout crashes and reloads. If users give the MOUNT command for a structure that is exclusive to another system, an error message will be issued, indicating that the structure is unavailable.

Note that any system can have exclusive use of any sharable structure in the CFS configuration.

12.8 DISMOUNTING STRUCTURES

When issuing a DISMOUNT command for a structure, operators have the option of specifying that the structure be physically removed from a disk drive. In the CFS environment, however, the system first ensures that the structure is not in use on other systems. If a structure is mounted on another system, the operator is notified and must go through the normal procedure of dismounting the structure from that system. Refer to the TOPS-20 Operator's Guide for details.

The default setting on CFS systems is for a structure to be dismounted with the no-removal option.

12.9 MAKING THE CI UNAVAILABLE TO A SYSTEM

Ordinarily, you need do nothing at all to operate the CI. However, you may need to disengage a system from the CI so Field Service personnel can diagnose and/or correct problems with the CI-20 or the

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HSC50. Or, you may wish to remove a system from the CFS configuration. At those times, you should instruct the operator to make the CI unavailable by means of the SET PORT CI UNAVAILABLE command. (Refer to the TOPS-20 Operator's Guide for details.)

When the CI is unavailable to a system, users cannot access multi-access disks (dual-ported disks, HSC50-based disks, or server disks on other systems). These disks rely on the CI to coordinate accesses and/or to transmit data. Server disks on the system disengaging from the CI will be unavailable to other systems.

When the operator gives the SET PORT CI UNAVAILABLE command, the system indicates the structures that need to be dismantled and the disk drives that need to be made unavailable. The operator is advised to follow the normal procedures of forewarning users before dismantling structures and making disk drives unavailable. The command option to forcibly disengage from the CI should be reserved for emergencies. If the operator determines that disengaging from the CI will be too disruptive to users, the operator has the option of aborting the procedure.

To rejoin the CFS configuration, the system must be rebooted.

12.10 USING DUMPER

CFS offers operators and users flexibility in saving and restoring disk files. The only restriction is that DUMPER must be running on the system to which the tape drives are attached. Tape drives are not served through CFS.

12.11 ERRORS

This section discusses the actions you or the operator take when errors occur in the CFS environment. It also describes how CFS systems react to various errors. Note that there is no single hardware or software point that can disable the whole configuration. For example, systems can start up or crash with little impact on other systems.

12.11.1 Communication Problems

CFS systems are sensitive to breaks in communication, whether they are caused by CI-20 errors or system crashes. Because the data integrity of shared structures depends on unbroken intersystem contact, the systems take quick action to prevent data corruption. Therefore, you may observe any of the following when systems lose contact with each

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other. These should be rare occurrences.

- o For up to 15 seconds, no system in the configuration can access any multiaccess disks (dual-ported disks, HSC50-based disks, server disks on other systems).

The 15 seconds allows each system to check that its own CI-20 and segment of the CI bus are working. Most likely, some system's CI-20 microcode has stopped and is automatically reloaded during the interval, or a system has crashed. (There may be other, unpredictable reasons for CI disruption.) Jobs that were accessing multiaccess disks hang.

If the CI-20 and CI bus are working before the end of the interval, the system can resume accessing all multiaccess disks except server disks on a crashed system.

- o A system crashes with a KLPNRL BUGHLT. This happens if the CI-20 microcode takes longer to reload than 10 seconds. This BUGHLT is expected to occur rarely, because the microcode should be reloaded within a couple of seconds.
- o In a two-system configuration, if communication resumes after the 15-second allowance, without one of the systems having crashed and restarted, the system with the lower serial number crashes with a CFRECN BUGHLT message.

With such a delayed reconnection, a system is likely to contain old, invalid information about the status of multi-access disks. This is because the other system may access the disks after the 15 seconds, believing the other system is no longer running. Therefore, the system with the lower serial number is selected to crash so that a fresh data base can be established for the disks when the system restarts.

12.11.2 Massbus Problems with Dual-Ported Disk Drives

Dual-ported disk drives are accessed by each system through the massbus hardware connections. However, if for some reason a massbus path becomes unavailable to a system, the other system, with working massbus connections, can provide access to the drives affected.

The operator enables this facility by flipping the drive port switches from the A/B position to the position that corresponds to the servicing system. Then the operator must crash and restart the system with the faulty massbus link. It is assumed that an ALLOW command has been entered in the n-CONFIG.COMD file for the disk drives, as described in Section 12.1.1, CFS Hardware.

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The operator returns the switches to the A/B position when the massbus problem is corrected. The PHYTPD BUGHLT is then issued to confirm that the massbus will now be used for data transmission.

APPENDIX A
THE BUILD COMMAND

NOTE

The information previously found in Appendix A has been removed. The BUILD command is described in the TOPS-20 Commands Reference Manual. Refer to the TOPS-20 Operator's Command-Language Reference Manual for a description of the ^ECREATE command.

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TOPS-20 KL Model B
Installation Guide

VERSION 6.0 INTERIM RELEASE DRAFT

December 1984

This manual describes the procedures for installing TOPS-20 Version 6 on a new system and updating TOPS-20 software on an existing KL10 Model B system.

This update supersedes the information contained in the manual numbered AA-M229B-TM and all updates. Please read it in its entirety.

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SOFTWARE: RSX-20F Version 15-20
 KLINIT Version 15-12
 Microcode Version 352

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PREFACE

This manual is for the person who has the responsibility to:

1. Install the TOPS-20 software on a new DECSYSTEM-20.
2. Update the TOPS-20 software system on an existing DECSYSTEM-20.

To use this manual effectively, first read Getting Started With TOPS-20. You should also become familiar with the information in the TOPS-20 User's Guide and the TOPS-20 Operator's Guide.

You do not have to know assembly language programming or have previous experience installing a TOPS-20 software system, although both are helpful.

Contents of This Manual

Chapters 1 through 7 contain step-by-step instructions, with error recovery procedures, describing how to install a new TOPS-20 Version 6.0 software system.

Appendix A contains step-by-step instructions describing how to update a TOPS-20 Version 5 software system to Version 6.0.

After you complete either the set of steps in Chapters 1 through 7 or the steps in Appendix A, your system is ready for timesharing.

Appendix B is a pocket installation guide for the experienced installer. This appendix contains the text and output from a sample installation, but does not cover error recovery procedures. The steps in this appendix are keyed to the body of this manual so that you can easily refer to a complete description of any step.

Appendix C describes the procedures for tailoring your system for the ARPA network.

Appendix D contains the procedures for generating a tailored batch and spooling system (GALAXY).

The commands you must type are printed in RED. If you type accurately, all you have to do is perform the indicated function and verify that your actual terminal output resembles the sample output. Remember that systems differ in memory size and peripherals, so steps that describe configuring memory, initializing line printers and disk packs, and assigning logical unit numbers to tape drives require you to type the values that are correct for your system and not the sample parameters.

If your terminal output does not resemble the sample output, first read ALL the instructions after the word "Error", then choose the recovery procedure that corrects your problem.

NOTE

The version and edit numbers in this manual could differ from the numbers printed on your console terminal. The numbers printed on your console must be equal to or greater than the numbers in this manual.

Time estimates are included so that you know about how long a step takes. Times are estimated to the nearest minute, so don't worry if a step takes somewhat longer or shorter than this.

Checking off each step as you complete it is a good way to keep your place.

Symbols Used in This Manual

CTRL/\ Indicates where you type a control backslash. This is done by holding down the CTRL key while typing a backslash. The backslash key is located near the key labeled LINEFEED or LF.

<ESC> Indicates where you press the key labeled ESC, ESCAPE, PREFIX, ALT, or ALTMODE.

<RET> Indicates where you press the RETURN key.

Reference Documentation

The following manuals are valuable as references for users of this manual. These manuals are included in the TOPS-20 Software Notebook Set.

Manual Title

TOPS-20 Commands Reference Manual

TOPS-20 EDIT Reference Manual

TOPS-20 Monitor Calls Reference Manual

TOPS-20 Operator's Guide

TOPS-20 OPR Command Language Reference Manual

TOPS-20 System Manager's Guide

TOPS-20 User Utilities Guide

TOPS-20 User's Guide

CHAPTER 1

INTRODUCTION

Installing the TOPS-20 software on the DECSYSTEM-20 is not a hard task if you follow the procedures outlined in the following chapters.

1.1 SUMMARY OF CONTENTS

Chapter 1 explains some of the procedures to follow. It also describes the tools you need to install the software.

Chapter 2 describes powering up the DECSYSTEM-20 and obtaining the DECSYSTEM-20 front-end monitor from floppy disk. This chapter also describes loading the TOPS-20 bundled software from magnetic tape.

Chapter 3 describes how to select the proper monitor, declare the system name, and change the system defaults for terminals, system devices, accounting, performance improvements, scheduler controls, and file archiving and migration.

Chapter 4 describes how to create the front-end file system for the DECSYSTEM-20 and copy files into it from the floppy disk. Upon your completion of this chapter, the installation is complete.

Chapter 5 describes how to boot the system from disk.

Chapter 6 describes how to install the TOPS-20 distribution and update tapes.

Chapter 7 describes how to run the User Environment Test Package (UETP program). This program performs a cursory check of the system.

Appendix A contains step-by-step instructions and pointers to various chapters within the manual, describing how to update a TOPS-20 Version 5.1 software system to a TOPS-20 Version 6.0 software system on the DECSYSTEM-20.

Appendix B is a pocket installation guide for the experienced installer. It contains the text and output from a sample installation of the TOPS-20 software on a DECSYSTEM-20, Model 2060. This appendix does not have error recovery procedures. The steps are keyed to the steps within the body of this manual that describe how to install the TOPS-20 software on a DECSYSTEM-20.

Appendix C contains the steps for tailoring your system for the ARPA network.

Appendix D contains the steps for generating a batch and spooling (Galaxy) system tailored for your particular site.

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2. A list of line numbers and line speeds. Use these numbers in Section 3.3.1 when you set the default terminal speeds. Also, find out which lines are remote so that you can define the remote lines as described in Section 3.3.2.

Lines					
Line #	Auto Speed	Remote?	Line #	Auto Speed	Remote?
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----

NOTE

The word Auto over the word Speed declares that the line is specified as an autobaud line in Section 3.3.2.

INTRODUCTION

3. The serial number of each magnetic tape drive. Use these numbers in Section 3.3.4 to define magnetic tape logical unit numbers. The number appearing on the thumbwheel does not necessarily correspond to the logical unit number of the drive.

Magnetic Tapes

Serial #	Type	Serial #	Type	Serial #	Type
-----	----	-----	----	-----	----
-----	----	-----	----	-----	----
-----	----	-----	----	-----	----
-----	----	-----	----	-----	----
-----	----	-----	----	-----	----
-----	----	-----	----	-----	----

NOTE

The serial numbers on TU70 and/or TU71 tape drives are made up of three factors. These factors consist of the RH20 channel number, the DX20 number, and a two-digit tape unit number. Assuming that the RH20 channel number is 2, the serial number for tape unit 3 would be as follows:

2003

In the above example, the RH20 channel is the first digit (2), the DX20 number is the second digit (0), and the last two digits are the tape unit number (03). The serial number for a TU72 tape drive can be found on the back of the tape drive.

4. The unit number and type of each line printer. Use this information in Section 3.3.5 to initialize the line printers.

Line Printers

Unit #	Model #	Lowercase ?	Programmable VFU ?
-----	-----	-----	-----
-----	-----	-----	-----

INTRODUCTION

1.3 INSTALLATION TOOLS

You need the following tools to install the TOPS-20 software on a DECSYSTEM-20:

1. The RSX-20F System Floppy A. The files on this floppy are used to boot the central processor from an RP04 or RP06 disk pack.
2. The RSX-20F System Floppy B. The files on this floppy are used for various functions in installing and maintaining the software on a DECSYSTEM-20.
3. The RSX-20F System Floppy C. This floppy contains the RSX-20F map file, which should be used for new installations only. If you are updating your software from a previous version DO NOT USE Floppy C.
4. The TOPS-20 V6.0 Installation Tape and the TOPS-20 Distribution tape. When installing the TOPS-20 software on a DECSYSTEM-20 model number 2060 or on a DECSYSTEM-20 model number 2040S, you should be using software package QT023, which contains the Installation Tape labeled TOPS-20 2060 INSTL.MT V6.0 and the Distribution Tape labeled TOPS-20 2060 DIST.MT V6.0.

The TOPS-20 V6.0 Installation Tape for 2040S, 2060, and ARPANET systems contains the TOPS-20 monitor and related programs. The files on this tape are:

The TOPS-20 monitor (SAVE format)

The TOPS-20 command processor (SAVE format)

The DLUSER program (SAVE format)

DLUSER data (ASCII file)

The DUMPER program (SAVE format)

Four DUMPER savesets recorded at 1600 bpi in DUMPER format for the following directories:

PS:<SYSTEM>
PS:<SUBSYS>
PS:<GALAXY-SUBSYS>
PS:<UETP.LIB>

The TOPS-20 Distribution Tape for all DECSYSTEM-20s contains the TOPS-20 bundled software. There are four DUMPER save sets recorded at 1600 bpi in DUMPER format. The contents of the savesets are:

Saveset 1 contains documents about the software.

Savesets 2 through 3 contain source files needed to build the software in the directories <SYSTEM> and <SUBSYS>, except for the monitor and the TOPS-20 command processor.

5. If you are installing the TOPS-20 software on a DECSYSTEM-2040S or DECSYSTEM-2060 that contains an RP20 Disk Subsystem, you should receive a DX20 microcode tape containing the microcode necessary to boot the DX20.

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6. A separate tape for each optional software product you have purchased.

NOTE

The term "bundled software" refers to the contents of the Installation and Distribution tapes considered together, or to the contents of the Distribution tape alone. The term "unbundled software" refers to the contents of the various tapes described in Chapter 6.

7. Formatted disk packs. If your disk packs are not formatted, ask your DIGITAL Field Service Representative to format them for you.

1.4 THE TOPS-20 MONITORS

Six monitors are distributed with the TOPS-20 V6.0 software for the DECSYSTEM-20 Models 2040S, 2060, and ARPANET systems. They are:

2060-MONBIG.EXE

2060-MONMAX.EXE

AN-MONMAX.EXE

AN-MONCFS.EXE

AN-MONBIG.EXE

AN-MONLGE.EXE

All the monitors mentioned above are described in Chapter 3. The installation will proceed more smoothly if you take time now to decide the monitor you want to use.

1.5 THE BATCH AND SPOOLING SYSTEM

Your TOPS-20 software system initialization includes a standard Galaxy batch and spooling system. If you need a special batch and spooling system, first install the standard system; then refer to Appendix D of this manual for instructions on how to build your own specialized batch and spooling system.

CHAPTER 2

CREATING THE TOPS-20 FILE SYSTEM

This chapter describes how to create a new TOPS-20 file system on the DECSYSTEM-20.

STOP: These Procedures Install a New System

Follow the procedures in this chapter if you are installing TOPS-20 Version 6.0 software on a new system, or if you are creating a new file system on a set of disk packs. Use Appendix A to update from TOPS-20 Version 5.1 to Version 6.0 software on an existing system.

2.1 CHECKING THE TOPS-20 SOFTWARE PACKAGE

The TOPS-20 software package contains the following items. Check to be sure that you have all of them.

1. RSX20F System Floppy A
2. RSX20F System Floppy B
3. RSX20F System Floppy C, which should be used for new installations only. If you are updating your software from a previous version, DO NOT USE Floppy C.
4. TOPS-20 Installation Tape V6.0

Throughout the rest of this text, this tape is referred to as the Installation tape.

5. TOPS-20 Distribution Tape V6.0
6. The DX20 Microcode Tape (RP20 Customer only)
7. A separate tape for each optional software product purchased. Chapter 6 lists the optional software products. Refer to the installation guide that accompanies each optional software product for specific installation procedures.

Refer to Chapter 1, Section 1.3 for the contents of the floppy disks and magnetic tapes.

CREATING THE TOPS-20 FILE SYSTEM

2.1.1 Preparing the DECSYSTEM-20 for Installation

Prepare the system for installation by powering it up and mounting the disk packs.

Step 1: Read the Listing Labeled TOPS20.BWR.

Read the listing labeled TOPS20.BWR to learn about any last-minute changes made to the installation procedure or to the TOPS-20 software.

Step 2: Ask Your DIGITAL Field Service Representative if the Disk Packs Are Formatted.

Ask your DIGITAL Field Service Representative if the disk packs are formatted for use with the DECSYSTEM-20. If they are not, ask him to format them. You cannot use the RP20 for the system structure. The packs must be formatted before you proceed further.

Step 3: Power Up the System.

Turn on the power by pressing the POWER switch if the light under the word POWER on the operator's panel is off. (Do not touch the emergency power switch unless you see smoke or sparks coming from the system.) The system is ready after a few seconds, and the power light comes on.

Be sure that the system is completely powered on:

1. Check the disk drives.
2. Check the magnetic tape drives. If power is off, press the rocker switch, i.e., the white switch containing the ON/OFF light, on the front panel. If you have trouble with the disk drives or magnetic tape drives, call your DIGITAL Field Service Representative for assistance.
3. Check the line printers. If power is off for an LP20A or LP20B printer (which has four buttons on the right of the top panel), reset the knee-level breaker on the lower panel. The TAPE light may be on; disregard it. If you have an LP20F or LP20H printer (which has four rocker switches on the left of the top panel), lift the cover just above the lights and reset the breaker. Be sure that the printer has paper.
4. Turn on the console terminal. Be sure that it is on line and has paper.

Step 4: Label the Disk Packs.

This manual contains the procedures for creating the system structure for your system. The system structure name can be up to six characters and contains the files needed to run the system. The system structure cannot include RP20 disk drives. If the system structure is on an RP07 disk drive, the front-end file system must reside on a RP04 or RP08 dual-ported disk drive. Decide how many packs you will have, and assign them consecutive "logical unit numbers," starting with 0. These are the logical pack numbers referred to in Step 25.

CREATING THE TOPS-20 FILE SYSTEM

Identify each pack by writing these numbers with a felt-tip pen on the pack cover with a gummed label. A sample of the format of the label is:

TOPS-20 Disk Pack
Structure ID: structure name
Logical Unit: n

CAUTION

Do not use a gummed label on the surface of the pack itself, because it can spin off and cause severe damage to the drive.

Step 5: Mounting an RP04 or RP06 Disk Pack.

Mount the disk packs on the proper drives. RP04 and RP06 disk packs are similar in appearance but can be distinguished by the name RP04 or RP06 written on the upper surface of the pack. Make sure you place one pack on the drive that is unit 0, dual ported, and connected to the front-end. The installation procedure stores the files used by the front-end on this pack. After the installation is complete, you may dismount the disk packs so that the drives can be cleaned and maintained. However, during system operation, the pack that contains the front-end files must be on dual-ported drive 0 as it was during installation.

Be careful when mounting a disk pack because the drive shaft can be damaged if the pack is jammed off center into the drive. Follow these instructions when mounting a pack:

NOTE

RP07 and RP20 disk packs are non-removable. To mount an RA60 disk pack refer to the HSC-50 User's Guide.

1. If another RP04 or RP06 disk is already mounted on the drive and spinning, press the START/STOP button and wait until the drive stops.
2. Push the door back; slide the pack cover down over the pack.
3. Turn the cover handle counterclockwise a few turns until it turns freely. Gently lift the pack vertically. If there is any resistance, turn the handle a few more turns counterclockwise and lift again.
4. Lift the pack out of the drive and place it on the protective bottom cover. Be sure that the cover clicks closed.
5. Pick up the pack to be mounted and remove the protective bottom cover by squeezing the handle of the bottom cover.

CAUTION

If you insert a pack without removing the bottom cover, you will be unable to use or remove the pack.

CREATING THE TOPS-20 FILE SYSTEM

Gently lower the pack vertically into the drive, being careful not to hit the sides of the drive. Keep the pack centered in the drive while lowering it.

6. Turn the handle clockwise about two full turns. You will feel a resistance roughly equal to the power steering on a car. When the resistance increases noticeably, stop turning or damage will result.
7. Lift off the cover vertically.
8. Close the door to the drive.
9. Start the drive by pressing the START/STOP button. The disk is ready to be used when the READY light comes on. (On an RP06 the DOOR LOCKED light ensures that the disk is mounted properly.)
10. Be sure that the drive is not write protected. The switch labeled WRITE PROTECT must be off.

CAUTION

Do not leave a disk pack or magnetic tape on top of a disk drive. The vibration from the drive can cause these items to fall to the floor, causing expensive and irreparable damage.

Step 6: Check the CONTROLLER SELECT Switches.

Be sure that the CONTROLLER SELECT switch on dual-ported drive 0 is set to A/B and that every other drive has the CONTROLLER SELECT switch set to A. To change the CONTROLLER SELECT switch, set the switch to the desired position and press the STOP button to cycle the drive down. When the drive has stopped spinning, press the START button and wait for the READY light to come on.

Step 7: Mount System Floppy A in Drive 0.

CAUTION

Make sure that the paper directory that is sometimes included with the floppy disk is not sticking to the back of the floppy disk. Failure to do so will damage the floppy disk and the floppy drive.

Place the floppy disk labeled:

System Floppy A

in the left floppy drive (drive 0). To mount a floppy disk, hold the floppy disk with your thumb on the label. Then with your thumb and the label facing upward, slide the floppy disk into the floppy drive until it contacts the back of the drive and stops. Press down the bar until it clicks.

CREATING THE TOPS-20 FILE SYSTEM

Step 8: Mount System Floppy B in Drive 1.

In the right floppy drive (drive 1), place the floppy disk labeled:

System Floppy B

HINT

Be sure that you have mounted the floppy disks in the correct drives, or problems will develop in Step 12.

Step 9: Mount the Installation Tape on MTA0:.

Remove the write ring (if present) from the magnetic tape labeled:

TOPS-20 Installation Tape

and mount the tape on drive 0. Drive 0 is the lowest unit on the lowest channel on the lowest TM03, TM02 controller or DX20 controller. Your DIGITAL Field Service Representative gives you this information. If you cannot determine which drive is drive 0, make sure that all drives are off line except the one you want to use.

NOTE

Be sure to mount the correct version of the Installation tape. Refer to Chapter 1, Section 1.3 for the correct Installation tape for your system.

CAUTION

The logical unit number for a magnetic tape drive is not determined by the numbered thumbwheel on the left side of TU45 drives. The numbered thumbwheel is the slave number of the drive. Never change the setting of this thumbwheel.

To mount a reel of tape on a TU45 tape drive:

1. Place the reel on the top hub with the labeled side of the tape facing you.
2. Lock the reel on the hub by pressing the rocker in the center of the hub.
3. Thread the tape through the slot in front of the tape heads by following the arrows. Move the head shields back for easier access to the tape slot.
4. Wind the tape one turn clockwise onto the take-up reel.

CREATING THE TOPS-20 FILE SYSTEM

5. Press the LOAD button. The tape slowly advances onto the take-up reel and moves to the logical beginning of the tape. If the drive overshoots the beginning of the tape, it repositions itself.
6. Make sure the ON LINE button is lit; if it is not, press the ON LINE button.

To mount a reel of tape on a TU77 or TU78 tape drive:

1. Place the reel of tape on the top hub with the labeled side of the tape facing you.
2. Lock the reel on the hub by pressing the rocker in the center of the hub.
3. Press, in order, the RESET and LOAD buttons. The tape is wound counterclockwise a few turns. Then the tape leader is threaded automatically through the slot near the upper right-hand corner of the drive, and the tape is positioned at the logical beginning of tape.
4. Press the ON LINE button.

On completion, the LOAD, ON LINE, and FILE PROTECT (FPT) lights should be on, indicating that the tape is positioned at the beginning. When the FILE PROTECT light is on, the system cannot write on the tape. If the FILE PROTECT light is not on, remove the write ring from the back of the tape.

To mount a reel of tape on a TU72 tape drive:

1. Place the reel of tape on the rightmost hub with the labeled side of the tape facing you.
2. Thread the tape leader down the slot until it is approximately three inches in front of the read/write head.
3. Press, in order, the RESET, LOAD, and START buttons. The tape leader is threaded automatically on the take-up reel and the tape is positioned at the logical beginning of tape.

2.1.2 Loading and Starting the TOPS-20 Monitor

To create the TOPS-20 file system, you need to load the TOPS-20 monitor into the system and start the file system initialization routine. Perform steps 10 through 19 to load and start the TOPS-20 monitor.

1. Load the front-end monitor from the floppy disks. Use the front end to initialize the central processor and memory.
2. Use the front-end monitor to load the TOPS-20 Magnetic Tape Bootstrap (MTBOOT) program from System Floppy A into the central processor.
3. Use MTBOOT to load the TOPS-20 monitor from magnetic tape into memory.
4. Use MTBOOT to start the TOPS-20 monitor at the file system initialization routine.

CREATING THE TOPS-20 FILE SYSTEM

Step 10: Place the Front-End HALT Switch in the ENABLE Position.

Open the second door from the left side of the DECSYSTEM-20, directly under the DECSYSTEM-20 control panel, to access the front-end switches.

Be sure that the front-end HALT switch is in the ENABLE position (Figure 2-1). If the switch is in the HALT position, move it up to the ENABLE position. When the HALT switch is in the HALT position, the front end will not operate.

Step 11: Set the Switch Register to 000007 (octal).

The front-end control panel has 16 switch register switches (Figure 2-1). Set them to 000007 (octal) by setting switches 2, 1, and 0 up, and leaving the rest down. (Refer to Part 4, Chapter 1 of the TOPS-20 Operator's Guide for a detailed description of all switches.)

Booting the front end from a floppy disk with the switch register set to 000007 causes the front-end monitor to run the central processor initialization dialog. This loads the central processor microcode and configures central processor memory.

Step 12: Hold ENABLE and Press the SWITCH REGISTER Button.

Hold ENABLE and press the SWITCH REGISTER button on the control panel (Figure 2-1); this loads the front-end monitor and starts the initialization dialog. The system prints:

```
|      RSX-20F VB15-20 6:11 5-MAR-84
|
|      [SY0: REDIRECTED TO DX0:]
|      [DX0: MOUNTED]
|      [DX1: MOUNTED]
|      KLI -- VERSION VB15-12 RUNNING
|      KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
|      KLI>
```

Item	Identifies
RSX-20F	The name of the front-end monitor.
VB15-20	The version of the front-end monitor.
6:11 5-MAR-84	The time and date that the front-end monitor was built.
SY0:	The area from which the front end obtains its files. If SY0: is redirected to DX0:, the front end obtains the files from floppy drive 0. If SY0: is redirected to DBO:, the front end obtains the files from disk drive 0.
KLI	The name and version of the central processor initialization dialog.
KLI>	The prompt for the central processor initialization dialog.

Error: If the system does not print the above heading, be sure that the floppy disks are mounted in the proper drives and the HALT switch is in the ENABLE position. Then retry Step 12.

CREATING THE TOPS-20 FILE SYSTEM

NOTE

The version and edit numbers in this manual could differ from the numbers printed on your console. The numbers printed on your console must be equal to or greater than the numbers in this manual.

Figure 2-1: DECSYSTEM-20 and Front-End Control Panels

CREATING THE TOPS-20 FILE SYSTEM

Step 13: Type YES and Press the RETURN Key.

To enter the central processor initialization dialog, type YES and press the RETURN key. Following this, if you answer either NO or YES to this question, you will see a description of your system's hardware. First comes the serial number (S/N) of the CPU, followed by its type and power line frequency (either 50 or 60 Hertz). Then comes a list of hardware options present on your system. If an item is not present, it will not be listed. The example below shows all available options. Following this, the system prints KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?:

```
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>YES<RET>
KL1 -- KL10 S/N: 2102., MODEL B, 60 HERTZ
KL1 -- KL10 HARDWARE ENVIRONMENT:
      MOS MASTER OSCILLATOR
      EXTENDED ADDRESSING
      INTERNAL CHANNELS
      CACHE

KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?
KLI>
```

Error: If the system does not print the above heading, be sure that the floppy disks are mounted in the proper drives, then return to Step 12.

DELETE KEY

If you make a typing error, press the DELETE key to erase a single character at a time. Type CTRL/U to delete the entire line.

| Step 14: Type YES KLX.MCB and Press the RETURN Key.

| To load the central processor microcode, type YES KLX.MCB and press
| the RETURN key. After 30 seconds, during which the floppy drives
| click, the microcode is loaded and the system prints KLI -- MICROCODE
| VERSION 352 LOADED followed by KLI -- RECONFIGURE CACHE
| [FILE,ALL,YES,NO]?

```
KLI -- RELOAD MICROCODE [YES,VERIFY,FIX,NO]?
KLI>YES KLX.MCB
KLI -- MICROCODE VERSION 352 LOADED
```

Step 15: STOP.

Go to Step 16 if the system prints:

```
KLI -- RECONFIGURE CACHE [FILE,ALL,YES,NO]?
```

Go to Step 17 if the system prints:

```
KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,FORCE,YES,NO]?
KLI>
```

CREATING THE TOPS-20 FILE SYSTEM

Step 16: Type ALL and Press the RETURN Key.

To reconfigure the central processor cache, type ALL and press the RETURN key. Upon receiving this reply, the system configures all available cache. After the configuration is complete, the system prints:

```
KLI>ALL<RET>
KLI -- ALL CACHES ENABLED
KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,FORCE,YES,NO]?
KLI>
```

Error: If the system does not print one of the headings above, be sure that the floppy disks are mounted in the proper drives, then return to Step 12.

Step 17: Type ALL and Press the RETURN Key.

To configure the central processor memory, type ALL and press the RETURN key. This answer configures all available memory in the most useful manner and then prints a message indicating the results. These results will be different, depending on the type of hardware you have. See below, for the sample output that pertains to your system. (Refer to the TOPS-20 Operator's Guide for details on memory configuration.) After the configuration is complete, the system prints KLI -- LOAD KL BOOTSTRAP [YES,NO,FILENAME]?:

```
KLI -- CONFIGURE KL MEMORY [FILE,ALL,REVERSE,FORCE,YES,NO]?
KLI>ALL<RET>
```

Depending on the size of your system, your output will resemble one of the following:

```
LOGICAL MEMORY CONFIGURATION
ADDRESS      SIZE INT TYPE CONTROLLER
00000000     768K  4  MF20    11
```

or

```
LOGICAL MEMORY CONFIGURATION
ADDRESS      SIZE INT TYPE CONTROLLER
00000000     128K  4  MB20    0 % 1
00400000     512K  4  MF20    10
02400000     256K  4  MF20    14
03400000     3200K                NON-EXISTENT
```

NOTE

The MOS memory configurator is capable of configuring 4096K of memory. The message concerning the NON-EXISTENT memory may be ignored. This message is specifying the difference between the actual physical memory and 4096K.

Error: If the system does not print a heading similar to one of those above, be sure that the correct floppy disks are mounted in the proper drives, then return to Step 12.

CREATING THE TOPS-20 FILE SYSTEM

Step 18: Type MTBOOT and Press the RETURN Key.

After the prompt KLI>, type MTBOOT and press the RETURN key:

```
KLI -- LOAD KL BOOTSTRAP [YES,NO,FILENAME]?
KLI>MTBOOT<RET>
KLI -- WRITE CONFIGURATION FILE [YES,NO]?
KLI>
```

The system asks whether it should write the front-end file KL.CFG, which describes your current configuration and the method you used to bring up the system (disk, floppy disks, or magnetic tape). If this file is written, the front end will attempt to use the same method and the same configuration when you next install or reload the system. The default answer to the question, WRITE CONFIGURATION FILE [YES,NO]?, is YES. Therefore, it is recommended that you answer NO to this question for the present. Later, when you have a front-end configuration that should be recorded (Step 136, in Chapter 5), the configuration file will be written for you.

Step 19: Type NO and Press the RETURN Key.

After the prompt KLI>, type NO and press the RETURN key.

```
KLI -- WRITE CONFIGURATION FILE [YES,NO]?
KLI>NO<RET>
KLI -- BOOTSTRAP LOADED AND STARTED
```

```
BOOT V10.0 (201)
```

```
MTBOOT>
```

The front end loads the central processor memory with the bootstrap program from the floppy mounted on drive 0, and then starts the bootstrap program. When at bootstrap command level (about 45 seconds), the system prints MTBOOT>.

Error: If the system prints:

```
KLI> -- ?BOOTSTRAP LOAD FAILED
```

or any other error message, you may have the wrong floppy disk mounted in drive 0 or you may not have stopped the central processor. Type CTRL/\. (The backslash key (\) is near the LINEFEED key.) After 10 seconds, the system prints PAR>. Type the command ABORT and press the RETURN key. The system prints PAR%, which means the central processor has stopped. Go back to Step 12.

If the system prints the following message exactly:

```
KLI -- ?BOOT FILE NOT FOUND
KLI -- ?BOOTSTRAP LOAD FAILED
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>
```

You either have the wrong floppies mounted or you mistyped the name of the bootstrap. Go back to Step 13. If the error recurs, make sure that you have mounted the proper floppy disks. If the error continues, contact Digital Software Support.

CREATING THE TOPS-20 FILE SYSTEM

Step 20: Type /L and Press the RETURN Key.

To load the TOPS-20 monitor from magnetic tape into memory, type /L and press the RETURN key. The system rewinds the tape on drive 0, loads the resident monitor, skips a line, and prints the MTBOOT> prompt:

```
MTBOOT>/L<RET>
[BOOT: STARTING CHN:1 DX20X:0 MICROCODE V10(0)] [OK]
[BOOT: LOADING] [OK]
```

MTBOOT>

NOTE

The message concerning the DX20 microcode is printed only if you are installing the TOPS-20 software on a DECSYSTEM-20 with a DX20 tape or disk controller.

Error: If you have made a typing error and pressed the RETURN key, the system prints the MTBOOT> prompt again. Reissue the correct command.

If you did not put the magnetic tape on line, the system prints:

```
?NO RDY DRIVE
MTBOOT>
```

Place the tape on line and give the /L command again.

If the system prints the message:

```
?BAD FIL FMT, or
?BAD EXE DIR
```

Make sure that you have mounted the correct TOPS-20 Installation tape on drive 0 and that all other tape drives are off line. Then rewind the tape and try giving the /L command again. If the error recurs, call DIGITAL Software Support.

Error: If the system does not print the MTBOOT> prompt, you probably mistyped the name MTBOOT. The system prints the message:

```
KLI -- ?BOOT FILE NOT FOUND
KLI -- ?BOOT LOAD FAILED
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>
```

If the floppy disks are mounted properly and you typed MTBOOT properly, go back to Step 12. If the error recurs, contact DIGITAL Software Support.

CREATING THE TOPS-20 FILE SYSTEM

The system will use the magnetic tape that is on line. Check to see if you have more than one tape drive on line. If so, press the ON LINE button to take each unwanted drive off line. Try typing /L again.

NOTE

The following procedure is intended for use during installation only. If you are trying to bring up a monitor that has already been installed on a set of TOPS-20 disk packs, refer to Step 136 in Chapter 4 of this manual or to the TOPS-20 Operator's Guide for the correct procedure.

Step 21: Type /G143 and Press the RETURN Key.

To start the TOPS-20 file-system initialization routine, type /G143 and press the RETURN key. The system starts the TOPS-20 monitor at the file-system initialization routine:

```
MTBOOT>/G143<RET>
```

```
[FOR ADDITIONAL INFORMATION TYPE "?" TO ANY OF THE FOLLOWING  
QUESTIONS.]
```

```
DO YOU WANT TO REPLACE THE FILE SYSTEM ON THE SYSTEM STRUCTURE?
```

Error: If you make an error and the system reprints the MTBOOT> prompt, reissue the correct command.

If the system does not print the MTBOOT> prompt, check your typescript. Go back to Step 12.

If the system prints:

```
?BAD EXE DIR
```

you probably typed the wrong command. Try giving the /G143 command again. If you still get an error, go back to Step 12.

2.2 INITIALIZING THE TOPS-20 FILE SYSTEM

To initialize the TOPS-20 file system, you must define the name of the system structure and the number and location of each disk pack that is part of the system structure.

The steps in this section initialize the TOPS-20 file system by creating:

1. New home blocks (which contain pointers to the beginning of the file system).
2. The directory <ROOT-DIRECTORY> (which contains pointers to all the directories in the system).
3. The directories <SYSTEM>, <SUBSYS>, <NEW-SYSTEM>, <NEW-SUBSYS>, <UETP>, <UETP.LIB>, <UETP.RUN>, <ACCOUNTS>, <SYSTEM-ERROR>, <OPERATOR>, and <SPOOL>.

CREATING THE TOPS-20 FILE SYSTEM

4. Space for the front-end file system.
5. The system swapping space (the area allocated for the movement, by the monitor, of pages between memory and disk).

NOTE

Refer to the TOPS-20 System Manager's Guide for a detailed explanation of all the above.

Step 22: Type YES and Press the RETURN Key.

To create the system structure, type YES and press the RETURN key.

[FOR ADDITIONAL INFORMATION TYPE "?" TO ANY OF THE FOLLOWING QUESTIONS.]

DO YOU WANT TO REPLACE THE FILE SYSTEM ON THE SYSTEM STRUCTURE? YES<RET>

DO YOU WANT TO DEFINE THE SYSTEM STRUCTURE?

Step 23: Type YES and Press the RETURN Key.

To write the home blocks for each unit in the system structure, type YES and press the RETURN key.

DO YOU WANT TO DEFINE THE SYSTEM STRUCTURE? YES<RET>

HOW MANY PACKS ARE IN THIS STRUCTURE:

Step 24: Type the Number of Packs and Press the RETURN Key.

Count the number of disk packs you plan to have in your system structure. Type the answer and press the RETURN key. The following example uses 1:

HOW MANY PACKS ARE IN THIS STRUCTURE: 1<RET>

ON WHICH "CHANNEL, CONTROLLER, UNIT" IS LOGICAL PACK # 0 MOUNTED:

Error: If you type the wrong number of disk packs, type CTRL/\. After the system prints PAR> (10 seconds), type ABORT and press the RETURN key. The system prints PAR% (indicating that the central processor has stopped). Go back to Step 12 and start again.

CREATING THE TOPS-20 FILE SYSTEM

Step 25: Type ? (Do Not Press the RETURN Key).

You must inform the system of the location of each disk pack that is to be in the public file system. If you are not sure of the channel, controller, and unit numbers of each disk pack, type ?. This causes the system to print the channel and unit number of each disk drive:

ON WHICH "CHANNEL, CONTROLLER, UNIT" IS LOGICAL PACK # 0 MOUNTED: ?

[ENTER A TRIPLE OF NUMBERS SEPARATED BY A COMMA THAT SPECIFY THE CHANNEL, CONTROLLER, AND UNIT UPON WHICH THE APPROPRIATE PACK IS MOUNTED. THE FOLLOWING IS A LIST OF VALID CHANNEL, CONTROLLER, UNIT NUMBERS:

1,-1,0 ;TYPE=RP06,DUAL PORT
1,-1,1 ;TYPE=RP06,OFFLINE,DUAL PORT
1,-1,2 ;TYPE=RP04,OFFLINE,DUAL PORT
1,-1,3 ;TYPE=RP07, OFFLINE

]

ON WHICH "CHANNEL,CONTROLLER,UNIT" IS LOGICAL PACK # 0 MOUNTED:

NOTE

The controller number is always -1 for all system structures.

Error: If you followed the procedure in Step 6 exactly, drive 0 will be listed as dual-ported. Of the remaining drives, those that contain the packs that are to be your system structure will be listed as on line. All other drives will be listed as off line.

If a drive that you want to use is not listed, the drive's controller select switch is probably set to B. Follow the procedure in Step 6 for changing it to A. Then type CTRL/\. After 10 seconds, the system prints PAR>. Type ABORT and press the RETURN key to halt the central processor. Return to Step 12 and start again.

If a drive you want to use is listed as off line, turn it on line and wait for the READY light to come on. Go back to Step 12.

Step 26: Type the Channel No., Controller No., Unit No., and Press the RETURN Key.

Type the channel number, the controller number, and the unit number of the dual-ported drive, and press the RETURN key. You must answer this question once for each disk pack. If there is any problem, ask your DIGITAL Field Service representative to give you the channel and unit number of each drive. The controller number of all drives except the RP20 is -1. The RP20 controller number cannot be -1.

ON WHICH "CHANNEL,CONTROLLER,UNIT" IS LOGICAL PACK # 0 MOUNTED:

1,-1,0<RET>

DO YOU WANT THE DEFAULT SWAPPING SPACE?

CREATING THE TOPS-20 FILE SYSTEM

Error: If your answer is invalid, the system prints one of several messages and repeats the question. You can simply repeat the current step.

Error: If your answer is valid but is not the one you wanted, type CTRL/\. After 10 seconds, the system prints PAR>. Type ABORT and press the RETURN key to halt the central processor. Go back to Step 12 and start again.

Step 27: Type ? (Do Not Press the RETURN Key).

To determine the default size of the swapping space for your system, type ?. The system prints the default swapping space, which is 10070 for a 2060.

If you are planning on using a monitor other than MONBIG for the 2060, refer to Chapter 3, Section 3.1 for the correct swapping space for the monitor you choose.

```
DO YOU WANT THE DEFAULT SWAPPING SPACE? ?  
[THE DEFAULT IS 10070 PAGES]
```

```
DO YOU WANT THE DEFAULT SWAPPING SPACE?
```

Step 28: Type YES or NO and Press the RETURN Key.

If you want to accept the default swapping space size, type YES, press the RETURN key, and proceed to Step 30.

```
DO YOU WANT THE DEFAULT SWAPPING SPACE? YES<RET>
```

```
DO YOU WANT THE DEFAULT SIZE FRONT END FILE SYSTEM?
```

If you want to specify the size of the swapping space, type NO and press the RETURN key. The formula for determining the proper swapping space for your system is found in the TOPS-20 System Manager's Guide, Chapter 4.

After you determine the size of the swapping space you need, proceed to Step 29.

```
DO YOU WANT THE DEFAULT SWAPPING SPACE? NO<RET>
```

```
HOW MANY PAGES FOR SWAPPING?
```

Error: If you type the wrong answer, type CTRL/\. After 10 seconds, the system prints PAR>. Type ABORT and press the RETURN key to halt the central processor. Return to Step 12 and start again.

CREATING THE TOPS-20 FILE SYSTEM

Step 29: Type the Decimal Number of Pages and Press the RETURN Key.

Type the decimal number of disk pages you want to assign for swapping and press the RETURN key. This option is provided so you can increase the amount of swapping space in the future. The default size is the maximum amount that your present monitor will use for swapping. If you decide to increase the amount used by the monitor in the future, you must already have assigned that much space on the disk during the installation procedure. Otherwise, you must repeat the installation procedure and specify the larger number. The system will round the number of pages specified up to an integral number of cylinders on the disk.

HOW MANY PAGES FOR SWAPPING? n <RET>

DO YOU WANT THE DEFAULT SIZE FRONT END FILE SYSTEM?

Error: If you type an invalid number, the system prints:

? INVALID NUMBER OF SWAPPING PAGES FOR THIS TYPE OF DISK

and returns to the question in Step 28. If you type an answer that is valid but is not the one you wanted, type CTRL/\. After 10 seconds, the system prints PAR>. Type ABORT and press the RETURN key to halt the central processor. Go back to Step 12 and start again.

Step 30: Type ? (Do Not Press the RETURN Key).

To determine the default size of the front-end file system, type ?. If you already know what the default is, you may omit this step.

DO YOU WANT THE DEFAULT SIZE FRONT END FILE SYSTEM? ?
[THE DEFAULT IS 950 PAGES]

DO YOU WANT THE DEFAULT SIZE FRONT END FILE SYSTEM?

NOTE

If you are using an RP07 disk drive as the system structure, do not reserve any pages for the front-end file system.

Step 31: Type YES and Press the RETURN Key.

Type YES, press the RETURN key, and proceed to Step 32.

DO YOU WANT THE DEFAULT SIZE FRONT END FILE SYSTEM? YES<RET>

DO YOU WANT THE DEFAULT SIZE BOOTSTRAP AREA?

CREATING THE TOPS-20 FILE SYSTEM

Step 32: Type ? (Do Not Press the RETURN Key).

To find out how many pages are assigned as the default boot file space, type a question mark. The system responds with the number of pages allocated for the boot file space.

DO YOU WANT THE DEFAULT SIZE BOOTSTRAP AREA? ?

[THE DEFAULT IS 64 PAGES]

DO YOU WANT THE DEFAULT SIZE BOOTSTRAP AREA?

Step 33: Type YES and Press the RETURN Key.

It is recommended that you take the default bootstrap space. Type YES and press the RETURN key.

DO YOU WANT THE DEFAULT SIZE BOOTSTRAP AREA? YES <RET>

WHAT IS THE NAME OF THIS STRUCTURE?

Step 34: Type the Name of the Structure and Press the RETURN Key.

TOPS-20 recognizes any six-character name as a valid structure name. Type the name of the structure and press the RETURN key. The following examples uses PS: as the structure name.

WHAT IS THE NAME OF THIS STRUCTURE? PS:<RET>

[STRUCTURE "PS" SUCCESSFULLY DEFINED]

Step 35: STOP.

The system now recognizes the structure you just defined and prints

[STRUCTURE "PS" SUCCESSFULLY DEFINED]

[PS MOUNTED]

%%NO SETSPD

If the system prints a message similar to:

?PS UNIT 0 HAS NO BAT BLOCKS
DO YOU WANT TO WRITE A SET OF PROTOTYPE BAT BLOCKS?

Type YES and press the RETURN key. Continue with the next step.

%%NO SETSPD means that the system cannot run the SETSPD program. This is expected because you have not yet loaded the SETSPD program into the file system. This message may be printed at any time before the system requests the date and time.

CREATING THE TOPS-20 FILE SYSTEM

Error: If certain error conditions occur while the monitor is mounting the structure (a drive is write protected, for example), the system prints an error message followed by:

?HAVE THE PROBLEMS MENTIONED ABOVE BEEN CORRECTED YET:

When the problem has been corrected, type Y and press the RETURN key. Go back to Step 12.

2.3 STARTING THE MONITOR

Now that the file system is initialized, you can start the system by performing the following steps.

Step 36: Type the Date and Time, and Press the RETURN Key.

The system prints

System restarting, wait...

ENTER CURRENT DATE AND TIME:

Type the date and time in the following format:

day-month-year hhmm

Press the RETURN key. Type the time in AM/PM format or 24-hour format. For example, 4:30 PM on the second day of March may be entered as 2-MAR-81 4:30 PM:

ENTER CURRENT DATE AND TIME: 5-MAR-84 1630

The system responds by retyping the date and time.

YOU HAVE ENTERED SUNDAY, 5-MARCH-1984 4:30PM,
IS THIS CORRECT (Y,N)

Step 37: Type Y and Press the RETURN Key if the Date Is Correct.

If the date and time are correct, type Y and press the RETURN key. If the date and time are incorrect, type N and press the RETURN key. The system again asks for the date and time:

YOU HAVE ENTERED SUNDAY, 5-MARCH-1984 4:30PM,
IS THIS CORRECT (Y,N) Y<RET>
WHY RELOAD?

Step 38: Type NEW and Press the RETURN Key.

Type NEW and press the RETURN key. The text you type following this question is entered into the system error file, PS:<SYSTEM-ERROR>ERROR.SYS. The TOPS-20 monitor starts running, and the system prints <SYSTEM>ACCOUNTS-TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED and RUNNING DDMP.

WHY RELOAD? NEW<RET>
<SYSTEM>ACCOUNTS-TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED
RUNNING DDMP

NO SYSJOB

CREATING THE TOPS-20 FILE SYSTEM

The system prints the message <SYSTEM>ACCOUNTS-TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED because the ACTGEN program has not been run. (Refer to Chapter 6 of the TOPS-20 System Manager's Guide for more information.) The system prints NO SYSJOB because the SYSJOB program is not stored on disk. This program is not needed yet, so ignore this message.

Error: If you type an incorrect string to the WHY RELOAD? question, the system prints the valid abbreviations and then prompts you again for the abbreviation.

Step 39: Type CTRL/C to Tell the System that You Want to Start a Job.

```
<SYSTEM>ACCOUNTS.TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED
RUNNING DDMP
NO SYSJOB
<CTRL/C>
!
NO EXEC
MX>
```

Step 40: Type G, Then MTA0: and Press the RETURN Key.

The system is now at the miniexec command level, and you can type any miniexec command. Use this command language to load the TOPS-20 command processor from tape. Type CTRL/U if you want to erase a line while at miniexec command level.

The system prints NO EXEC because the file PS:<SYSTEM>EXEC.EXE (containing the TOPS-20 command processor) does not exist. The command processor is not needed at this point, so ignore this message.

To skip over the end of the monitor save file, type G. The system prints ET FILE. Type MTA0: and press the RETURN key. The system skips over the end of the monitor save file and prints the miniexec prompt MX>.

```
NO EXEC
MX>GET FILE MTA0:<RET>
MX>
```

NOTE

If you are using a tape drive other than tape drive 0, reply accordingly in the following steps and/or error recovery procedures, e.g., MTA1:, MTA2:.

| Error: If you get a ? (Question mark) after issuing the command, you can ignore this message and continue with the next step.

CREATING THE TOPS-20 FILE SYSTEM

Step 41: Again Type G, Then MTAO:, and Press the RETURN Key.

To load the TOPS-20 command processor from magnetic tape into memory, type G. The system prints ET FILE. Type MTAO: and press the RETURN key. The system reads the program from MTAO: into memory and prints the minixec prompt when it is finished:

```
MX>GET FILE MTAO:<RET>
MX>
```

Error: If you get another error in the form INTERRUPT AT location, the tape could be bad or you may be specifying the wrong tape drive. Start at Step 10 once more. If the errors continue, call DIGITAL Software Support.

If you make a typing mistake and press the RETURN key, the system prints the MX> prompt. Try again.

Step 42: Type S and Press the RETURN Key.

To start the TOPS-20 command processor that you just loaded into memory, type S. The system prints TART. Press the RETURN key. The system prints the name and version of the TOPS-20 command processor and the TOPS-20 prompt, @:

```
MX>START<RET>
```

```
TOPS-20 Command processor 6(1640)
@
```

Error: If the system prints INTERRUPT AT 1, you typed only one G command to the minixec. Repeat the command in this step. If you still get the error, go back to Step 12. If the errors continue, contact DIGITAL Software Support.

If you receive the error message INTERRUPT AT 601772, follow the error recovery procedures listed below.

Rewind the tape manually and give the following commands:

```
MX>GET FILE MTAO:<RET>
MX>RESET<RET>
MX>GET FILE MTAO:<RET>
MX>START<RET>
```

Proceed to Step 43.

If you make a typing error and press the RETURN key, the system prints the MX> prompt. Try again.

Error: If many error messages are repeatedly printed, the tape could be bad. Press the front-end HALT switch and wait one minute. Go back to Step 12. If the errors persist, ask for another tape.

2.4 CREATING SYSTEM DIRECTORIES

With the system running, you must create directories to store system files and files for testing the system. You create these directories by running the DLUSER program from tape.

CREATING THE TOPS-20 FILE SYSTEM

Step 43: Give the Command: ENABLE (CAPABILITIES).

To be able to load files into privileged areas and create user names and directories, give the ENABLE command to obtain the required capabilities. Type ENABLE and press the ESC key. The system prints (CAPABILITIES). Press the RETURN key. The system prints a \$ prompt instead of @:

```
      ESC
      |
@ENABLE (CAPABILITIES)<RET>
$
```

Step 44: Give the Command: RUN (PROGRAM) MTAO:.

To run the DLUSER program from the magnetic tape, type RUN and press the ESC key. The system prints (PROGRAM). Type MTAO: and press the RETURN key. After you issue this command, the system prints the prompt DLUSER>:

```
      ESC
      |
$RUN (PROGRAM) MTAO:<RET>
DLUSER>
```

Error: If you receive an error message, rewind the tape, skip two files, and reissue this command. The following example shows how to do this for MTAO:

```
      ESC
      |
$REWIND (DEVICE) MTAO:<RET>
      ESC
      |
$SKIP (DEVICE) MTAO: 2 FILES<RET>
      ESC
      |
$RUN (PROGRAM) MTAO:<RET>
DLUSER>
```

Step 45: Give the DLUSER Command: LOAD (FROM FILE) MTAO:.

To load the directory structure from the tape into the file system, type LOAD and press the ESC key. The system prints (FROM FILE). Type MTAO: and press the RETURN key. After a few seconds, the system prints DONE. and the DLUSER prompt:

```
      ESC
      |
DLUSER>LOAD (FROM FILE) MTAO:<RET>

DONE.
DLUSER>
```

Error: If you mistype the command and have not pressed the RETURN key, delete the entire line by typing a CTRL/U, and reissue the command.

If you mistyped the command and pressed the RETURN key, follow the error recovery procedure in Step 44.

CREATING THE TOPS-20 FILE SYSTEM

If you get a group of JSYS error messages, you probably did not give the ENABLE command in Step 43. Type two CTRL/Cs, type ENABLE, give the commands in the following example, and reissue the command in this step:

```
ESC
!
$REWIND (DEVICE) MTAO:<RET>
?DEVICE MTAO: OPEN ON JFN 3
%CLOSE JFN? YES<RET>
3 MTAO: [OK]
ESC
!
$SKIP (DEVICE) MTAO: 2 FILES<RET>
ESC
!
$RUN (PROGRAM) MTAO:<RET>
DLUSER>
```

Step 46: Type EXIT and Press the RETURN Key.

Type EXIT and press the RETURN key to end the DLUSER program. The system prints \$:

```
DLUSER>EXIT<RET>
$
```

2.5 RUNNING DUMPER FROM TAPE

The DUMPER program places files from the magnetic tape into the TOPS-20 file system. The DUMPER program is the fifth file on the Installation Tape.

Step 47: Give the Command: RUN (PROGRAM) MTAO:.

The DUMPER program is on the tape mounted on drive 0. Type RUN and press the ESC key. The system prints (PROGRAM). Since the tape is already positioned at the DUMPER program, type MTAO: and press the RETURN key. After the DUMPER program starts, the system prints the DUMPER prompt:

```
ESC
!
$RUN (PROGRAM) MTAO:<RET>
DUMPER>
```

CREATING THE TOPS-20 FILE SYSTEM

Error: If you get errors, the magnetic tape was either not recorded properly or not positioned properly. Rewind the tape, skip five files, and try again. The following lines show how to do this for MTA0:.. If the errors persist, contact DIGITAL Software Support.

```
      ESC
      |
$REWIND (DEVICE) MTA0:<RET>
      ESC
      |
$SKIP (DEVICE) MTA0: 4 FILES<RET>
      ESC
      |
$RUN (PROGRAM) MTA0:<RET>

DUMPER>
```

Step 48: Give the DUMPER Command: TAPE (DEVICE) MTA0:..

Tell DUMPER which tape drive to use by giving the DUMPER command TAPE. Type TAPE and press the ESC key. The system prints (DEVICE). Type MTA0: and press the RETURN key. The system prints the DUMPER prompt:

```
      ESC
      |
DUMPER>TAPE (DEVICE) MTA0:<RET>
DUMPER>
```

Error: If you make a typing error, reissue the command.

2.6 RESTORING TOPS-20 BUNDLED SOFTWARE FROM TAPE

Restore the files for the directories PS:<SYSTEM>, PS:<SUBSYS>, and PS:<UETP.LIB> from the tape.

Give the DUMPER command FILES just before the RESTORE command if you want the system to print the file specification of each file it restores. The installation takes longer if you print this information. To stop printing each file specification, give the NO FILES command after the current RESTORE command finishes.

(Refer to Chapter 7 of the TOPS-20 User Utilities Guide for an explanation of any messages that DUMPER may print on your terminal.)

CREATING THE TOPS-20 FILE SYSTEM

NOTE

The following steps assume you are restoring the files on the Installation tape to a structure called PS:. If in Step 34 of this manual you gave a structure name other than PS:, type the structure name you specified in place of PS: in the following steps. For example:

```
          ESC          ESC
          |            |
RESTORE (FROM) PS:<*>*.*** (TO) FOO: <SYSTEM><RET>
```

Notice the files are being restored to a structure called FOO: and the directory <SYSTEM>.

Step 49: Give the DUMPER Command: RESTORE (TAPE FILES) PS:<*>*.***
(TO) PS:<SYSTEM>*.***.

To copy the TOPS-20 monitor and its related programs from magnetic tape to disk, give the DUMPER RESTORE command. Type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*.*** (TO). Type PS:<SYSTEM> and press the <ESC> key. The system prints *.***. Press the RETURN key.

This DUMPER command restores all the files in the first saveset to the directory PS:<SYSTEM>. When all the files are restored, the system prints END OF SAVESET and the DUMPER prompt:

```
          <ESC>          <ESC>          <ESC>
          |            |            |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<SYSTEM>*.***<RET>
```

```
Saveset "SYSTEM FILES FOR TOPS-20 V6.0"
LOADING FILES(S) INTO PS:<SYSTEM>
```

```
END OF SAVESET
DUMPER>
```

The system prints a header containing the date and time that the tape was written.

Error: If you do not type the correct input structure, PS:, or if the tape is not positioned correctly, no files are restored from tape. In this case you will not see the message, LOADING FILES(S) INTO PS:<SYSTEM>. To correct this error, type <CTRL/E>, give the following commands, and begin again at Step 49.

```
<CTRL/E>
!
INTERRUPTING
DUMPER>>ABORT<RET>
Aborting RESTORE command...
DUMPER>REWIND<RET>
```

Error: If you do not type the correct structure and directory name, PS:<SYSTEM>, the files are restored to the wrong directory. To correct this error, type <CTRL/E>, give the following command, and reissue the RESTORE command in this step. Be sure to delete and expunge the files in the incorrect directory.

```
<CTRL/E>
```

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```

!
INTERRUPTING...
DUMPER>>ABORT<RET>
Aborting RESTORE command...

          <ESC>          <ESC>          <ESC>
          |              |              |
DUMPER>RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<SYSTEM>:***<RET>
    
```

Step 50: Give the DUMPER Command: RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<SUBSYS>***.

Restore the system program files to the directory PS:<SUBSYS>. Type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*** (TO). Type PS:<SUB> and press the <ESC> key. The system prints SYS>***. Press the RETURN key. When all the files are restored, the system prints END OF SAVESET and the DUMPER prompt:

```

          <ESC>          <ESC>          <ESC>
          |              |              |
DUMPER>RESTORE (TAPE FILES)PS:<*>*** (TO) PS:<SUBSYS> ***<RET>
    
```

Saveset "SUBSYS FILES FOR TOPS-20 V6.0"
LOADING FILE(S) INTO PS:<SUBSYS>

END OF SAVESET
DUMPER>

Error: If you do not type the correct input structure, PS: , or if the tape is not positioned correctly, no files are restored from tape. In this case you will not see the message LOADING FILE(S) INTO PS:<SUBSYS>. To correct this error, type <CTRL/E>, give the following command, and begin again at Step 48.

```

<CTRL/E>
INTERRUPTING...
DUMPER>>ABORT<RET>
Aborting RESTORE command...
DUMPER>
    
```

Error: If you forget to type the directory PS:<SUBSYS>, the files are restored to the wrong directory. Type <CTRL/E>, give the following command to correct the error, and reissue the RESTORE command in this step. Be sure to delete and expunge the files in the incorrect directory.

```

<CTRL/E>
INTERRUPTING...
DUMPER>>ABORT<RET>
Aborting RESTORE command...
DUMPER>
    
```

Step 51: Give the DUMPER Command: RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<SUBSYS>***.

To restore the GALAXY files into the directory PS:<SUBSYS>, type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*** (TO). Type PS:<SUB> and press the <ESC> key. The system prints SYS>***. Press the RETURN key. When all the files are restored, the system

CREATING THE TOPS-20 FILE SYSTEM

prints END OF SAVESET and the DUMPER prompt.

```
          <ESC>          <ESC>          <ESC>
          |              |              |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<SUBSYS>*.***<RET>
```

```
Saveset "GALAXY SUBSYS FILES FOR TOPS-20 V6.0"
LOADING FILE(S) INTO PS:<SUBSYS>
```

END OF SAVESET

Error: If you forget to type PS:<SUBSYS>, the system restores the files to the wrong directory. Type <CTRL/E> to stop DUMPER, give the commands listed below, and reissue the RESTORE command. Be sure to delete and expunge the files in the incorrect directory.

```
<CTRL/E>
INTERRUPTING...
DUMPER>>ABORT<RET>
Aborting RESTORE command...
DUMPER>SKIP 0<RET>
```

```
          <ESC>          <ESC>          <ESC>
          |              |              |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) <SUBSYS>*.***<RET>
```

NOTE

If you have an RP20 disk subsystem, perform Steps 53 through 55. Otherwise, continue the installation procedures at Step 56.

Step 52: Give the DUMPER Command: RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<UETP.LIB>*.***.

To restore the files into the directory <UETP.LIB>, type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*.*** (TO). Type PS:<UETP.LIB> and press the <ESC> key. The system prints IB>*.***. Press the RETURN key. When all the files are restored, the system prints END OF SAVESET and the DUMPER prompt:

```
          <ESC>          <ESC>          <ESC>
          |              |              |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<UETP.LIB>*.***<RET>
```

```
Saveset "UETP FILES FOR TOPS-20 V.6.0"
LOADING FILE(S) INTO PS:<UETP.LIB>
```

END OF SAVESET
DUMPER>

Error: If you do not type the correct input structure, PS:, for example, or if the tape is not positioned correctly, no files are restored from tape. In this case you will not see the message LOADING FILE(S) INTO PS:<UETP.LIB>. To correct this error, type <CTRL/E>, give the following commands, and begin again at Step 48.

```
<CTRL/E>
INTERRUPTING...
```

Owner VIVIAN
Name SS:<6-MANUALS>20BINST.MEM.1
Spooldate Thursday, April 25, 1985 11:53:21

Jobheader: on
Language: impress
paper: letter
copies: 1
jamresistance: on

IMPRINT-10 System Version: v1.9 (Serial packet communications)
Page images processed: 25
Pages printed: 25

Number of job messages: 1
Flushed leftover document bytes:
13 bytes

■

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```
DUMPER>>ABORT<RET>
Aborting RESTORE command...
DUMPER>
```

Step 53: Give the DUMPER Command: DUMPER>UNLOAD

To remove the TOPS-20 Installation tape from the tape drive, type UNLOAD and press the RETURN key. The system rewinds the tape onto the source reel.

```
DUMPER>UNLOAD<RET>
DUMPER>
```

Step 54: Remove the TOPS-20 Installation Tape and Physically Mount the RP20 Microcode Tape on the Tape Drive.

Step 55: Give the DUMPER Command: RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<SUBSYS>*.*** <RET>

To copy the RP20 Microcode from magnetic tape to disk, give the DUMPER RESTORE command. Type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*.*** (TO). Type PS:<SUB and press the <ESC> key. The system prints SYS>*.***. Press the RETURN key.

```
          <ESC>          <ESC>          <ESC>
          |             |             |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<SUBSYS>*.*** <RET>
```

```
Saveset "RP20 DX20 MICROCODE FOR TOPS-20 V5.1",
LOADING FILE(S) INTO PS:<SUBSYS>
```

```
END OF SAVESET
DUMPER>
```

Error: If you do not type the correct structure and directory name, PS:<SUBSYS>, the files are restored to the wrong directory. To correct this error, type <CTRL/E>, ABORT and reissue the RESTORE command in Step 55. Be sure to delete and expunge the files in the incorrect directory.

```
<CTRL/E>
```

```
INTERRUPTING...
DUMPER>ABORT<RET>
Aborting RESTORE command..
```

```
          <ESC>          <ESC>          <ESC>
          |             |             |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<SUBSYS>*.***<RET>
```

Step 56: Type EXIT and Press the RETURN Key.

Type EXIT and press the RETURN key to end DUMPER. The system prints the TOPS-20 enabled prompt:

```
DUMPER>EXIT<RET>
$
```

CREATING THE TOPS-20 FILE SYSTEM

Step 57: Give the Command: UNLOAD (DEVICE) MTA0:.

To remove the TOPS-20 Installation Tape or RP20 Microcode Tape from the tape drive, type UNLOAD and press the <ESC> key. The system prints (DEVICE). Type MTA0: and press the RETURN key. The system rewinds the tape onto the source reel.

```
      <ESC>  
      !  
$UNLOAD (DEVICE) MTA0:<RET>  
$
```

You can now remove the TOPS-20 Installation Tape from the tape drive.

CREATING THE TOPS-20 FILE SYSTEM

Error: If the system prints:

```
%Device open in lower fork
%Kill lower fork?
```

type YES and press the RETURN key. The system unloads your tape.

Step 58: Give the Command: INFORMATION (ABOUT) DISK-USAGE (OF DIRECTORY) PS:<*> and Press the RETURN Key.

If you give the command INFORMATION (ABOUT) DISK-USAGE (OF DIRECTORY) PS:<*>, the system will print the size of every directory on the public structure, PS:.. The example below was obtained using a DECSYSTEM-20, model 2060. You will notice that there are two directories called <NEW-SYSTEM> and <NEW-SUBSYS>. These directories should have no files associated with them. They were created by the monitor and will be used in the event you update your system to a newer release of the TOPS-20 operating system.

```
          ESC          ESC
          |            |
$INFORMATION (ABOUT) DISK-USAGE (OF DIRECTORY) PS:<*><RET>
```

```
PS:<ROOT-DIRECTORY>
872 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

```
PS:<ACCOUNTS>
14 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

```
PS:<NEW-SUBSYS>
0 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

```
PS:<NEW-SYSTEM>
0 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

```
PS:<OPERATOR>
0 Pages assigned
250 Working pages, 250 Permanent pages allowed
```

```
PS:<SPOOL>
0 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

```
PS:<SUBSYS>
2319 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

```
PS:<SYSTEM>
5493 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

```
PS:<SYSTEM-ERROR>
1 Pages assigned
+INF Working pages, +INF Permanent pages allowed
```

CREATING THE TOPS-20 FILE SYSTEM

PS:<UETP>
0 Pages assigned
100000 Working pages, 100000 Permanent pages allowed

PS:<UETP.LIB>
1740 Pages assigned
4000 Working pages, 4000 Permanent pages allowed

PS:<UETP.RUN>
0 Pages assigned
500 Working pages, 500 Permanent pages allowed

Total of 9675 Pages assigned, in 12 directories.
57943 Pages free on PS:, 18057 pages used.

Error: If the "Pages assigned" for each directory shown do not approximately match the value shown in this manual or the value derived from the directory listing shipped with your Installation tape, some files may not have been copied correctly. Mount the tape again on MTA0:, skip four files and begin again at Step 47.

Step 59: Give the Command: RUN (PROGRAM) PS:<SUBSYS>MAKDMP.EXE and Press the RETURN Key.

To create the DUMP.EXE file, which records any system failures, type RUN and press the ESCAPE key. The system prints (PROGRAM). Type PS:<SUBSYS>MAKDMP.EXE and press the RETURN key. The system prints the prompt MAKDMP>.

```
ESC
|
$RUN (PROGRAM) PS:<SUBSYS>MAKDMP.EXE<RET>
MAKDMP>
```

NOTE

If you do not know how much memory your system has, type the HELP command and press the RETURN key after the system prints MAKDMP>. MAKDMP prints examples of physical memory size with the corresponding number of words.

Step 60: Give the MAKDMP Command: CREATE (DUMP FILE) PS:<SYSTEM>DUMP.EXE (FOR MEMORY SIZE) Memory Size and Press the RETURN Key.

To overwrite the existing DUMP.EXE file with a new DUMP.EXE file, type CREATE and press the ESCAPE key. The system prints (DUMP FILE). Type PS:<SYSTEM>DUMP.EXE and press the ESCAPE key. The system prints (FOR MEMORY SIZE). Type the total amount of memory your system has and press the RETURN key. In the following example 2048K words was the memory size.

```
ESC                               ESC
|                                 |
| MAKDMP>CREATE (DUMP FILE)PS:<SYSTEM>DUMP.EXE (FOR MEMORY SIZE) 2048<RET>
```

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Step 61: Give the MAKDMP Command: EXIT and Press the RETURN Key.

To exit the MAKDMP program and return to TOPS-20 command level, type EXIT and press the RETURN key.

```
MAKDMP>EXIT<RET>  
$
```

NOTE

If in the future you add some additional memory to your system, you should reconfigure the DUMP.EXE file to allow it to accommodate the additional memory.

CHAPTER 3

TAILORING THE SYSTEM

After you have installed the bundled TOPS-20 software from the Installation Tape, tailor your system for your specific needs. You must:

1. Select a monitor that is correct for your system.
2. Change the system name.
3. Set terminal speeds; define remote lines, system logical names, magnetic tape drive parameters, line printer parameters, time zone, file archiving and migration recycle periods, and accounting shift parameters; and enable or disable directory parameter setting, account validation, class scheduling, working set swapping, latency optimization, and tape drive allocation. All these parameters are located in the system parameter file PS:<SYSTEM>6-CONFIG.COMD.
4. Change the operator's password and user group.
5. Create the directory PS:<REMARKS>.
6. Create the PS:<SYSTEM>LPFORM.INI file.

3.1 SELECTING A TOPS-20 MONITOR

At this time you are running the TOPS-20 monitor 2060-MONBIG.EXE. You should now select the monitor that most closely meets your system's requirements. Choose a monitor that supports at least:

1. As much memory as your system contains. A monitor that supports less memory than your system contains will not use all available memory.
2. The number of terminal lines you need. Do not count the operator's console in this number. Just count the local terminal lines and remote lines.
3. The number of user jobs that you plan to run, plus two (one operator job and job 0). For example, if you expect to run 20 user jobs, the monitor you select should support at least 22 jobs.

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4. The number of pseudo-terminals that you need. The system needs at least two pseudo-terminals, one to run the PTYCON program, which in turn usually runs the operator program OPR, and one for unplanned situations that may arise. For example, if you want to run five pseudo-terminals in your batch system, you need a monitor that supports at least seven pseudo-terminals.
5. The number of peripheral devices on your system.

All monitors are stored in the directory <SYSTEM>. They all run timesharing and batch concurrently. Do not select a monitor that has fewer resources than you need, or a monitor that is unnecessarily large. The TOPS-20 monitors and their characteristics are listed below. Refer to Table 3-1 for the maximum structure size.

2060-MONBIG.EXE A large timesharing monitor. This monitor supports up to:

- 100 jobs
- 128 lines
- 30 pseudo-terminals
- 3MEG of memory
- 8 magnetic tape drives
- 2 line printers
- 1 card reader
- 120 million words of disk storage (six RP04, three RP06, three RP20 spindles, or one RP07) per structure
- 10000 pages for swapping space

2060-MONMAX.EXE The largest timesharing monitor. This monitor supports up to:

- 128 jobs
- 128 lines
- 50 pseudo-terminals
- 3MEG of memory
- 16 magnetic tape drives
- 2 line printers
- 1 card reader
- 120 million words of disk storage (six RP04 three RP06, three RP20 spindles, or one RP07) per structure
- 15000 pages for swapping space

AN-MONBIG.EXE A large ARPANET timesharing monitor. This monitor supports up to:

- 100 jobs
- 128 lines
- 30 pseudo-terminals
- 40 NVT's
- 3MEG of memory
- 8 magnetic tape drives
- 2 line printers
- 1 card reader
- 120 million words of disk storage (six RP04, three RP06, three RP20 spindles, or one RP07) per structure
- 10000 pages for swapping space

TAILORING THE SYSTEM

AN-MONCFS.EXE A large ARPANET timesharing monitor. This monitor supports up to:

- 80 jobs
- 128 lines
- 50 pseudo-terminals
- 40 NVTs
- 3M6 of memory
- 8 magnetic tape drives
- 2 line printers
- 1 card reader
- 120 million words of disk storage (six RP04, three RP06, three RP20 spindles, on RP07,).
- 15000 pages for swapping space

AN-MONMAX.EXE The largest ARPANET timesharing monitor. This monitor supports up to:

- 128 jobs
- 128 lines
- 50 pseudo-terminals
- 40 NVT's
- 3M6 of memory
- 8 magnetic tape drives
- 2 line printers
- 1 card reader
- 120 million words of disk storage (six RP04, three RP06, three RP20 spindles, or one RP07) per structure
- 15000 pages for swapping space

Table 3-1: Maximum Structure Size

Type of Disk Drive	Max. No. Packs Per Structure	No. Pages Per Pack *
RP04	6	38,000
RP06	3	76,000
RP07	1	216,376
RP20	3	201,420

* a page = 512 x 36 bit words

TAILORING THE SYSTEM

Step 62: Give the Command: CONNECT (TO DIRECTORY) PS:<SYSTEM>.

Connect to the PS:<SYSTEM> directory by typing CONNECT and pressing the ESC key. The system prints (TO DIRECTORY). Type PS:<SYSTEM> and press the RETURN key:

```
      ESC
      |
$CONNECT (TO DIRECTORY) PS:<SYSTEM><RET>
$
```

Step 63: Give the Command: COPY (FROM) montyp.EXE (TO) MONITR.EXE.

Copy the monitor that you have selected to the file MONITR.EXE. Type COPY and press the ESC key. The system prints (FROM). Type the name of the monitor that you have selected and press the ESC key. The system prints the generation number and (TO). Type MONITR.EXE and press the RETURN key.

```
      ESC          ESC
      |            |
$COPY (FROM) montyp.EXE.1 (TO) MONITR.EXE<RET>
montyp.EXE.1 => MONITR.EXE.1 [OK]
```

The different monitors are:

TOPS-20	TOPS-20
2080/2040S	ARPANET
2060-MONBIG.EXE	AN-MONBIG.EXE
2080-MONMAX.EXE	AN-MONMAX.EXE
	AN-MONCFS.EXE

E

Error: If you type the wrong name, reissue the command.

3.2 CHANGING THE SYSTEM NAME

Whenever a user types CTRL/C before logging in or gives the INFORMATION (ABOUT) VERSION command, the system prints a message similar to:

```
| TOPS-20 SMALL SYSTEM, TOPS-20 MONITOR 6.(5050)
```

You can change the system name "TOPS-20 SMALL SYSTEM" by entering the name you want into the file PS:<SYSTEM>MONNAM.TXT. If the name contains lowercase letters, give the command TERMINAL (MODE IS) NO RAISE before entering the name.

The text of the system name can contain up to 105 characters. For practical purposes, it should not exceed 32 characters to fit on a single 72-character line of terminal output. The following two steps show how to change the system name to "Installation-test System."

TAILORING THE SYSTEM

Step 64: Give the Command: `TERMINAL (MODE IS) NO RAISE.`

If you want lowercase letters in the system name, type `TERMINAL` and press the `ESC` key. The system prints `(MODE IS)`. Type `NO RAISE` and press the `RETURN` key. Make sure the `CAPS LOCKED` button on the terminal is not depressed. The system prints `$`.

```
      ESC
      |
$TERMINAL (FEATURE OR TYPE) NO RAISE<RET>
$
```

Step 65: Give the Command: `COPY (FROM) TTY: (TO) MONNAM.TXT<RET>`
`type-system-name-here ^Z.`

Type `COPY` and press the `ESC` key. The system prints `(FROM)`. Type `TTY:` and press the `ESC` key. The system prints `(TO)`. Type `MONNAM.TXT` and press the `RETURN` key. The system is now waiting for you to type the new name of your system. After you enter the new system name, press the `RETURN` key; then type a `CTRL/Z`. The system prints `^Z`, followed by the `$` prompt. In the example below, we use `Installation-test System` as the new system name.

```
      ESC      ESC
      |        |
$COPY (FROM) TTY: (TO) MONNAM.TXT<RET>
  TTY: => MONNAM.TXT.1

Installation-test System <RET>
CTRL/Z
|
^Z
$
```

You can change this file at any time, but the system reads the system name only when the monitor is started (whenever you boot the system).

Step 66: Give the Command: `COPY (FROM) TTY: (TO) TAPNAM.TXT<RET>`
`type-short-system-name-here ^Z.`

You should also change the system name that will be written on the volume header label of any tape initialized by users of the system. Do this by entering the name you want into the file `PS:<SYSTEM>TAPNAM.TXT`. This system name must contain ten or fewer characters, so you will probably have to abbreviate the name given in the previous step. The following step shows how to change the system name appearing on tape labels written by the system to `"Instal-tst"`.

```
      ESC      ESC
      |        |
$COPY (FROM) TTY: (TO) TAPNAM.TXT<RET>
  TTY:=> TAPNAM.TXT.1

Instal-tst<RET>

CTRL/Z
|
^Z
$
```

TAILORING THE SYSTEM

3.3 CREATING SYSTEM DEFAULTS IN 6-CONFIG.COMD

You must create the file PS:<SYSTEM>6-CONFIG.COMD to define system parameters for:

- o Terminal line speeds
- o Logical names
- o Magnetic tape drives
- o Line printers
- o Local time zone
- o Directory parameter setting
- o Account validation
- o Performance improvements
- o Scheduler controls
- o File archiving and migration
- o Tape drive allocation
- o Accounting shift changes

The next time the system starts, the SETSPD (SET System Parameter Defaults) program uses the parameters entered into this file. This program runs automatically at system startup.

The formats of the commands are described in Sections 3.3.1 through 3.3.13. You may include comment lines if they are preceded by exclamation points.

Step 67: Give the Command: CREATE (FILE) 6-CONFIG.COMD.

Use EDIT to create the 6-CONFIG.COMD file. (Refer to the TOPS-20 EDIT Reference Manual for more information on how to use EDIT.) To create the file 6-CONFIG.COMD, type CREATE and press the ESC key. The system prints (FILE). Type 6-CONFIG.COMD and press the RETURN key. The system prints Input: 6-CONFIG.COMD.1 and line number 00100:

```
      ESC
      |
      $CREATE (FILE) 6-CONFIG.COMD<RET>
      Input: 6-CONFIG.COMD.1
      00100
```

Do not confuse the CREATE command, which creates a file, with the CTRL/E CREATE command, which creates a directory.

3.3.1 Setting Terminal Speeds

Whenever the system starts, the SETSPD program reads the TERMINAL commands from PS:<SYSTEM>6-CONFIG.COMD and sets the terminal lines to the specified speeds.

TAILORING THE SYSTEM

Users can change the speeds of their terminals by giving the `TERMINAL (MODE IS) SPEED` command. When one user logs out and another user logs in on the same terminal, the system does not change the line speed back to the default listed in `6-CONFIG.CMD`.

However, if the line is defined as `REMOTE`, the speed is changed back after the line is disconnected.

The operator can change the speed of the line by giving the `CTRL/E SET` command.

To set the default speed for a particular line, enter a command in the following format into `6-CONFIG.CMD`:

```
TERMINAL line SPEED input output
```

Item	Identifies
line	An octal line number, or a range of lines in the form line-line. Your DIGITAL Field Service Representative will provide you with a list of line numbers and the corresponding locations. (Refer to Section 1.2.)
input	The input (to the system) speed of the terminal(s).
output	The output speed of the terminal(s). If you do not specify an output speed along with an input speed, the system assumes that the output speed is the same as the input speed.

Valid terminal speeds are:

0 (to shut off the line)	300
50	600
75	1200
110	1800
134 (actually 134.5)	2400
150	4800
200	9600

NOTE

If you do not specify a speed for a line, the system uses 300 for both input and output. If you have lines in the terminal controller (the DH11) that are not installed, you should define those lines with a speed of 0. Otherwise, the lines run open, causing degradation in system performance.

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Line numbers are always octal, and the console terminal line number is always one greater than the highest line number. Refer to Table 3-2, below, for line numbers for the DECSYSTEM-20.

Table 3-2: Terminal Line Numbers DECSYSTEM-20

Number of Lines (Decimal)	Timesharing Line Numbers (Octal)	Console Line Number (Octal)
8	1 to 10	11
16	1 to 20	21
32	1 to 40	41
64	1 to 100	101
96	1 to 140	141

Step 68: Type the TERMINAL SPEED Commands.

Type your required TERMINAL SPEED commands. You can include comment lines by preceding each of them with an exclamation point. The file entered below is an example. Determine the most useful definitions for the system according to the terminals that you have.

```
00100  ! Terminal Speeds<RET>
00200  ! Line 1 has input=9600 and output=9600<RET>
00300  TERMINAL 1 SPEED 9600<RET>
00400  ! Lines 2 to 20 have input and output=2400<RET>
00500  TERMINAL 2-20 SPEED 2400<RET>
00600  ! Lines 23 to 40 do not exist<RET>
00700  TERMINAL 23-40 SPEED 0<RET>
00800
```

3.3.2 Defining Dial-Up (Remote) Lines

For each dial-up line, you have the option of declaring that line to have a specified speed or you may declare a line to be autobaud. If a dial-up line is declared an autobaud line, at system startup the line can be automatically set to 9600 baud.

To declare a line autobaud, replace the word SPEED with the word AUTO in the TERMINAL command and do not specify any input and output speeds.

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Include a **TERMINAL** command for each dial-up line. Use the same form as described above, but insert the word **REMOTE** after the line number. If you do not use the **AUTO** argument and omit the output speed, the system assumes that the output speed is the same as the input speed. The command format is:

```
TERMINAL line REMOTE SPEED input output
```

or

```
TERMINAL line REMOTE AUTO
```

Whenever a user starts a job on a dial-up line, and **AUTO** has not been specified, the system sets the speed of that line to the speed specified in **6-CONFIG.COMD**.

Step 69: Define **REMOTE** Lines.

If you have remote lines, obtain the line numbers from your **DIGITAL** Field Service Representative and enter the proper commands in **6-CONFIG.COMD**. The lines entered below are only an example. You must determine the correct commands for your own system.

```
00800  ! Lines 21 and 22 are dialup lines<RET>
00900  TERMINAL 21 REMOTE SPEED 9600<RET>
01000  TERMINAL 22 REMOTE AUTO<RET>
```

3.3.3 Defining System Logical Names

Insert a command in the following format to define any special system logical names that you require. These logical names are defined when the system starts. The command format is:

```
DEFINE name definition-list
```

The logical name **SYS:** defaults to **PS:<SUBSYS>** if you do not define it in **6-CONFIG.COMD**. The **TOPS-20** System Manager's Guide describes logical names.

Step 70: Type System Logical Name Definitions.

Enter any system logical name definitions into **6-CONFIG.COMD**. The lines entered below are examples. You must determine the correct definitions for your own system.

```
01100  DEFINE NEW: PS:<NEW>,SYS:<RET>
01200  DEFINE OLD: PS:<OLD>,SYS:<RET>
01300  DEFINE HLP: SYS:<RET>
01400  DEFINE SERR: PS:<SYSTEM-ERROR><RET>
01500  DEFINE DMP: PS:<directory>
01600  DEFINE POBOX: PS:<directory>
```

3.3.3.1 Selecting an Editor - You have the option of selecting the default editing program (editor) with which your users create and edit files using the **CREATE** and **EDIT** commands. If you want them to use **TV**, enter the command, **DEFINE EDITOR: SYS:TV.EXE** into the **6-CONFIG.COMD** file. If you do not put this command into the **6-CONFIG.COMD** file, the default editor used for the **CREATE** and **EDIT** commands will be the **EDIT** program.

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By defining logical name EDITOR: for their own jobs, users can override your choice of default editor, as long as the editor they specify is available at your installation. The following step is an example of making TV the default editor for your installation.

Step 71: Type DEFINE EDITOR: SYS:TV.EXE and Press the RETURN Key.

If you are using the TV editor as your system's default editor, type DEFINE EDITOR: SYS:TV.EXE and press the RETURN key.

```
01700 DEFINE EDITOR: SYS:TV.EXE<RET>
01800
```

NOTE

If you want your system's default editor to be the EDIT program, do not put any DEFINE EDITOR: command into the 6-CONFIG.COMD file.

3.3.4 Defining Magnetic Tape Logical Unit Numbers

The system assigns logical unit numbers to magnetic tape drives. It starts with the lowest numbered unit on the lowest numbered controller on the lowest numbered channel, and proceeds upward. If the cabling connecting the tape drives to the system changes, the logical unit numbers referencing the tape drives can also change, unless you enter the appropriate commands in 6-CONFIG.COMD. The commands in 6-CONFIG.COMD guarantee that the physical drives always have the same logical unit numbers.

Request the tape drive serial numbers from your DIGITAL Field Service Representative, or open the back door of the magnetic tape drives and look on the sticker containing the number. Use the last four digits of the number. Enter a MAGTAPE command in the following format into the 6-CONFIG.COMD file:

MAGTAPE unit serial slave

Item	Identifies
unit	The logical unit number that you wish to assign to the drive. The unit number can be 0, 1, 2, 3, 4, 5, 6, or 7.
serial	The last four digits of the serial number. (Leading 0s may be omitted.)
slave	The type of tape drive, e.g., TU72, TU45, TU77, TU78.

NOTE

If no slave number is entered, the system assumes that the slave number is TU45.

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Step 72: Define Magnetic Tape Drive Logical Unit Numbers.

Enter the definitions of the magnetic tape drive logical unit numbers into 6-CONFIG.COMD. The commands entered below are only examples. You must determine the correct definitions for your system.

```
01900  MAGTAPE 0 24      TU45<RET>
02000  MAGTAPE 1 2001   TU77<RET>
02100  MAGTAPE 2 2002   TU71<RET>
02200  MAGTAPE 3 2003   TU70<RET>
02300  MAGTAPE 4 1500   TU72<RET>
02400
```

3.3.5 Defining Line Printer Parameters

The characteristics of the six possible line printers that can be ordered with your DECSYSTEM-20 are listed in Table 3-3, below. Ask your DIGITAL Field Service Representative which type of line printer you have.

Table 3-3: DECSYSTEM-20 Line Printers

Model	VFU	Lowercase	Identification
LP20A	PROGRAMMABLE	NO	Four buttons on the right top panel, with the top button being POWER ON ALARM/CLEAR
LP20B	PROGRAMMABLE	YES	
LP20C	PROGRAMMABLE	NO	Four buttons on the right top panel, with the top button being POWER ON ALARM/CLEAR
LP20D	PROGRAMMABLE	YES	
LP20F	TAPE	NO	Four rocker switches on the left of the top panel
LP20H	TAPE	YES	

Sections 3.3.5.1 and 3.3.5.2 describe how to install the line printer.

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3.3.5.1 Specifying the VFU File - The VFU (vertical formatting unit) is used to control paper advance through the line printer. For a line printer with a programmable VFU, place a command in 6-CONFIG.CMD that specifies the file to program the VFU. For installation purposes, use SYS:NORMAL.VFU. The command format is:

```
PRINTER n LOWERCASE VFU dev:<dir>name.typ
```

Item	Identifies
n	The unit number of the printer.
LOWERCASE	The printer has the 96-character set. If your printer has the 64-character set, do not include the word LOWERCASE in the command.
VFU	The type of file specified by the command.
dev:<dir>name.typ	The location of the VFU file.

You do not need VFU commands for LP20F and LP20H line printers.

Examples of typical VFU commands in the 6-CONFIG.CMD file are:

```
For an LP20A and LP20C  
PRINTER 0 VFU SYS:NORMAL.VFU
```

```
For an LP20B and LP20D  
PRINTER 0 LOWERCASE VFU SYS:NORMAL.VFU
```

Step 73: Type the VFU Command.

If you have one or more line printers with programmable VFUs, enter the appropriate PRINTER commands in 6-CONFIG.CMD:

```
02500 PRINTER 0 LOWERCASE VFU SYS:NORMAL.VFU<RET>  
02600 PRINTER 1 VFU SYS:NORMAL.VFU<RET>  
02700
```

3.3.5.2 Specifying the RAM File - You must identify a file that will load the translation RAM (random-access memory). This RAM controls the way in which each character is treated by the line printer. Use SYS:LP96.RAM for line printers that have lowercase letters. Use SYS:LP64.RAM for printers that do not have lowercase letters. The command format is:

```
PRINTER n LOWERCASE RAM dev:<dir>name.typ
```

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Item	Identifies
n	The line printer unit number.
LOWERCASE	The printer has the 96-character set. If your printer has the 64-character set, do not include the word LOWERCASE in the command.
RAM	The type of file specified by the command.
dev:<dir>name.typ	The file that contains the translation RAM.

| Examples of typical RAM commands in the 6-CONFIG.COMD file are:

```
For an LP20A, LP20F or LP20C
PRINTER 0 RAM SYS:LP64.RAM
```

```
For an LP20B, LP20H or LP20D
PRINTER 0 LOWERCASE RAM SYS:LP96.RAM
```

Step 74: Type the RAM Command.

| Enter the RAM command into 6-CONFIG.COMD:

```
02800 PRINTER 0 LOWERCASE RAM SYS:LP96.RAM<RET>
02900 PRINTER 1 RAM SYS:LP64.RAM<RET>
03000
```

3.3.6 Defining the Local Time Zone

The time zone in which your installation is located can be represented as the number of hours west or east of Greenwich. For example, Eastern Standard Time is zone 5; Central Standard Time is zone 6; Mountain Standard Time is zone 7; and Pacific Standard Time is zone 8. To set your local time zone, you can enter the following command in 6-CONFIG.COMD:

```
TIMEZONE n
```

where n is a decimal number between -12 and 12 inclusive. Zones -12 and 12 represent the same clock time but on opposite sides of the international date line. If you do not specify a time zone in 5-1-CONFIG.COMD, the time zone will default to zone 0, signifying Greenwich mean time.

Step 75: Type the TIMEZONE Command.

| Enter the TIMEZONE command into 6-CONFIG.COMD:

```
03100 TIMEZONE 5<RET>
03200
```

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3.3.7 Directory Parameter Setting

You have the option of allowing users to change their directory parameters. If you decide to allow users to do this, no command is entered into the 6-CONFIG.COMD file, because the system default is: ENABLE DIRECTORY-PARAMETER-SETTING. However, if you decide not to allow users to change their directory parameters, you should enter the command: DISABLE DIRECTORY-PARAMETER-SETTING into the 6-CONFIG.COMD file. When this command is given, it prevents the user from changing any of his directory parameters unless he has WHEEL or OPERATOR capabilities. The following step is an example of disallowing users from changing their directory parameters.

Step 76: Type DISABLE DIRECTORY-PARAMETER-SETTING and Press the RETURN key.

To prevent users from changing their directory parameters, type DISABLE DIRECTORY-PARAMETER-SETTING and press the RETURN key.

```
| 03300  DISABLE DIRECTORY-PARAMETER-SETTING<RET>  
| 03400
```

NOTE

If the default is taken, users are allowed to change some of their directory parameters with the SET DIRECTORY commands.

3.3.8 Account Validation

You have the option of requiring all users to enter a valid account name when they are logging in to the system. If you decide to require valid accounts, you do not have to enter any command into the 6-CONFIG.COMD file, because the system default is: ENABLE ACCOUNT-VALIDATION. However, if you decide not to validate accounts, you must enter the command DISABLE ACCOUNT-VALIDATION into the 6-CONFIG.COMD file. The following step is an example of not using the account validation facility.

Step 77: Type DISABLE ACCOUNT-VALIDATION and Press the RETURN Key.

If you are not validating accounts, type DISABLE ACCOUNT-VALIDATION and press the RETURN key.

```
| 03500  DISABLE ACCOUNT-VALIDATION<RET>  
| 03600
```

3.3.9 Performance Improvements

Sections 3.3.9.1 and 3.3.9.2 discuss full latency optimization and working set swapping, respectively.

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3.3.9.1 Full Latency Optimization - When the command, ENABLE FULL-LATENCY-OPTIMIZATION is entered into the 6-CONFIG.CMD file, the number of revolutions needed to read pages off the disk is minimized.

NOTE

Before you can use this performance feature, you must obtain from your DIGITAL Field Service Representative the following information about your hardware.

1. If you have a KL10-E processor, it must be at revision level 3.
2. If you have board M7772, it must be at version level E and CS revision level F; or you may have board M7786.

If your hardware does not meet the above requirements, take the system default, which is DISABLE FULL-LATENCY- OPTIMIZATION.

Step 78: Type ENABLE FULL-LATENCY-OPTIMIZATION and Press the RETURN Key.

If your hardware meets the above requirements, type ENABLE FULL-LATENCY-OPTIMIZATION and press the RETURN key.

```
03700  ENABLE FULL-LATENCY-OPTIMIZATION<RET>
03800
```

3.3.9.2 Working Set Swapping - If the command, ENABLE WORKING-SET-PRELOADING, is entered in the 6-CONFIG.CMD file, the entire working set of a process is brought into memory at once when it is the process's turn to run. Otherwise, this action occurs on a page-by-page basis.

NOTE

You should enable working set swapping only if your system runs large compute-bound jobs. However, if your system runs many interactive jobs or if you are unsure which description better fits your system, take the system default, which is:

DISABLE WORKING-SET-PRELOADING

Step 79: Type ENABLE WORKING-SET-PRELOADING and Press the RETURN Key.

```
03900  ENABLE WORKING-SET-PRELOADING<RET>
04000
```

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3.3.10 Scheduler Controls

Sections 3.3.10.1 and 3.3.10.2 describe bias controls and class scheduling, respectively.

3.3.10.1 Bias Controls - You have the option of deciding how your system's CPU time is to be divided between interactive and batch jobs. You do this by entering the command, BIAS n, into the 6-CONFIG.CMD file, where n is any integer between 1 and 20. The smaller the value of n, the larger the percentage of CPU time that is given to interactive jobs. If you do not give this command, a default value of 11 will be taken, calling for equal division of time between interactive and batch jobs.

Step 80: Type the BIAS n Command.

The example below shows how to enter a BIAS n command with a value of 6, which favors interactive jobs. You must determine the correct value of n for your own system.

```
04100 BIAS 6<RET>
04200
```

3.3.10.2 Class Scheduling - You can use class scheduling to divide your system's CPU time among different classes of jobs. Class scheduling assigns percentages of CPU time to jobs according to their account number or according to a policy program written especially for your site.

NOTE

If you do not want to use class scheduling, you do not have to enter any command into the 6-CONFIG.CMD file, because the system default is: DISABLE CLASS-SCHEDULING.

If you use either kind of class scheduling you can allocate any unused CPU time (windfall) among active jobs, or withhold it from all jobs. The command for enabling class scheduling using a policy program and allocating windfall is: ENABLE CLASS-SCHEDULING POLICY-PROGRAM ALLOCATED. The command for enabling class scheduling using a policy program and withholding windfall is: ENABLE CLASS-SCHEDULING POLICY-PROGRAM WITHHELD. If you enable class scheduling using a policy program, you cannot also enable class scheduling using accounts, and should skip to Section 3.3.11 after giving one of these two commands.

If you do not have a policy program to use with class scheduling at your site, you can still enable class scheduling by assigning jobs to classes according to the account under which each job is running. (Refer to Chapter 6 of the TOPS-20 System Manager's Guide for information about associating accounts with particular classes.) To do this you must first enter commands into the 6-CONFIG.CMD file, specifying the percentage of CPU time that is to be given to jobs in each class.

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The command, CREATE 1 .20, specifies that jobs running under accounts in class 1 are to be given a total of 20% of your system's CPU time. You must enter a CREATE command for each class that your system will use, with a different percentage for each class. The sum of the percentages you specify must not add up to more than 100%, although they may add up to less than 100%. If they add up to less than 100%, the percentage of CPU time that is not assigned becomes part of the system's windfall. The following commands are an example of dividing up 75% of the system's CPU time among three classes of jobs. You must supply the correct class numbers and percentages for your own system.

Step 81: Enter CREATE Commands for Scheduler Classes.

Enter CREATE commands for your system's classes into 6-CONFIG.CMD.

```
04300 CREATE 1 .20<RET>
04400 CREATE 2 .40<RET>
04500 CREATE 3 .15<RET>
04600
```

Batch jobs can be put into a special class of their own by including the BATCH-CLASS n command, where n is the number of the class you choose for batch jobs. If you do not enter a BATCH-CLASS command, batch jobs are given CPU time according to the class associated with the account of the job's owner at the time of submission. The following commands are an example of creating a class for batch jobs and assigning 25% of CPU time to this class.

Step 82: Enter the BATCH-CLASS n Command and Assign a Percentage to This Class.

```
04700 BATCH-CLASS 4<RET>
04800 CREATE 4 .25<RET>
04900
```

Now you must enter the command that enables class scheduling using accounts. You must also decide whether to allocate any windfall CPU time to the jobs that are running or to withhold this windfall. The default for this command is ALLOCATED. It is recommended that you take this default.

Step 83: Type ENABLE CLASS-SCHEDULING ACCOUNTS ALLOCATED and Press the RETURN Key.

Now you actually enable class scheduling by giving the following command.

```
05000 ENABLE CLASS-SCHEDULING ACCOUNTS ALLOCATED<RET>
05100
```

CAUTION

Do not enter the above command into the 6-CONFIG.CMD file until you have entered the commands shown in this section that create scheduler classes. If you enable class scheduling before creating classes, class scheduling will not function properly.

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3.3.11 File Archiving and Migration Parameters

Sections 3.3.11.1 and 3.3.11.2 describe tape recycle periods for use with the file archiving and migration features.

3.3.11.1 Archive Tape Recycle Period - TOPS-20 provides a feature that allows off-line storage of selected files on magnetic tape for long periods of time. You can specify for how long these files are saved by inserting a command into the 6-CONFIG.COMD file stating, in days, the recycle period of the tapes. For example, to save archival files on tape for five years, you would enter the command, ARCHIVE-TAPE-RECYCLE-PERIOD 1825 (because 5 years x 365 days/year = 1825 days). If you do not insert an ARCHIVE-TAPE-RECYCLE-PERIOD command in the 6-CONFIG.COMD file, a default value of 3650 (ten years) will be taken.

Step 84: Type the ARCHIVE-TAPE-RECYCLE-PERIOD n Command.

The example below shows how to enter an ARCHIVE-TAPE-RECYCLE-PERIOD n command with a value of 1825 (five years). You must determine a suitable value of n for your own system.

```
05200 ARCHIVE-TAPE-RECYCLE-PERIOD 1825<RET>
05300
```

3.3.11.2 Migration Tape Recycle Period - TOPS-20 provides a feature that allows automatic off-line storage of old or little-used files on magnetic tape for short periods of time. You can specify for how long these files are saved by inserting a command into the 6-CONFIG.COMD file stating, in days, the recycle period of the tapes. For example, to save migrated files on tape for three months, you would enter the command, TAPE-RECYCLE-PERIOD 90 (because 3 months x 30 days/month = 90 days). If you do not insert a TAPE-RECYCLE-PERIOD command in the 6-CONFIG.COMD file, a default value of 180 (six months) will be taken.

Step 85: Type the TAPE-RECYCLE-PERIOD n Command.

The example below shows how to enter a TAPE-RECYCLE-PERIOD n command with a value of 90 (three months). You must determine a suitable value of n for your own system.

```
05400 TAPE-RECYCLE-PERIOD 90<RET>
05500
```

3.3.12 Tape Drive Allocation

Sections 3.3.12.1 and 3.3.12.2 describe putting tape drive allocation into effect, and specifying a response to certain error conditions.

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3.3.12.1 Enabling Tape Drive Allocation - TOPS-20 provides for the automatic assignment of tape drives to users who wish to read or write magnetic tapes. In order to use this feature, which also allows your system to read and write the labels of standard labeled tapes, you must insert the command, ENABLE TAPE-DRIVE-ALLOCATION into the 6-CONFIG.COMD file. If you do not give this command, your users must assign tape drives with the TOPS-20 ASSIGN command and their labeled tapes will be treated as unlabeled tapes.

Step 86: Type the ENABLE TAPE-DRIVE-ALLOCATION Command.

To allow labeled tape processing and the automatic assignment of tape drives, type ENABLE TAPE-DRIVE-ALLOCATION and press the RETURN key.

```
| 05600 ENABLE TAPE-DRIVE-ALLOCATION<RET>  
| 05700
```

3.3.12.2 Treatment of Unrecognized Tapes - If you enabled tape drive allocation in the previous step, you must decide what action the system should take if a labeled tape is mounted improperly, for example, the user specifies the wrong label type or density. If you want the system to unload the tape so that it cannot be accidentally erased, you must insert the command, TAPE-RECOGNITION-ERRORS UNLOAD, into the 6-CONFIG.COMD file. If you do not give this command, the system will treat improperly mounted labeled tapes as unlabeled tapes and will continue processing them. That is, the system default is TAPE-RECOGNITION-ERRORS REGARD-AS-UNLABELED.

Step 87: Type the TAPE-RECOGNITION-ERRORS UNLOAD Command.

To force the automatic unloading of any tapes that are improperly mounted, type TAPE-RECOGNITION-ERRORS UNLOAD and press the RETURN key.

```
| 05800 TAPE-RECOGNITION-ERRORS UNLOAD<RET>  
| 05900
```

3.3.13 Accounting Shift Changes

The accounting facility allows you to provide varied billing rates for system use at different times. You do this by entering commands into the 6-CONFIG.COMD file specifying the time of day for each rate change. You should give one command for each time the rate changes. Use days of the week or keywords WEEKDAYS, WEEKENDS, and ALL, and times in either 24-hour or AM/PM format. (Refer to Chapter 6 of the TOPS-20 System Manager's Guide for detailed information about accounting shift changes.) The example below allows special rates for evenings and weekends. You must provide the correct days and times for your own system.

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Step 28: Enter CHANGE Commands for Accounting Shift Changes.

```
06000 CHANGE 9:00 WEEKDAYS
06100 CHANGE 17:00 WEEKDAYS
06200 CHANGE 0:00 SATURDAY
06300
```

NOTE

You do not have to enter CHANGE commands into the 6-CONFIG.COMD file. If you do not enter any CHANGE commands, the accounting shift change feature of system accounting is not used.

3.3.14 Assigning MSCP Served Disk Drive

MSCP (Mass Storage Communication Protocol) is responsible for granting access to MASSBUS disks across the CI (Computer Interconnect). You can limit the number of disks served by MSCP with the RESTRICT and ALLOW commands. Enter the command in the following format

```
ALLOW      drive-type  Low-order-Serial-number
RESTRICT
```

where:

drive-type = RP04,RP06,RP07,or RP20

serial-number = serial number of the disk drive

Step 88A: Defining MSCP Served Disk Drives.

Enter the ALLOW command for each disk drive that is to be served by MSCP. Enter a RESTRICT command for the disk drives that are not to be served by the MSCP server. The commands entered below are only examples. You must determine the correct definitions for your system.

```
06400  ALLOW  RP06  1243
06500  ALLOW  RP20  3327
```

3.3.15 Specifying Daylight Savings Time

You can specify one of three daylight savings time options in the 6-CONFIG. CMD file. The three options are: AUTOMATIC (change at prescribed time), OFF (never do DST conversions), and ON (always do DST conversions).

Step 88B: Enter the DAYLIGHT Argument Command for Your Site.

To specify the DST option for your system, type DAYLIGHT argument. The following is only an example. You must enter the correct definition for your system.

```
04700  DAYLIGHT-SAVINGS-TIME ON
```

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3.3.16 Specifying Remote Line Conditions

You can specify whether or not a remote line will hung up after the logout command is issued on logged-out or logged-in terminal jobs. Setting these parameters can be especially useful for dial-up lines or for resource contention devices such as terminal concentrators. To specify whether a remote line will be hung-up, you must enter either a ENABLE or DISABLE in the 6-CINFIG.CMD file.

Step 88C: Type the ENABLE HANGUP-IF-LOGGED-IN and ENABLE HANGUP-IF-LOGGED-OUT commands.

To enable the remote line to be disconnected after a logout command is issued on logged-out or logged-in terminal jobs, type the following two commands into the 6-CONFIG.CMD file.

```
06600  ENABLE  HANGUP-IF-LOGGED-IN
06700  ENABLE  HANGUP-IF-LOGGED-OUT
```

3.3.17 Controlling System Message Levels

You have the option of notifying users of certain events, such as resource problems. The following two commands allow you to control what class of messages the user will receive.

```
ENABLE
SYSTEM-MESSAGE-LEVEL-0
DISABLE
```

will inform (or not inform) users about resource problems.

```
ENABLE
SYSTEM-MESSAGE-LEVEL-1
DISABLE
```

will inform (or not inform) users of operational type messages.

Step 88D: ENABLE SYSTEM-MESSAGE-LEVEL n

To enable users to receive both types of system messages, type ENABLE SYSTEM-MESSAGE-LEVEL-0 and ENABLE SYSTEM-MESSAGE-LEVEL-1 and press the RETURN key.

```
06800  ENABLE SYSTEM-MESSAGE-LEVEL-0
06900  ENABLE SYSTEM-MESSAGE-LEVEL-1
```

Step 89: Press the ESC Key, Type EU and Press the RETURN Key.

When you have finished creating the 6-CONFIG.CMD file, press the ESC key to end insert mode. Type EU and press the RETURN key to save the file. The system prints the filename and \$:

```
ESC
!
```

```
05200 $
*EU<RET>
```

```
[6-CONFIG.CMD.1]
$
```

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| Step 90: Give the Command: TYPE (FILE) <SYSTEM>6-CONFIG.CMD.

To be sure that the file is in the proper directory, type TYPE and press the ESC key. The system prints (FILE). Type PS:<SYSTEM>6-CONFIG.CMD and press the RETURN key. The system prints the contents of the file on your terminal.

ESC

```
| $TYPE (FILE) PS:<SYSTEM>6-CONFIG.CMD<RET>
|   ! Terminal Speeds
|   ! Line 1 has input=9600 and output=9600
|   TERMINAL 1 SPEED 9600 ! Burke's line
|   ! Lines 2 to 20 have input and output=2400
|   TERMINAL 2-20 SPEED 2400
|   ! Lines 23 to 40 are shut off
|   TERMINAL 23-40 SPEED 0
|   ! Line 21 and 22 are dialup lines
|   TERMINAL 21 REMOTE SPEED 300
|   TERMINAL 22 REMOTE AUTO
|   DEFINE NEW: PS:<NEW>,SYS:
|   DEFINE OLD: PS:<OLD>,SYS:
|   DEFINE HLP: SYS:
|   DEFINE SERR: PS:<SYSTEM-ERROR>
|   DEFINE DMP: PS:<directory>
|   DEFINE POBOX: PS:<directory>
|   DEFINE EDITOR: SYS:TV.EXE
|   MAGTAPE 0 24 TU45
|   MAGTAPE 1 2001 TU77
|   MAGTAPE 2 2002 TU71
|   MAGTAPE 3 2003 TU70
|   MAGTAPE 4 150000 TU72
```

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```
PRINTER 0 VFU SYS:NORMAL.VFU
PRINTER 1 VFU SYS:NORMAL.VFU
PRINTER 0 LOWERCASE RAM SYS:LP96.RAM
PRINTER 1 RAM SYS:LP64.RAM
TIMEZONE 5
ENABLE FULL-LATENCY-OPTIMIZATION
ENABLE WORKING-SET-PRELOADING
BIAS 6
CREATE 1 .20
CREATE 2 .40
CREATE 3 .15
BATCH-CLASS 4
CREATE 4 .25
ENABLE CLASS-SCHEDULING ACCOUNTS ALLOCATED
ARCHIVE-TAPE-RECYCLE-PERIOD 1825
TAPE-RECYCLE-PERIOD 90
ENABLE TAPE-DRIVE-ALLOCATION
TAPE-RECOGNITION-ERRORS UNLOAD
CHANGE 9:00 WEEKDAYS
CHANGE 17:00 WEEKDAYS
CHANGE 0:00 SATURDAY
$
```

Remember, the file shown above is just an example.

Error: If the system cannot find the file or prints the wrong file, give the following COPY command to place the file in <SYSTEM>:

```
          ESC          ESC
          |            |
$COPY (FROM) 6-CONFIG.CMD (TO) PS:<SYSTEM>6-CONFIG.CMD<RET>
```

(Refer to the TOPS-20 EDIT Reference Manual if you want to change the file.)

3.4 CHANGING THE OPERATOR'S PASSWORD AND USER GROUP

You may wish to change the operator's password from the widely publicized DEC-20 to a 39-alphanumeric-character phrase of your choosing. The password can include a hyphen. Be sure to remember the password or you will have to reinstall the system if you cannot think of the particular password that you typed.

Also, in order for the operator to run the User Environmental Test Package, he must belong to the correct user group. This section describes how to change the operator's password and user group.

Step 91: Give the Command: ^ECREATE (DIRECTORY NAME) PS:<OPERATOR> and Press the RETURN Key.

Type CTRL/E CREATE, and press the ESC key. The system prints (DIRECTORY NAME). Type PS:<OPERATOR> and press the RETURN key. The system prints [OLD], and then the subcommand prompt \$\$.

```
CTRL/E ESC
  |       |
  $^ECREATE (DIRECTORY NAME) PS:<OPERATOR><RET>
  [OLD]
  $$
```

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Step 92: Give the Command: PASSWORD Your Password and Press the RETURN Key.

To insert the operator's new password, type PASS and press the ESC key. The system prints WORD. Type the new password and press the RETURN key. The system prints the subcommand prompt.

```
ESC
!
$$PASSWORD your password<RET>
$$
```

Step 93: Give the Subcommand: USER-GROUP (NUMBER) 100 and Press the RETURN Key.

The operator must be a member of user group 100 in order for him to run the User Environmental Test Package. Type USER-GROUP and press the ESC key. The system prints (NUMBER). Type 100 and press the RETURN key.

```
ESC
!
$$USER-GROUP (NUMBER) 100<RET>
$$
```

Error: If you see a message similar to: %Group already exists, you can ignore this message. The operator is already a member of the correct user group. Go to Step 95.

Step 94: Give the Subcommand: IPCF (CAPABILITY) and Press the RETURN Key.

The operator must have IPCF capabilities in order to run the User Environmental Test Package. Type IPCF and press the ESCAPE key. The system prints (CAPABILITY). Press the RETURN key.

```
ESC
!
$$IPCF (CAPABILITY)<RET>
$$
```

Step 95: Press the RETURN Key.

To return to the TOPS-20 command level, press the RETURN key.

```
$$<RET>
$
```

3.5 CREATING PS:<REMARKS> DIRECTORY

The directory PS:<REMARKS> is used to receive messages sent by users to the operator. Creating this directory avoids constant interruption to the operator from users issuing PLEASE requests. With this directory the operator can read the messages at a specified time each day.

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Step 96: Give the Command ^E CREATE (DIRECTORY NAME) PS:<REMARKS> and Press the RETURN Key.

Type CTRL/E CREATE, and press the ESC key. The system prints (DIRECTORY NAME). Type PS:<REMARKS> and press the RETURN key.

```
CTRL/E ESC
|         |
|^CREATE (DIRECTORY NAME) PS:<REMARKS><RET>
[NEW]
$$
```

Step 97: Press the RETURN Key.

Upon completion of the above step, the system prints [NEW] and \$\$.
Press the RETURN key and proceed to the next step.

```
$$<RET>
$
```

3.6 CREATING THE LPFORM.INI FILE

If the LPFORM.INI file is created, each time LPTSPL receives a request for the line printer, the system does the following:

1. Prints the name of the user who requested the line printer. (BANNER)
2. Prints the name of the file that is being printed. (HEADER)
3. After all the information in that file is printed, it prints the user's name again. (TRAILER)

If this file is omitted, each time a request for the line printer is received, LPTSPL will use the system default.

Step 98: Give the Command: CONNECT (TO DIRECTORY) PS:<SUBSYS> and Press the RETURN Key.

The LPFORM.INI file must reside in the directory PS:<SUBSYS>. Type CONNECT and press the ESC key. The system prints (TO DIRECTORY). Type PS:<SUBSYS> and press the RETURN key.

```
ESC
|
$CONNECT (TO DIRECTORY) PS:<SUBSYS><RET>
$
```

TAILORING THE SYSTEM

Step 99: Give the Command: CREATE (FILE) LPFORM.INI and Press the RETURN Key.

Use your system's text editing program to create the LPFORM.INI file. (The example below uses the editing program, EDIT.) Type CREATE and press the ESC key. The system prints (FILE). Type LPFORM.INI and press the RETURN key. The system proceeds into edit mode and prints 00100. The parameters in the example below are used only for explanatory purposes. You must decide the parameters to be used on your system.

```
      ESC
      !
$CREATE (FILE) LPFORM.INI<RET>
  INPUT: LPFORM.INI.1
00100  NORMAL/BANNER:2/HEADER:2/TRAILER:2<RET>
00200  NARROW/BANNER:2/HEADER:2/TRAILER:2/WIDTH:72<RET>
00300
```

The above example causes the user's name and the filename to be printed twice on both normal and narrow forms before the actual data is printed. Also, after all the data is printed, the system prints the user's name twice again on both normal and narrow forms. The parameter WIDTH:72 informs the system that a maximum of 72 characters can be printed horizontally on narrow forms. (Refer to the TOPS-20 Operator's Guide for a complete description of all the LPFORM.INI parameters.)

Step 100: Press the ESC Key. Type EU and Press the RETURN Key.

To leave edit mode and save the file without line numbers, press the ESC key. The system prints the edit prompt. Type EU and press the RETURN key. The system prints the filename and the generation number, then the TOPS-20 command prompt.

```
00300 <ESC>
*EU<RET>
[LPFORM.INI.1]
$
```

NOTE

If your system is going to be part of the ARPA network, you should perform the steps in Appendix C before going on to Chapter 4.

NOTE

Perform Step 101 through Step 111 only if you are using an RP07 disk drive for your system structure.

TAILORING THE SYSTEM

3.7 BUILDING A FRONT-END FILE STRUCTURE

Steps 101 through 111 describe how to build an RP04 or RP06 structure for the front-end file system when you are using an RP07 disk pack for the TOPS-20 file system.

Step 101: Give the Command: RUN (PROGRAM) CHECKD and Press the RETURN Key.

To run CHECKD to create a structure for your front-end file system, type RUN and press the ESC key. The system prints (PROGRAM). Type CHECKD and press the RETURN key. The system prints the prompt CHECKD>.

```
ESC
!
$RUN (PROGRAM) CHECKD <RET>
CHECKD>
```

Step 102: Give the CHECKD Command: CREATE (NEW FILE SYSTEM FOR) FE-SYS

To inform the system that you are creating a structure, type CREATE and press the ESC key. The system prints (NEW FILE SYSTEM FOR). Type the name of the structure. The structure name can consist of 1 to 6 alphanumeric characters. The example uses FE-SYS. Press the RETURN key. The system prints ENTER ALIAS:.

```
<ESC>
!
CHECKD>CREATE (NEW FILE SYSTEM FOR) FE-SYS <RET>
ENTER ALIAS:
```

Step 103: Give the Command: FE-SYS and Press the RETURN Key.

To inform the system of the alias name of the structure, type FE-SYS and press the RETURN key. The system prints HOW MANY UNITS IN THIS STRUCTURE:

```
ENTER ALIAS: FE-SYS <RET>
HOW MANY UNITS IN THIS STRUCTURE:
```

Step 104: Give the Command: 1 and Press the RETURN Key.

The front-end file system can only reside on a single structure. Type 1 and press the RETURN key. The system prints CHANNEL, CONTROLLER, AND UNIT NUMBER FOR LOGICAL UNIT 0:.

```
HOW MANY UNITS IN THIS STRUCTURE: 1 <RET>
CHANNEL, CONTROLLER, AND UNIT NUMBER FOR LOGICAL UNIT 0:
```

TAILORING THE SYSTEM

Step 105: Give the Command: 1, -1, 0 and Press the RETURN Key.

The front-end file system must reside on either an RP04 or RP08 disk drive that is connected to both the KL10 and PDP11 front-end. If you are not sure, type a ? and press the RETURN key. The system prints the information needed to make the decision. The example uses channel 1, controller -1 (which is the default), and unit 0. After you type this information, the system prints NUMBER OF PAGES TO ALLOCATE FOR SWAPPING?

```
CHANNEL, CONTROLLER, AND UNIT NUMBERS FOR LOGICAL UNIT 0: 1, -1, 0 <RET>
NUMBER OF PAGES TO ALLOCATE FOR SWAPPING?
```

Step 106: Type the Number of Pages to Allocate for Swapping and Press the RETURN Key.

If you plan to use this structure as a secondary system structure, type a decimal number between 2000 and 40,000 and press the RETURN key. Otherwise, type 0 and press the RETURN key. The example assumes you will be using this structure as a secondary structure.

```
NUMBER OF PAGES TO ALLOCATE FOR SWAPPING? 7035 <RET>
NUMBER OF PAGES TO ALLOCATE FOR THE FRONT-END FILE SYSTEM?
```

Step 107: Type the Number of Pages to Allocate for the Front-End File System and Press the RETURN Key.

To allocate the number of pages to reserve for the front-end file system, type 950 and press the RETURN key. The system prints OWNER NAME?

```
NUMBER OF PAGES TO ALLOCATE FOR THE FRONT-END FILE SYSTEM? 950 <RET>
OWNER NAME?
```

Step 108: Type the Owner's Name and Press the RETURN Key.

Type the owner's name of the structure and press the RETURN key. The owner's name can be from 1 to 12 alphanumeric characters. The example uses the name OPERATOR. The system prints IS THIS A SYSTEM STRUCTURE FOR STARTUP?

```
OWNER NAME? OPERATOR <RET>
IS THIS A SYSTEM STRUCTURE FOR STARTUP?
```

Step 109: Type NO And Press the RETURN Key.

To inform the system that this structure will not be used at system startup, type NO and press the RETURN key. The system prints the CHECKD prompt.

```
IS THIS A SYSTEM STRUCTURE FOR STARTUP? NO <RET>
CHECKD>
```

TAILORING THE SYSTEM

| Step 110: Give the CHECKD Command: EXIT and Press the RETURN Key.

To exit the CHECKD program, type EXIT and press the RETURN key. The system prints the TOPS-20 command prompt \$.

```
CHECKD>EXIT <RET>  
$
```

NOTE

When performing the steps in Chapter 4, be sure you install the front-end file system on the structure you have just created.

CHAPTER 4

CREATING THE FRONT-END FILE SYSTEM

The steps in this chapter restore the front-end file system when you reinitialize it or change the front-end hardware. They also restore the front-end software if the front-end file system on disk is destroyed.

These steps copy the front-end software from the floppy disks to the front-end file space on the public structure. They involve the following front-end programs:

- MOU Adds a device to the list of front-end devices.
- UFD Creates a directory in the front-end file space on the public structure.
- PIP Copies files from the floppy disk to the public structure.
- RED Changes the definition of the front-end logical name SY0: from the floppy disk to the public structure.
- SAV Saves the front-end monitor.
- INI Initializes the front-end file system on the public structure.
- DMO Logically dismounts the floppy disks from the disk drives.

4.1 HALTING THE TOPS-20 MONITOR

- | Step 111: Make Sure that the Correct Floppy Disks Are Mounted.

Be sure that System Floppy A is mounted in the left drive (drive 0) and that System Floppy B is mounted in the right drive (drive 1). (Refer to Step 7 in Chapter 2 if you have trouble.)

- | Step 112: Type CTRL/\.

At the console terminal, type CTRL/\ to return to the front-end Command Parser. When you are at Command Parser command level, the system prints the prompt PAR>:

```
CTRL/\  
PAR>
```

CREATING THE FRONT-END FILE SYSTEM

Step 113: Type SHUTDOWN and Press the RETURN Key.

To stop the TOPS-20 monitor, type SHUTDOWN and press the RETURN key. The system prints a list of messages.

```
PAR>SHUTDOWN<RET>
**HALTED**
```

```
%DECSYSTEM-20 NOT RUNNING
```

Error: If you mistype SHUTDOWN an error message is printed, after which you can reissue the command.

The system must print %DECSYSTEM-20 NOT RUNNING. If it does not, type CTRL/\ and give the ABORT command. Go back to Step 113.

4.2 RESTARTING THE FRONT-END MONITOR

This entire procedure is invalid if you did not stop the TOPS-20 monitor as described in Section 4.1.

| Step 114: Set the Switch Register to 000003 (Octal).

Set the front-end switch register to 000003 (switches 1 and 0 up, the rest down).

| Step 115: Hold ENABLE and Press the SWITCH REGISTER Button.

Hold ENABLE and press the SWITCH REGISTER button to start the front-end monitor from drive 0. The system will print a few lines of information. After the system prints [DX1: MOUNTED] proceed to Section 4.3.

```
| RSX-20F VB15-20 6:11 5-MAR-84
```

```
[SYO: REDIRECTED TO DXO:]
[DXO: MOUNTED]
[DX1: MOUNTED]
```

Error: If you left the switch register set to 000007, the system starts the KL Initialization routine. In this case, the printout looks like this:

```
| RSX-20F VB15-20 6:11 5-MAR-84
```

```
[SYO: REDIRECTED TO DXO:]
[DXO: MOUNTED]
[DX1: MOUNTED]
| KLI -- VERSION VB15-12 RUNNING
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>
```

Set the switch register to 000003 and press the ENABLE and SWITCH REGISTER buttons again.

CREATING THE FRONT-END FILE SYSTEM

If you set the switch register to 000003, the system may print:

```
11-HALT  
T04
```

or

****This VOLUME DOES NOT CONTAIN A HARDWARE-BOOTABLE SYSTEM****

Set the switch register correctly and press the ENABLE and SWITCH REGISTER buttons again.

4.3 COPYING FILES FROM FLOPPY DISK TO RP04 OR RP06

Use the following procedures to copy the files. Remember that you are typing commands to the front end and that you must wait for a prompt before typing the answer. There is no type-ahead feature except when you want to type a CTRL/\. You can type a CTRL/U to erase an entire line or press the DELETE key to erase a single character per keystroke.

Many of the steps in this chapter and in Chapter 5 assume that the disk pack is mounted on drive 0. To use a dual-port drive other than drive 0, make the following changes:

1. Where a step calls for DB0: to be typed, type the number of the actual drive used. For example: DB1:, DB2:, etc. Messages printed by the system will reflect this change.
2. If the disk is mounted on a drive other than drive 0, pressing ENABLE and DISK in Step 151 will not work. Instead, set the front-end switch register switches 7 and 0 in the up position. Set switches 10, 9, and 8 to the binary number of the drive used. For example, for drive 1, set switch 8 up; for drive 2, set switch 9 up; for drive 3, set switches 9 and 8 up. After this has been completed, press the ENABLE and SWITCH REGISTER buttons.

| Step 116: Type CTRL/\
.

To start the front-end Command Parser, type CTRL/\
. The system takes about 10 seconds to load the Command Parser from the floppy disks. You are at Command Parser command level when the system prints the prompt PAR%. The % after PAR indicates that the central processor is not running:

```
[DX1: MOUNTED]  
CTRL/\  
.
```

```
PAR%
```

| Step 117: STOP.

The central processor (as opposed to the front-end processor) must be halted before you proceed to the next step. If the central processor is not halted, the front-end monitor will not be saved in the front-end file system in a usable state. When the central processor is stopped, the system prints a percent sign, %, following the Command Parser prompt. If it prints an angle bracket, >, give the SHUTDOWN

CREATING THE FRONT-END FILE SYSTEM

command and type CTRL/\ before continuing.

CREATING THE FRONT-END FILE SYSTEM

- | Step 118: Type MCR INI and Press the RETURN Key.

To start the INITIALIZE program, type MCR INI and press the RETURN key. When the INITIALIZE program is ready for you to type commands (after a few seconds), it prints the prompt INI>:

```
PAR%MCR INI<RET>
```

```
INI>
```

- | Step 119: Type DBO:, and Press the RETURN Key. Wait 5 Seconds and Perform the Next Step.

To initialize the front-end file system on the public structure, type DBO: and press the RETURN key. In about 5 seconds, the INI program finishes. It does not reprint the prompt. Proceed directly to the next step.

```
INI>DBO:<RET>
```

Error: If you type the wrong device name or get an error message, start again at Step 117. If you still get an error message, press the front-end HALT switch and wait one minute. Go back to Step 118.

- | Step 120: Type CTRL/\.

To start the front-end Command Parser, type CTRL/\ . When the Command Parser is ready for you to type commands (about 10 seconds), it prints the prompt PAR%:

```
CTRL/\
```

```
PAR%
```

NOTE

Nothing happens until you type CTRL/\.

- | Step 121: Type MCR MOU and Press the RETURN Key.

To start the MOUNT program again, type MCR MOU and press the RETURN key. When you are at MOUNT command level, the system prints MOU>:

```
PAR%MCR MOU<RET>  
MOU>
```

Error: If you make a typing error, reissue the command.

- Step 122: Type DBO: and Press the RETURN Key.

To allow the front end to use its reserved area on the dual-port disk (the one with the channel selector set to A/B), type DBO: and press the RETURN key. When the mount operation is complete, the system prints a message and the prompt, MOU>:

```
MOU>DBO:<RET>  
MOU -- MOUNT COMPLETE  
MOU>
```

CREATING THE FRONT-END FILE SYSTEM

Error: If you mistype DB0:, the mount operation may fail. If this happens and the system reprints the prompt MOU>, reissue the command. Otherwise, go back to Step 121.

| Step 123: Type CTRL/Z and CTRL/\
.

To terminate the MOUNT program and start the front-end Command Parser, type CTRL/Z, followed by CTRL/\
. After about 10 seconds, when the system is at Command Parser command level, it prints the prompt PAR%:

```
CTRL/Z`  
!  
MOU>^Z  
  
CTRL/\  
  
PAR%
```

| Step 124: Type MCR UFD and Press the RETURN Key.

To run the UFD program, type MCR UFD and press the RETURN key. The system loads the program from the floppy disk and starts it. After a few seconds, UFD is ready for you to type commands and prints the prompt UFD>:

```
PAR%MCR UFD<RET>  
  
UFD>
```

Error: If you make a typing error, reissue the command.

| Step 125: Type DB0:[5,5], Press RETURN Key, Wait 10 Seconds and Perform the Next Step.

To create the directory (in the front-end reserved space on the public structure) that contains the front-end file system, type DB0:[5,5] and press the RETURN key. When the UFD program finishes, it does not reprint the prompt. Wait 10 seconds and then proceed directly to the next step:

```
UFD>DB0:[5,5]<RET>
```

Error: If the system prints:

```
UFD -- FAILED TO CREATE DIRECTORY
```

you probably did not give the correct command the last time you ran the MOU program. Go back to Step 118.

Error: If the system prints:

```
UFD -- DIRECTORY ALREADY EXISTS
```

and you have run the INI program on the disk, then the front-end file system has been corrupted and the entire disk pack will have to be reformatted and rebuilt from the beginning of the installation.

CREATING THE FRONT-END FILE SYSTEM

| Step 126: Type CTRL/\
.

To load the front-end Command Parser from the floppy disk, type CTRL/\
. After 10 seconds, the Command Parser is at command level and the system prints the prompt PAR%:

```
CTRL/\  
PAR%
```

NOTE

Nothing happens until you type CTRL/\
.

| Step 127: Type MCR PIP and Press the RETURN Key.

To load the PIP program from the floppy disk and start it, type MCR PIP and press the RETURN key. After 10 seconds, PIP is ready for you to type commands. The system prints the prompt PIP>:

```
PAR%MCR PIP<RET>  
PIP>
```

Error: If you make a typing error, reissue the command.

| Step 128: Type DBO:/NV=DX0:*.*,DX1:*. and Press the RETURN Key.

To copy the newest version of all the files from the floppy disks (both drive 0 and drive 1) to the front-end file system on the public structure, type DBO:/NV=DX0:*.*,DX1:*. and press the RETURN key. (You can use CTRL/U and the DELETE key to help type this line and others in this chapter.) You will hear clicking as the system accesses the floppy disks. After about 10 minutes, the transfer is complete and the system prints the prompt PIP>:

```
PIP>DBO:/NV=DX0:*.*,DX1:*.<RET>  
PIP>
```

Error: If you make a typing error, reissue the command.

| Step 129: Type CTRL/Z and CTRL/\
.

To end PIP and start the front-end Command Parser, type CTRL/Z followed by CTRL/\
. After 10 seconds, the system is ready to accept commands and prints the prompt PAR%:

```
CTRL/Z  
!  
PIP>^Z  
CTRL/\  
PAR%
```

Error: If you make a typing error, reissue the command.

CREATING THE FRONT-END FILE SYSTEM

| Step 130: Type MCR RED and Press the RETURN Key.

To load and start the REDIRECT program from floppy disk, type MCR RED and press the RETURN key. After the REDIRECT program is ready to accept commands (about five seconds), the system prints the REDIRECT prompt RED>:

```
PAR%MCR RED<RET>
RED>
```

Error: If you make a typing error, reissue the command.

| Step 131: Type DB0:=SY0: and Press the RETURN Key. Wait 5 Seconds and Perform the Next Step.

To redirect the primary front-end file structure from the floppy disks to the front-end file system on the public structure, type DB0:=SY0: and press the RETURN key. After 5 seconds, the REDIRECT program is finished and does not reprint the prompt. Proceed directly to the next step.

```
RED>DB0:=SY0:<RET>
```

Error: If this operation fails or if you make a mistake and the system has printed the prompt RED>, reissue the command. If it still fails, perform Steps 115 through 117 and Steps 122 through 124, then continue at Step 131. (Even this may not work. You may have to perform all the steps again, beginning with Step 115.)

| Step 132: Type CTRL/\.

To start the front-end Command Parser, type CTRL/\. After one second, the system loads and starts the Command Parser and prints the prompt PAR%:

```
CTRL/\
PAR%
```

| Step 133: Type MCR SAV and Press the RETURN Key.

To start the SAVE program, type MCR SAV and press the RETURN key. After one second, the SAVE program is ready to accept commands and the system prints the prompt SAV>:

```
PAR%MCR SAV<RET>
SAV>
```

Error: If you make a typing error, reissue the command.

| Step 134: Set the Switch Register to Zero.

Before proceeding, set the switch register to zero (all switches down).

CREATING THE FRONT-END FILE SYSTEM

| Step 135: Type SY0:/WB and Press the RETURN Key.

To save the system bootstrap and the front-end monitor in the front-end file system on the public structure, type SY0:/WB and press the RETURN key (WB stands for write bootstrap). After the bootstrap and the monitor are saved, the system prints a message and the front end restarts itself at the save entry point:

```
SAV>SY0:/WB<RET>
[DB0: DISMOUNTED]
[DX0: DISMOUNTED]
[DX1: DISMOUNTED]
```

| RSX-20F VB15-20 6:28 5-MAR-84

```
[SY0: REDIRECTED TO DB0:]
[DB0: MOUNTED]
```

The last two messages inform you that the front end is using the files on the TOPS-20 file system instead of on the floppy disks.

Error: If you make a typing error, reissue the command.

| Step 136: Store the Floppy Disks A and B.

Remove the floppy disks, insert them in their covers, and store them in a safe place.

NOTE

If you have some spare floppies available, it is a good idea to copy System Floppies A and B to the spare floppies for backup purposes. Refer to the TOPS-20 System Manager's Guide for this procedure.

| Step 137: Mount System Floppy C on Drive 0

Mount System Floppy C in the left drive (drive 0). (Refer to Step 7 in Chapter 2 if you have trouble.)

| Step 138: Type CTRL/\

To start the front-end Command Parser again, type CTRL/\. After one second, the system loads and starts the Command Parser and prints the prompt PAR%:

```
CTRL/\
PAR%
```

CREATING THE FRONT-END FILE SYSTEM

| Step 139: Type MCR MOU and Press the RETURN Key.

To start the MOUNT program, type MCR MOU and press the RETURN key. When the system is at MOUNT command level, the system prints the prompt MOU>:

```
PAR%MCR MOU<RET>
MOU>
```

Error: If you make a typing error, reissue the command.

| Step 140: Type DX0: and Press the RETURN Key.

The MOUNT program mounts floppy drive 0, then prints the message MOUNT COMPLETE:

```
MOU>DX0:<RET>
MOU -- MOUNT COMPLETE
```

| Step 141: Type CTRL/Z and CTRL/\
.

To terminate the MOUNT program and start the front-end Command Parser, type CTRL/Z, followed by CTRL/\
.\. After about one second, when the system is at Command Parser command level, it prints the prompt PAR%:

```
CTRL/Z
!
MOU>^Z

CTRL/\  
.\

PAR%
```

| Step 142: Type MCR PIP and Press the RETURN Key.

To run the PIP program, type MCR PIP and press the RETURN key. When PIP is at command level, it prints the prompt PIP>:

```
PAR%MCR PIP<RET>
PIP>
```

Error: If you make a typing error, retype the command.

| Step 143: Type DB0:/NV=DX0:*** and Press the RETURN Key.

Copy the contents of System Floppy C to the disk by typing DB0:/NV=DX0:***. This copies RSX20F.MAP to the disk. When the file is copied, PIP prints the prompt PIP>:

```
PIP>DB0:/NV=DX0:***<RET>
PIP>
```

| Step 144: Type DB0:/LI and Press the RETURN Key.

To get a list of the files on the front-end file system, type DB0:/LI and press the RETURN key. The system prints the list of the files copied from floppies A, B, and C. Check it against the directory listing shown in the TOPS20.BWR file to be sure that you have all the files shown there. The TOPS20.BWR file is located on the TOPS-20

CREATING THE FRONT-END FILE SYSTEM

Installation tape.

CREATING THE FRONT-END FILE SYSTEM

The directory listing shown here is only a sample. Do not worry about the order of the files, generation numbers, or dates and times when comparing the files. The file sizes (indicated in the second column in 256-word blocks) should be the same. When the listing is finished, the system prints the prompt PIP>:

```
PIP>DB0:/LI<RET>
```

```
DIRECTORY DB0:[5,5]  
5-MAR-84 16:36
```

```
PIP>
```

| Step 145: Type CTRL/Z and CTRL/\

To exit from the PIP program, type a CTRL/Z. To restart the front-end command parser, type a CTRL/\. When at command level, the front-end command parser prints the prompt PAR%:

```
CTRL/Z  
|  
PIP>^Z  
  
CTRL/\  
  
PAR%
```

CREATING THE FRONT-END FILE SYSTEM

| Step 146: Type MCR DMO and Press the RETURN Key.

To start the DMO program, type MCR DMO and press the RETURN key. When at command level, the DMO program prints the prompt DMO>:

```
PAR%MCR DMO<RET>
DMO>
```

| Step 147: Type DX0: and Press the RETURN Key.

To dismount the floppy drive, type DX0: and press the RETURN key. After a few seconds, when the drive is dismounted, DMO prints a message and the prompt DMO>:

```
DMO>DX0:<RET>
DMO -- DISMOUNT COMPLETE
DMO>
```

| Step 148: Type a CTRL/Z and CTRL/\

To exit from the DMO program, type a CTRL/Z followed by a CTRL/\. When you return to command level, the front-end command parser prints the prompt PAR%:

```
CTRL/Z
!
DMO>^Z

CTRL/\

PAR%
```

NOTE

If you have a spare floppy available, it is a good idea to copy System Floppy C to the spare floppy for backup purposes. Refer to the TOPS-20 System Manager's Guide for this procedure.

CHAPTER 5
RESTARTING THE SYSTEM

At this point you have:

1. Initialized the TOPS-20 file system.
2. Loaded the TOPS-20 monitor and related programs into directories PS:<SYSTEM> and PS:<SUBSYS>.
3. Loaded the files for the TOPS-20 User Environmental Test Package into directory PS:<UETP.LIB>.
4. Created the system initialization files.
5. Loaded the front-end software into the TOPS-20 file system.

| The only thing left to be done is to restart the system. Once this is done, the TOPS-20 file system is intact and the standard TOPS-20 bundled software is completely installed on your system. This means you can stop the system and reboot it from the file system on disk.

Whenever you have to restart the system, be sure that the central processor is stopped; otherwise you can damage the file system you just created.

| Step 149: Be Sure that the Central Processor Is Stopped

Check your output to be sure that the last time the system printed the prompt PAR (in Step 149) it was followed by a % to indicate that the central processor has stopped. If the prompt is followed by a >, type SHUTDOWN and press the RETURN key.

| Step 150: Hold ENABLE and Press the DISK Button.

To restart the system, hold ENABLE and press the DISK button. The system restarts after a few seconds and obtains all the software from the TOPS-20 file system.

If the TOPS-20 file system is on a drive other than drive 0, holding the ENABLE button and pressing the DISK button does not work. You must set the switch register to the appropriate disk drive. For example, if the TOPS-20 file system is on drive 1, set switches 8, 7, and 0 up; for drive 2, set switches 9, 7 and 0 up. (Refer to Part 4, Chapter 1, of the TOPS-20 Operator's Guide for more information on setting the switch register.)

RESTARTING THE SYSTEM

Once you have set the switches to the appropriate disk drive, hold ENABLE and press the SWITCH REGISTER button rather than the DISK button. When you follow this procedure, the system prints the question, KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]? and waits for a reply. Reply by pressing the RETURN key.

RSX-20F VB15-20 6:11 5-MAR-84

[SYO: REDIRECTED TO DB0:]

[DB0: MOUNTED]

KLI -- VERSION YB15-12 RUNNING

KLI -- KL10 S/N: 2102., MODEL B, 60 HERTZ

KLI -- KL10 HARDWARE ENVIRONMENT:

MOS MASTER OSCILLATOR

EXTENDED ADDRESSING

INTERNAL CHANNELS

CACHE

KLI -- MICROCODE VERSION 352 LOADED

KLI -- ALL CACHES ENABLED

LOGICAL MEMORY CONFIGURATION

ADDRESS	SIZE	INT	TYPE	CONTROLLER
00000000	1024K	4	MF20	4

KLI -- CONFIGURATION FILE WRITTEN

KLI -- BOOTSTRAP LOADED AND STARTED

BOOT V10.0 (201)

[BOOT: LOADING] [OK]

[PS MOUNTED]

System restarting wait...

ENTER CURRENT DATE AND TIME:

The line "System restarting, wait..." is printed on all the terminals currently connected to the system to inform users that the system will soon be ready to use.

Error: If the system prints:

*** THIS VOLUME DOES NOT CONTAIN A HARDWARE BOOTABLE SYSTEM ***

the disk pack on the dual-port drive does not contain the front-end software. Perhaps the wrong disk pack has been mounted. But if everything appears to be in order, try the steps in Chapters 2 through 4 again. If the error continues, contact DIGITAL Software Support.

If the system does nothing when you press the switches, you may have pressed ENABLE and SWITCH REGISTER by mistake. Try pressing ENABLE and DISK.

If the system prints JSYS error messages between the lines [PS MOUNTED] and System restarting, wait..., you probably have mistyped some information in the PS:<SYSTEM>6-CONFIG.COMD file. Use EDIT to check the file and correct any errors.

RESTARTING THE SYSTEM

| Step 151: Type the Date and Time and Press the RETURN Key.

After the prompt, type the date and time in the form:

day-month-year hhmm

Then press the RETURN key:

ENTER CURRENT DATE AND TIME: 5-MAR-84 1112<RET>

YOU HAVE ENTERED WEDNESDAY, 5-MAR-84 11:12AM,
IS THIS CORRECT (Y,N)

| Step 152: Type Y or N and Press the RETURN Key.

After the system prints the date and time, check to be sure that it is correct. If it is, type Y and press the RETURN key. If the date or time is incorrect, type N, press the RETURN key, and go back to the Step 151:

YOU HAVE ENTERED WEDNESDAY, 5-MAR-82 11:12AM,
IS THIS CORRECT (Y,N) Y<RET>
WHY RELOAD?

| Step 153: Type SC and Press the RETURN Key.

If you plan to install optional software, type SC and press the RETURN key. When you bring up the system for any other reason, type one of the abbreviations listed in Table 5-1, below:

WHY RELOAD? SC<RET>
<SYSTEM>ACCOUNTS-TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED
RUN CHECKD?

Table 5-1: System Reload Abbreviations

Abbreviation	Meaning
OP	OPR
PA	Parity
PO	Power Failure
ST	Static
HAR	Hardware
HA	Halt
HU	Hung
PM	Preventive Maintenance
CM	Corrective Maintenance
SA	Stand-alone
NE	New Monitor
SC	Scheduled
OT	Other

RESTARTING THE SYSTEM

| Step 154: Type N and Press the RETURN Key.

The CHECKD program examines the entire disk file system, reports any errors, and tries to correct them. You do not have to run this program unless the system crashes unexpectedly, or if, for some other reason, you suspect that there may be disk errors. If you halt the system by giving a CTRL/E CEASE command or by using some other controlled means, you do not have to run CHECKD before restarting.

Type N and press the RETURN key. The system prints RUNNING DDMP and runs the SYSJOB.RUN file.

If you do run CHECKD, be prepared for a long wait until the system prints something on your console terminal. For each inconsistency, CHECKD prints a message and the directory in which the error occurred. (Refer to the TOPS-20 Operator's Guide for a list of CHECKD error messages.)

```
RUN CHECKD? N<RET>
```

```
RUNNING DDMP
```

```
| SYSJOB 6(23) STARTED AT 5-MAR-84 1112  
RUN SYS:ORION  
RUN SYS:QUASAR
```

```
*****
```

```
| 5-MAR-84 11:12:09 - TGHA 4(0) IS RUNNING FOR THE FIRST TIME.
```

```
*****
```

```
RUN SYS:MOUNTR  
RUN SYS:INFO  
RUN SYS:MAILER  
RUN SYS:MAPPING  
RUN SYS:LPTSPL  
RUN SYS:CDRIVE  
RUN SYS:SPRINT  
JOB 0 /LOG OPERATOR XX OPERATOR  
ENA
```

```
^ESET LOGIN PSEUDO  
^ESET LOGIN CONSOLE  
^ESET OPERATOR
```

```
PTYCON  
GET SYSTEM:6-PTYCON.ATO
```

```
| /  
JOB 1 /LOG OPERATOR XX OPERATOR  
ENA  
RUN SYS:BATCON
```

```
/
```

```
SJ 0:
```

```
| SJ 0: 10/5-INSTALLATION-TEST SYSTEM, TOPS-20 MONITOR 6(nnnn)
```

```
SJ 1:
```

```
| SJ 1: 10/5-INSTALLATION-TEST SYSTEM, TOPS-20 MONITOR 6(nnnn)
```

RESTARTING THE SYSTEM

SJ 0: @LOG OPERATOR OPERATOR
SJ 1: @LOG OPERATOR OPERATOR
SJ 0: JOB 1 ON TTY206 5-MAR-84 11:12:22
SJ 0: @ENA
SJ 0: \$^ESET LOGIN PSEUDO
SJ 0: \$^ESET LOGIN CONSOLE
SJ 0: \$^ESET OPERATOR
SJ 0: \$PTYCON
SJ 1: JOB 2 ON TTY207 5-MAR-84 11:12:23
SJ 1: @ENA
SJ 0: PTYCON> GET SYSTEM:6-PTYCON.ATO
SJ 0: PTYCON> SILENCE
SJ 1: \$RUN SYS:BATCON

[From OPERATOR on line 210: SYSTEM IN OPERATION]

SJ 0: PTYCON.LOG.1
SJ 0: PTYCON> W ALL
SJ 0: OPR(0) 3 OPERATOR OPR TI 0:0:1
SJ 0: PTYCON> CONN OPR
SJ 0: [CONNECTED TO SUBJOB OPR(0)]

CHAPTER 6

INSTALLING TOPS-20 DISTRIBUTION AND UPDATE TAPES

The steps in this section describe how to install the TOPS-20 distribution tape or any TOPS-20 update tapes.

To install any option software products, follow the steps specified in the installation guide that accompanies each optional software product.

The TOPS-20 distribution tape contains four savesets. These savesets are: documentation regarding specific programs; sources that allow you to rebuild certain programs, if required; language sources that allow you to rebuild certain language modules, such as MACRO, LINK; GALAXY sources that allow you to rebuild a GALAXY system, if required.

If you are installing the TOPS-20 DECnet-20 software on a 2060, follow the steps in the TOPS-20 DECnet-20 Manual.

If you are installing the IBM communications software, follow the steps in the IBM Emulation/Termination Manual.

INSTALLING TOPS-20 DISTRIBUTION AND UPDATE TAPES

| Step 155: Type CTRL/C.

Type CTRL/C to start a job at your terminal:

```
| CTRL/C
  Installation-test System, TOPS-20 Monitor 6(nnnn)
  @
```

| Step 156: Type SYSTAT OPERATOR and Press the RETURN Key.

To look at the operator jobs on the system, type SYSTAT OPERATOR and press the RETURN key. The system prints a list of the current operator jobs. Determine which operator job is running PTYCON. Use that job number in the next step.

```
@SYSTAT OPERATOR<RET>

      0   DET   SYSJOB   OPERATOR
      1   206   PTYCON   OPERATOR
      2   207   BATCON   OPERATOR
      3   210   OPR      OPERATOR
  @
```

| Step 157: Give the Command: ATTACH (USER) OPERATOR (JOB#) n.

Attach to the operator's job running PTYCON. Type ATTACH and press the ESC key. The system prints (USER). Type OPERATOR and press the ESC key. The system prints (JOB #). Type the number of the job running PTYCON and press the RETURN key. The system prints a message similar to [PSEUDO-TERMINAL, CONFIRM]. Press the RETURN key.

```
      ESC           ESC
      |             |
  @ATTACH (USER) OPERATOR (JOB #) 1<RET>
  [PSEUDO-TERMINAL, CONFIRM] <RET>
  PASSWORD:
```

| Step 158: Type Your Password and Press the RETURN Key Twice.

Type the operator's password and press the RETURN Key twice. The system prints the prompt for the OPR program.

```
PASSWORD: your password <RET>
<RET>
OPR>
```

INSTALLING TOPS-20 DISTRIBUTION AND UPDATE TAPES

| Step 159: Give the Command: SHOW STATUS TAPE-DRIVE /ALL, and Press the RETURN Key.

To find a tape drive that you can use for mounting the software tape, give the OPR program command SHOW STATUS TAPE-DRIVE /ALL, and press the RETURN key. The system responds with a list of tape drives and their status.

```
OPR>SHOW STATUS TAPE-DRIVE /ALL <RET>
OPR>
9:35:49          --Tape Drive Status--
DRIVE  STATE    VOLID  REQ#  JOB#  USER
-----
MTA0:  Unloaded
      AVR: Yes
MTA1:  In Use    DEK     31    45    LARRUP
      AVR: Yes, Write: Yes, Unlabeled
MTA2:  Loaded
      AVR: Yes, Write: Yes, Unlabeled
MTA3:  Unloaded
      AVR: Yes
MTA4:  Unloaded
      AVR: No
MTA5:  Unloaded
      AVR: Yes
OPR>
```

| Step 160: Give the Command: SET TAPE-DRIVE MTAn: UNAVAILABLE.

To mount the software tape, you should first make a free drive unavailable to timesharing users. The OPR program command SET TAPE-DRIVE MTAn: UNAVAILABLE accomplishes this. The example uses drive number 0, but you can specify any drive that is not in use at the moment.

```
OPR>SET TAPE-DRIVE MTA0: UNAVAILABLE<RET>
Enter text and terminate with ^Z
```

| Step 161: Enter INSTALLING OPTIONAL SOFTWARE and Type CTRL/Z.

Enter text and terminate with ^Z

```
          CTRL/Z
          |
INSTALLING OPTIONAL SOFTWARE ^Z
OPR>
```

INSTALLING TOPS-20 DISTRIBUTION AND UPDATE TAPES

| Step 162: Give the PUSH Command and Press the RETURN Key.

To restore the contents of the tape, you should be at TOPS-20 command level. Giving the PUSH command to the OPR program puts you at TOPS-20 command level.

```
OPR>PUSH<RET>
```

```
| TOPS-20 Command processor 6(nnnn)
```

```
@
```

NOTE

If you are using the console terminal, as recommended above, your PUSH command to OPR puts you at TOPS-20 command level. You then see the TOPS-20 prompt (@).

| Step 163: Give the Command: ASSIGN (DEVICE) MTA:.

Give the ASSIGN command to assign a magnetic tape drive to your job. The example uses drive number 0, but you can use any free drive of your choice. Type ASSIGN and press the ESC key. The system prints (DEVICE). Type MTA0: and press the RETURN key. The system prints the system prompt when the drive is assigned:

```
ESC
|
@ASSIGN (DEVICE) MTA0:<RET>
@
```

Error: If the device is assigned to another job, the system prints the message:

```
?ALREADY ASSIGNED TO JOB n
```

Use the command INFORMATION (ABOUT) AVAILABLE DEVICES to find an available tape drive. Reissue the ASSIGN command.

| Step 164: Give the Command: ENABLE (CAPABILITIES).

Because you will be restoring files to restricted areas, you must enable your capabilities. Type ENABLE and press the ESC key. The system prints (CAPABILITIES). Press the RETURN key. The system prints a \$ prompt:

```
ESC
|
@ENABLE (CAPABILITIES)<RET>
$
```

INSTALLING TOPS-20 DISTRIBUTION AND UPDATE TAPES

| Step 165: Type DUMPER and Press the RETURN Key.

To start DUMPER, type DUMPER and press the RETURN key. The system prints the DUMPER prompt:

```
$DUMPER<RET>
```

```
DUMPER>
```

DUMPER ERRORS

If you get errors when using DUMPER, refer to the description of DUMPER in the TOPS-20 User Utilities Guide.

| Step 166: Give the Command: TAPE (DEVICE) MTA:.

Tell DUMPER which tape drive to use. The example uses MTA0;; but, if you have assigned another drive in Step 164, use that drive number. Type TAPE and press the ESC key. The system prints (DEVICE). Type MTA0: and press the RETURN key. The system prints the DUMPER prompt:

```
ESC  
!  
DUMPER>TAPE (DEVICE) MTA0:<RET>  
DUMPER>
```

| Step 167: Mount the Distribution Tape or the Update Tape.

Mount the distribution tape or the update tape on the drive that is assigned to your job. Remember to press the ON LINE button after mounting the tape on a TU45 tape drive.

| Step 168: Type REWIND and Press the RETURN Key.

To start the tape at the beginning, type REWIND and press the RETURN key. The system moves the tape to the beginning and prints the DUMPER prompt:

```
DUMPER>REWIND<RET>  
DUMPER>
```

INSTALLING TOPS-20 DISTRIBUTION AND UPDATE TAPES

Step 169: Give the Command: RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<OPERATOR>.

To restore the documents to directory PS:<OPERATOR>, type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS:. Press the <ESC> key. The system prints <*>*.*** (TO). Type PS:<OPERATOR> and press the RETURN key. The system prints a header containing the date and time that the tape was made, followed by the DUMPER prompt. If you want a list of the files, give the FILES command before the RESTORE command. You can restore the files to any directory. PS:<OPERATOR> is not required.

<ESC> <ESC>
! !

DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<OPERATOR><RET>

DUMPER TAPE # 1, "DOCUMENTATION FILES FOR TOPS-20 V6"
LOADING FILE(S) INTO PS:<OPERATOR>

END OF SAVESET
DUMPER>

Error: If you do not see the message LOADING FILE(S) INTO PS:<OPERATOR>, no files are being restored from tape. Rewind the tape and try again. Be sure you have the correct tape mounted and the tape drive is on line. If problems persist, contact your DIGITAL Field Service Representative.

You can list any of the files on the line printer by typing CTRL/C and giving the PRINT command. The files with file types .MEM, .BWR, .BD, .SD, .DOC, .TCO, and .PCO are the most useful to print. Return to DUMPER by giving the CONTINUE command and pressing the RETURN key twice. In the example, the user prints the file SOURCE.DIR:

<CTRL/C>
!
DUMPER>^C
\$PRINT (FILES) SOURCE.DIR<RET>
\$CONTINUE<RET>
<RET>
DUMPER>

Step 170: Give the Command: RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<SUBSYS>.

To restore the binary files to PS:<SUBSYS>, type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS:. Press the <ESC> key. The system prints <*>*.*** (TO). Type PS:<SUBSYS> and press the RETURN key. The system prints the header, followed by the DUMPER prompt:

<ESC> <ESC>
! !

DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<SUBSYS><RET>

DUMPER TAPE # 1, <BINARY>, WEDNESDAY, 5-MAR-84 1743
LOADING FILE(S) INTO PS:<SUBSYS>

END OF SAVESET
DUMPER>

INSTALLING TOPS-20 DISTRIBUTION AND UPDATE TAPES

| Step 171: Sources.

If you want to restore the source files for either the language or GALAXY sources, give the same RESTORE command as in the last step; but replace <SUBSYS> with the name of the directory where you want the sources stored. Normally, the directories in the definition of the system logical name SYS: do not contain source files, so you should use the CTRL/E CREATE command to create appropriate directories for the source files.

| Step 172: Dismount the Tape and Store It.

Remove the tape from the drive and store it in a safe place.

| Step 173: Go to Step 167 to Restore Other Software Products.

| Go back to Step 167 if you want to install other software products.

| Step 174: Give the DUMPER Command: EXIT.

Type EXIT and press the RETURN key to end DUMPER. Return to TOPS-20 command level:

```
DUMPER>EXIT<RET>
$
```

| Step 175: Give the Command: DEASSIGN (DEVICE) MTAn:.

Give the DEASSIGN command to release the magnetic tape for use by other users. Type DEASSIGN and press the ESC key. The system prints (DEVICE). Type MTAn: (or the number of the magnetic tape drive that you are using) and press the RETURN key. The system prints the TOPS-20 prompt:

```
ESC
|
$DEASSIGN (DEVICE) MTA0:<RET>
$
```

| Step 176: Proceed to Step 177 in Chapter 7.

CHAPTER 7

RUNNING THE TOPS-20 UETP PACKAGE

This chapter describes how to run the User Environment Test Package. This program performs a cursory check of the system.

This program starts a number of tests that can run either once or repeatedly. The source files are kept in the directory <UETP.LIB>, while the temporary data files and results of the test are stored in the directory <UETP.RUN>. For more information on UETP, refer to the User Environment Test Package Reference Manual.

NOTE

If you performed the steps in Chapter 6 of this manual, you may skip Steps 177 through 179 and start at Step 180. You should perform all the steps in this chapter on the operator's console terminal (CTY). Otherwise, you must return to the CTY after completing the steps in this chapter to resume control of the system.

Step 177: Type CTRL/C.

Type a CTRL/C to start a job.

CTRL/C

Installation-test System, TOPS-20 Monitor 6(nnnn)

⓪

Step 178: Give the Command: LOGIN (USER) OPERATOR (PASSWORD) Your Password (ACCOUNT) OPERATOR and Press the RETURN Key.

From this terminal, log into the system as OPERATOR, using your password and the account OPERATOR. Type LOGIN and press the ESC key. The system prints (USER). Type OPERATOR and press the ESC key. The system prints (PASSWORD). Type your password and press the ESC key. The system prints (ACCOUNT). Type OPERATOR and press the RETURN key.

ESC

ESC

ESC

⓪LOGIN (USER) OPERATOR (PASSWORD) your password (ACCOUNT) OPERATOR<RET>
JOB 6 ON TTY1 8-MAR-84 13:51

⓪

RUNNING THE TOPS-20 UETP PACKAGE

| Step 183: Load the Standard Verification Tests.

Type:

TAKE (COMMANDS FROM) VERIFY.CMD<RET>

This command causes the standard tests to be loaded and the first test (VERIFY) to begin. The following messages are typed out:

UETP>ENABLE VERIFY/CYCLE:1 ! Verify that the correct software
[hh:mm:ss ENABLE COMPLETED]

UETP>BEGIN ! is installed
[hh:mm:ss BEGIN COMPLETED]

UETP>DEFAULT/CYCLE:00:15
[hh:mm:ss DEFAULT COMPLETED]

UETP>ENABLE RANCBL
[hh:mm:ss ENABLE COMPLETED]

UETP>ENABLE RANFOR
[hh:mm:ss ENABLE COMPLETED]

UETP>ENABLE MTAO
[hh:mm:ss ENABLE COMPLETED]

The field hh:mm:ss contains the time the message was generated.

Following these messages, the system prints the following status information:

| [5-MAR-84 9:42:47]

Test name	Depth	Status	Cycle	Times run	Error count	Error limit	Start time
====	=====	=====	=====	=====	=====	=====	=====
VERIFY	VER	Queued	1	0	0	0	dd-mmm-yy hh:mm:ss
RANCBL	VER	Enabled	0:15	0	0	0	
RANFOR	VER	Enabled	0:15	0	0	0	
MTAO	VER	Enabled	0:15	0	0	0	

The next two messages you see are

START VERIFY 9:43:33
END VERIFY 10:14:53

The messages signify the beginning and ending of the test.

NOTE

If any messages appear between the start message and the end message, there are errors in the files you received. Do not proceed any further.

RUNNING THE TOPS-20 UETP PACKAGE

If the first test (VERIFY) finishes without error, go on to Step 185.

NOTE

In the following steps you should use a tape drive that is not presently available to timesharing users. If you have just completed the steps in Chapter 6 of this manual, you can give the TOPS-20 ASSIGN command to assign the drive that you deassigned in Step 175. Otherwise, perform Steps 159 through 163 in Chapter 6 before continuing with Step 184 below.

Step 184: Mount a Magnetic Tape on the Drive You Want to Test.

Test MTA0 requires that a blank magnetic tape be mounted on drive 0. Be sure that a write ring has been inserted in the tape and that the drive is on line before you issue the BEGIN command.

NOTE

The standard tests include a random I/O COBOL test, a random I/O FORTRAN test, and a magtape test for MTA0:. If you want to test a tape drive other than drive 0, you must enable the test for the selected drive. Type ENABLE and press the ESC key. The system prints (TEST). Type MTAn (n = the number of the drive, e.g., MTA1, MTA2) and press the RETURN key.

ESC

|

UETP>ENABLE (TEST) MTAn<RET>

Step 185: Begin the Remaining Tests.

Type:

BEGIN<RET>

The system prints the following messages:

START RANCBL hh:mm:ss
START RANFOR hh:mm:ss
START MTA0 hh:mm:ss

END RANCBL hh:mm:ss
END RANFOR hh:mm:ss
END MTA0 hh:mm:ss

RUNNING THE TOPS-20 UETP PACKAGE

If messages other than those shown above appear, the tests generating the messages have failed.

When all tests are completed, the following status information appears:

[All tests complete on processor # 2102]

| [1-Nov-84 10:26:01]

Test name	Depth	Status	Cycle	Times run	Error count	Error limit	Start time
=====	=====	=====	=====	=====	=====	=====	=====
VERIFY	VER	Ended	1	1	0	0	5-MAR-84 9:42:33
RANCB	VER	Ended	0:15	1	0	0	5-MAR-84 10:15:46
RANFOR	VER	Ended	0:15	1	0	0	5-MAR-84 10:15:46
MTAO	VER	Ended	0:15	1	0	0	5-MAR-84 10:15:46

NOTE

| At this point you can either type an EXIT command to terminate UETP, or begin the tests for the optional software. The following step (Step 186) shows how to terminate UETP. If you want to test the optional software, you should skip Step 186 and proceed to Step 187.

| Step 186: Type EXIT<RET>.

UETP>EXIT<RET>

7.1 TESTING SOFTWARE

The steps in this section describe how to enable tests for optional software products. Be sure to enable tests only for the optional software products you have installed.

| Step 187: If You Have Installed BASIC-PLUS-2, Give the Command: ENABLE (TEST) BASIC and Press the RETURN Key.

If you have installed BASIC-PLUS-2, type ENABLE and press the ESC key. The system prints (TEST). Type BASIC and press the RETURN key.

```
      ESC
      |
UETP>ENABLE (TEST) BASIC<RET>
      10:43:07 [ENABLE COMPLETED]
UETP>
```

RUNNING THE TOPS-20 UETP PACKAGE

| Step 188: If You Have Installed ALGOL, Give the Command: ENABLE
(TEST) ALGOL and Press the RETURN Key.

If you have installed ALGOL-20, type ENABLE and press the ESC key.
The system prints (TEST). Type ALGOL and press the RETURN key.

```
ESC
|
UETP>ENABLE (TEST) ALGOL<RET>
10:43:07 [ENABLE COMPLETED]
UETP>
```

| Step 189: If You Have Installed DBMS-20, Give the Command: ENABLE
(TEST) DBMS and Press the RETURN Key.

If you have installed DBMS-20, type ENABLE and press the ESC key. The
system prints (TEST). Type DBMS and press the RETURN key.

```
ESC
|
UETP>ENABLE (TEST) DBMS<RET>
10:43:07 [ENABLE COMPLETED]
UETP>
```

| Step 190: If You Have Installed APL-20, Give the Command: ENABLE
(TEST) APL and Press the RETURN Key.

If you have installed APL-20, type ENABLE and press the ESC key. The
system prints (TEST). Type APL and press the RETURN key.

```
ESC
|
UETP>ENABLE (TEST) APL<RET>
10:43:07 [ENABLE COMPLETED]
UETP>
```

| Step 190A: If you have installed FORTRAN, Give the Command: ENABLE
(TEST) FORTRA and press the RETURN key.

If you have installed FORTRAN, type ENABLE and press the ESC key. The
system prints (TEST). Type FORTRA and press the RETURN key.

```
ESC
|
UETP>ENABLE (TEST) FORTRA<RET>
10:43:07 [ENABLE COMPLETED]
UETP>
```

| Step 190B: If you have installed COBOL-68, Give the Command: ENABLE
(TEST) COBOL and press the RETURN key.

If you have installed COBOL-68, type ENABLE and press the ESC key.
The system prints (TEST). Type COBOL and press the RETURN key.

```
ESC
|
UETP>ENABLE (TEST) COBOL<RET>
10:43:07 [ENABLE COMPLETED]
UETP>
```

RUNNING THE TOPS-20 UETP PACKAGE

| Step 190C: If you have installed COBOL-74, Give the Command ENABLE
| (TEST) CBL74 and press the RETURN key.

If you have installed COBOL-74, type ENABLE and press the ESC key.
The system prints (TEST). Type CBL74 and press the RETURN key.

ESC

|
| UETP>ENABLE (TEST) CBL74<RET>
| 10:43:07 [ENABLE COMPLETED]
| UETP>

| Step 190D: If you have installed SORT-20, Give the Command ENABLE
| (TEST) SORT and press the RETURN key.

If you have installed SORT-20, type ENABLE and press the ESC key. The
system prints (TEST). Type SORT and press the RETURN key.

|
| UETP>ENABLE (TEST) SORT<RET>
| 10:43:07 [ENABLE COMPLETED]
| UETP>

| Step 191: Give the Command: BEGIN and Press the RETURN Key.

To begin the standard tests and all the optional software tests you
enabled, type BEGIN and press the RETURN key. The system starts all
the tests immediately.

UETP>BEGIN <RET>
10:45:17 [BEGIN COMPLETED]

UETP>

NOTE

Periodically give a STATUS command to find out which
tests are running and how many times they have been
run. The following is an example of the STATUS
command:

RUNNING THE TOPS-20 UETP PACKAGE

UETP>STATUS<RET>

| [1-Nov-84 11:02:05]

Test name	Depth	Status	Cycle	Times run	Error count	Error limit	Start time
VERIFY	VER	Ended	1	1	0	0	5-MAR-84 10:42:20
RANCBL	VER	Running	0:15	0	0	0	5-MAR-84 10:59:27
RANFOR	VER	Queued	0:15	0	0	0	5-MAR-84 10:59:27
MTAO	VER	Queued	0:15	0	0	0	5-MAR-84 10:59:27

UETP>

From the above example you can see that the RANCBL.SUP test is running, the RANFOR.SUP and MTAO.SUP tests are in a wait state, and the VERIFY.SUP test has ended.

If under the heading ERROR COUNT there is a number other than 0, be sure to print the ERRORS.LOG file, when the tests are completed, to find out what caused the error.

The UETP program does not notify you when all the tests are completed. To find out when all the tests are completed, give a STATUS command. When all the tests are completed, your output from the STATUS command resembles the following:

STATUS<RET>

| [1-Nov-84 11:40:45]

Test name	Depth	Status	Cycle	Times run	Error count	Error limit	Start time
VERIFY	VER	Ended	1	1	0	0	5-MAR-84 10:42:20
RANCBL	VER	Ended	0:15	1	0	0	5-MAR-84 10:59:27
RANFOR	VER	Ended	0:15	1	0	0	5-MAR-84 10:59:27
MTAO	VER	Ended	0:15	1	0	0	5-MAR-84 10:59:27

| Step 192: Give the Command: EXIT and Press the RETURN Key.

To exit from the UETP program, type EXIT and press the RETURN key. The system prints the TOPS-20 enabled prompt.

UETP>EXIT<RET>
\$

Error: If you try to exit while there are tests still running, the system prints the message %YOU STILL HAVE TESTS RUNNING. "ABORT ALL" BEFORE EXITING. Wait until all the tests are completed and then reissue the EXIT command.

RUNNING THE TOPS-20 UETP PACKAGE

| Step 193: Give the Command: TAKE (COMMANDS FROM) <UETP.LIB>
CLEAN-UP.CMD and Press the RETURN Key.

To delete the temporary directories, type TAKE and press the ESC key. The system prints (COMMANDS FROM). Type <UETP.LIB>CLEAN-UP.CMD and press the RETURN key. The system prints the word [OLD] for each directory it has deleted.

```
<ESC>
!
$TAKE (COMMANDS FROM) <UETP.LIB>CLEAN-UP.CMD<RET>
[OLD]
End of <UETP.LIB>CLEAN-UP.CMD.3
```

NOTE

If you did not perform the steps in Chapter 6 before proceeding to the steps in this chapter, you cannot return to the OPR program (Step 194). Instead, perform Steps 156 through 158 in Chapter 6 at this time. Then you can skip Step 194 and continue with Step 195, below.

| Step 194: Type POP.

To return the CTY to the OPR program, type POP. The system prints the OPR prompt.

```
$POP<RET>
OPR>
```

| Step 195: Give the command: SET TAPE-DRIVE MTA0: AVAILABLE and Press the RETURN key.

To return the tape drive you were using to the pool of available resource, type SET TAPE-DRIVE MTA0: AVAILABLE and press the RETURN key.

```
OPR>SET TAPE-DRIVE MTA0: AVAILABLE<RET>
OPR>
```

| Step 196: Start Timesharing.

APPENDIX A

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

This appendix describes how to install Version 6.0 software on a DECSYSTEM-20 now running TOPS-20 Version 5.1 software.

As you update the system, enter the commands printed in red. The system's replies are printed in black.

The updating procedures are divided into four sections. They are:

- o INSTALLING THE VERSION 6.0 SOFTWARE (Section A.1)
- o REVERTING TO VERSION 5.1 (Section A.2)
- o MAKING THE VERSION 6.0 MONITOR THE PRIMARY MONITOR (Section A.3)
- o MAKING THE VERSION 6.0 MONITOR THE PERMANENT MONITOR (Section A.4)

The steps in this Appendix assume you are using the CTY.

A.1 INSTALLING THE VERSION 6.0 SOFTWARE

To install the TOPS-20 Version 6.0 software, you need:

- o System Floppy A
- o System Floppy B
- o System Floppy C, which should be used for new installations only. If you are updating your software from a previous version, DO NOT USE Floppy C.
- o TOPS-20 Installation Tape V6.0
- o RP20 Microcode Tape (RP20 only)
- o A separate tape for each optional software product you have purchased.

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 1: Log in to the System with OPERATOR or WHEEL Capabilities.

```
      ESC          ESC          ESC
      |            |            |
@LOGIN (USER) OPERATOR (PASSWORD) password (ACCOUNT) account<RET>
```

NOTE

If you are using the OPR program at the CTY, you can give the PUSH command to OPR instead of logging in another job. The PUSH command to OPR puts you at TOPS-20 command level. Below is an example of giving the PUSH command to OPR at the CTY and performing Step 2:

```
OPR>PUSH<RET>

TOPS-20 Command processor 5.1(1640)
      <ESC>
      |
@INFORMATION (ABOUT) DISK-USAGE<RET>
  n pages assigned
  n Working pages, n Permanent pages allowed
  n Pages free on PS:
  @
```

Step 2: Give the Command: INFORMATION (ABOUT) DISK-USAGE and Press the RETURN Key.

You must have enough disk space on your public structure (PS:) before you can proceed. To find out how many free pages there are on PS:, type INFORMATION and press the ESCAPE key. The system prints (ABOUT); type DISK-USAGE and press the RETURN key. The system prints the number of pages assigned to you and the number of free pages on PS:.

```
      ESC
      |
@INFORMATION (ABOUT) DISK-USAGE<RET>
```

The system prints

```
  n pages assigned
  n Working pages, n Permanent pages allowed
  n Pages free on PS:
  @
```

Where n = the number of pages

NOTE

The number of free pages on PS: must be at least 5000. If you do not have at least this number of pages free, you must dump some files to tape or delete and expunge some files.

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 3: Give the Command: ENABLE (CAPABILITIES).

```
      ESC
      |
@ENABLE (CAPABILITIES)<RET>
```

Step 4: Give the Command: TAKE PS:<UETP.LIB>CLEAN-UP.CMD and Press the RETURN Key.

To delete various directories created by the UETP program, type TAKE PS:<UETP.LIB>CLEAN-UP.CMD and press the RETURN key.

```
$TAKE PS:<UETP.LIB>CLEAN-UP.CMD<RET>
$
```

Step 5: Give the Command: ^ECREATE (DIRECTORY NAME) PS:<UETP.LIB> and Press the RETURN Key.

Before you can load the Version 6.0 UETP program onto PS:, you must delete the Version 5.1 PS:<UETP.LIB> directory. Type CTRL/E CREATE and press the ESC key. The system prints (DIRECTORY NAME). Type PS:<UETP.LIB> and press the ESC key. The system prints (PASSWORD). Press the RETURN key.

```
CTRL/E   ESC                               ESC
  |       |                               |
  $^CREATE (DIRECTORY NAME) PS:<UETP.LIB> (PASSWORD)<RET>
  [OLD]
  $$
```

Step 6: Give the Command: KILL and Press the RETURN Key.

To delete the Version 5.1 PS:<UETP.LIB> directory, type KILL and press the RETURN key. The system prints [CONFIRM].

```
$$KILL<RET>
[CONFIRM]
```

Step 7: Press the RETURN Key Twice.

To confirm you are deleting the directory PS:<UETP.LIB>, press the RETURN key twice.

```
[CONFIRM]<RET>
$$<RET>
$
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 8: Kill Directories PS:<UETP.RUN> and PS:<UETP> in the Same Manner.

```
<CTRL/E>
!
$^ECREATE PS:<UETP.RUN><RET>
[OLD]
$$KILL<RET>
[CONFIRM]<RET>
$$<RET>
<CTRL/E>
!
$^ECREATE PS:<UETP><RET>
[OLD]
$$KILL<RET>
[CONFIRM]<RET>
$$<RET>
$
```

Step 9: Give the Command: DELETE PS:<SPOOL>PRIMARY-MASTER-QUEUE-FILE .QUASAR and Press the RETURN Key.

After allowing any pending jobs to complete or after sending messages to their owners asking them to re-submit them later, you must delete the master spooling file in preparation for the batch and spooling (GALAXY) system. Type DELETE PS:<SPOOL>PRIMARY- and press the ESCAPE key. The system prints MASTER-QUEUE-FILE.QUASAR.1 and gives a message verifying the deletion.

```
<ESC>
!
$DELETE PS:<SPOOL>PRIMARY-MASTER-QUEUE-FILE.QUASAR<RET>
PS:<SPOOL>PRIMARY-MASTER-QUEUE-FILE.QUASAR.1 [OK]
$
```

NOTE

If you gave a PUSH command to OPR, at the CTY give a POP command to return to OPR command level, and perform Steps 11 through 14. Otherwise, perform Steps 10 through 14.

If you have tape drive allocation enabled, perform Steps 10 through 13. Otherwise, continue at Step 15.

Step 10: Give the Command: OPR and Press the RETURN Key

To place yourself at OPR command level, type OPR and press the RETURN key. The system prints the prompt OPR>.

```
$OPR<RET>

OPR>
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 11: Give the OPR Command: SHOW STATUS TAPE-DRIVES /ALL and Press the RETURN Key

To find out what drives on the system are available to mount the Installation Tape, give the OPR command SHOW STATUS TAPE-DRIVES /ALL. The system prints the status of all tape drives on the system and then prints the prompt OPR> again.

Any tape drive that has the status of "UNLOADED" can be used for mounting the Installation tape.

```

                <ESC>   <ESC>
                |       |
OPR>SHOW STATUS TAPE-DRIVES /ALL<RET>

OPR>

10:13:09          --Tape Drive Status--
DRIVE  STATE  VOLID  REQ#  JOB#  USER
-----
MTA0:  Available
MTA1:  Unloaded
      AVR: Yes
MTA2:  Unloaded
      AVR: Yes
MTA3:  Unloaded
      AVR: Yes
MTA5:  Unloaded
      AVR: Yes
MTA6:  Unavailable
MTA7:  Unavailable

```

Step 12: Give the OPR Command: SET TAPE-DRIVE MTAn UNAVAILABLE and Press the RETURN Key.

To mount the TOPS-20 Installation Tape, you should first make an available tape drive unavailable to timesharing users. To do this, give the OPR command SET TAPE-DRIVE MTAn UNAVAILABLE, and press the RETURN key. The system prints Enter text and terminate with ^Z. Type Installing Version 6.0 Software and type a CTRL/Z. The system prints the prompt OPR>.

The example uses MTA0: as the tape drive, but you can specify any tape drive that is not in use at the moment.

```

                <ESC>           <ESC>
                |               |
OPR>SET TAPE-DRIVE MTA0: UNAVAILABLE<RET>
Enter text and terminate with ^Z
Installing Version 6.0 Software <CTRL/Z>

OPR>

```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 13: Give the OPR Command: PUSH and Press the RETURN Key.

To install the Version 6.0 software, you should be at TOPS-20 command level. To place yourself at TOPS-20 Command level, type PUSH to OPR and press the RETURN key. The system prints TOPS-20 command Processor 5.1(1640) and then the prompt @.

```
OPR>PUSH<RET>
TOPS-20 Command Processor 5.1(1640)
@
```

Step 14: Give the Command: ENABLE (CAPABILITIES) and Press the RETURN Command.

To enable your capabilities, type ENABLE and press the ESCAPE key. The system prints (CAPABILITIES). Press the RETURN key. The system prints the \$ prompt.

```
<ESC>
|
@ENABLE (CAPABILITIES)<RET>
$
```

Step 15: Give the Command: ASSIGN (DEVICE) MTA0: and Press the RETURN Key.

To assign tape drive 0 to your job, type ASSIGN and press the ESCAPE key. The system prints (DEVICE). Type MTA0: and press the RETURN key. The system prints the \$ prompt.

```
<ESC>
|
$ASSIGN (DEVICE) MTA0:<RET>
$
```

Step 16: Mount the Installation Tape on MTA0: and Give the Following Commands:

```
ESC
|
$REWIND (DEVICE) MTA0:<RET>

ESC
|
$SKIP (DEVICE) MTA0: 2 FILES<RET>
```

Step 17: Give the Command: RUN (PROGRAM) MTA0: and Press the RETURN Key.

To run the DLUSER program from magnetic tape, type RUN and press the ESCAPE key. The system prints (PROGRAM). Type MTA0: and press the RETURN key. After the DLUSER program starts, the system prints the DLUSER prompt.

```
ESC
|
$RUN (PROGRAM) MTA0:<RET>

DLUSER>
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Error: If you make a typing mistake, rewind the tape, skip two files, and reissue the command above. The following example shows how to do this when the Installation tape is on MTA0:.

```
ESC
!
$REWIND (DEVICE) MTA0:<RET>

ESC
!
$SKIP (DEVICE) MTA0: 2 FILES<RET>

ESC
!
$RUN (PROGRAM) MTA0:<RET>

DLUSER>
```

Step 18: Give the DLUSER Command: LOAD (FROM FILE) MTA0: and Press the RETURN Key.

To load the parameters for the directories <UETP> and <SYSTEM-ERROR> into the file system from the TOPS-20 Installation tape, type LOAD and press the ESCAPE key. The system prints (FROM FILE). Type MTA0: and press the RETURN key. After a few seconds, the system prints DONE. and gives the DLUSER prompt.

```
ESC
!
DLUSER>LOAD (FROM FILE) MTA0:<RET>
```

The system prints

```
DONE.
DLUSER>
```

Step 19: Type EXIT and Press the RETURN Key.

Type EXIT and press the RETURN key to leave the DLUSER program. The system prints the TOPS-20 enabled prompt.

```
DLUSER>EXIT<RET>

$
```

Step 20: Give the Command: RUN (PROGRAM) MTA0: and Press the RETURN Key.

To run the DUMPER program, type RUN and press the ESCAPE key. The system prints (PROGRAM). Type MTA0: and press the RETURN key. After the DUMPER program starts, the system prints the DUMPER prompt.

```
ESC
!
$RUN (PROGRAM) MTA0:<RET>
```

The system prints

```
DUMPER>
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Error: If you receive any errors, rewind the tape, skip four files and reissue the command above. The following example shows how to do this for MTAO:. If errors still persist, contact DIGITAL Software Support.

```
ESC
|
$REWIND (DEVICE) MTAO:<RET>

ESC
|
$SKIP (DEVICE) MTAO: 4 FILES<RET>

ESC
|
$RUN (PROGRAM) MTAO:<RET>
```

The system prints

```
DUMPER>
```

Step 21: Give the DUMPER Command: TAPE (DEVICE) MTAO: and Press the RETURN Key.

To tell the DUMPER program which tape drive you are using, type TAPE and press the ESC key. The system prints (DEVICE). Type MTAO: and press the RETURN key. The system prints the DUMPER prompt.

```
ESC
|
DUMPER>TAPE (DEVICE) MTAO:<RET>
```

The system prints

```
DUMPER>
```

Step 22: Give the DUMPER Command: FILES and Press the RETURN Key.

To have the files being restored into the individual directories typed on your terminal, type FILES and press the RETURN key. The system prints the DUMPER prompt.

```
DUMPER>FILES<RET>
DUMPER>
```

Step 23: Give the Command: RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<NEW-SYSTEM> and Press the RETURN Key.

To copy the TOPS-20 monitor and its related programs from the Installation tape to your public structure, type RESTORE and press the ESC key. The system prints (TAPE FILES). Type PS: and press the ESC key. The system prints <*>*.*** (TO). Type PS:<NEW-SYSTEM> and press the RETURN key.

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

This DUMPER command restores all the files in the first saveset to the directory PS:<NEW-SYSTEM>. When all the files are restored, the system prints the message END OF SAVESET and the DUMPER prompt.

```
          <ESC>          <ESC>
          |              |
DUMPER>RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<NEW-SYSTEM><RET>
```

```
Saveset "NEW-SYSTEM FOR Version V6.0"
LOADING FILE(S) INTO PS:<NEW-SYSTEM>
```

```
END OF SAVESET
DUMPER>
```

Step 24: Give the Command: RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<NEW-SUBSYS> and Press the RETURN Key.

Restore the system program files to the directory PS:<NEW-SUBSYS>. Type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*** (TO). Type PS:<NEW-SUBSYS> and press the RETURN key. When all the files are restored, the system prints the message END OF SAVESET and the DUMPER prompt.

```
          <ESC>          <ESC>
          |              |
DUMPER>RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<NEW-SUBSYS><RET>
```

```
Saveset "SUBSYS FILES FOR TOPS-20 V6.0"
LOADING FILE(S) INTO PS:<NEW-SUBSYS>
```

```
END OF SAVESET
DUMPER>
```

Step 25: Give the DUMPER Command:RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<NEW-SUBSYS>***

To restore the GALAXY files into the directory PS:<NEW-SUBSYS>, type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*** (TO). Type PS:<NEW-SUB and press the <ESC> key. The system prints SYS>***. Press the RETURN key. When all the files are restored, the system prints END OF SAVESET and the DUMPER prompt.

```
          <ESC>          <ESC>          <ESC>
          |              |              |
DUMPER>RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<NEW-SUBSYS>***<RET>
Saveset "GALAXY NEW-SUBSYS FILES FOR TOPS-20 V6.0"
Loading file(s) into PS:<NEW-SUBSYS>
```

```
End of SAVESET
DUMPER>
```

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Step 26: Give the DUMPER Command: RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<UETP.LIB>*.*** and Press the RETURN Key.

To restore the files for the User Environment Test Package, type RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*.*** (TO). Type PS:<UETP.LIB> and press the <ESC> key. The system prints *.*.*. Press the RETURN key. When all the files are restored, the system prints END OF SAVESET and the DUMPER prompt.

```
          <ESC>          <ESC>          <ESC>
          |             |             |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<UETP.LIB>*.***<RET>
```

```
Saveset "UETP FILES FOR TOPS-20 V6.0"
LOADING FILE(S) INTO PS:<UETP.LIB>
```

```
END OF SAVESET
DUMPER>
```

NOTE

If you have an RP20 disk system, perform the procedures in Steps 27 to 29. Otherwise, continue the installation process at Step 30.

Step 27: Give the DUMPER Command: UNLOAD and Press the RETURN Key.

To unload the Version 6 Installation Tape from the tape drive, give the DUMPER command UNLOAD and press the ESCAPE key. The system prints (DEVICE). Type MTA0: and press the RETURN key. The system rewinds and unloads the tape from the drive.

```
DUMPER>UNLOAD<RET>
```

```
DUMPER>
```

Step 28: Dismount the Installation Tape and Mount the RP20 Microcode Tape.

Step 29: Give the DUMPER Command: RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<NEW-SUBSYS> and Press the RETURN Key.

After you have mounted the RP20 Microcode Tape on MTA0, give the DUMPER command. RESTORE and press the <ESC> key. The system prints (TAPE FILES). Type PS: and press the <ESC> key. The system prints <*>*.*** (TO). Type PS:<NEW-SUBSYS> and press the <ESC> key. The system prints *.*.*. Press the RETURN key. After all the file(s) are restored, the system prints END OF SAVESET and then the DUMPER prompt.

```
          <ESC>          <ESC>          <ESC>
          |             |             |
DUMPER>RESTORE (TAPE FILES) PS:<*>*.*** (TO) PS:<NEW-SUBSYS>*.***<RET>
```

```
Saveset "RP20 MICROCODE FOR Version V6.0"
LOADING FILE(S) INTO PS:<NEW-SUBSYS>
```

```
END OF SAVESET
DUMPER>
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 30: Give the DUMPER Command: EXIT and Press the RETURN Key.

To terminate the DUMPER program and return to the TOPS-20 command level, type EXIT and press the RETURN key.

```
DUMPER>EXIT<RET>  
$
```

Step 31: Give the Command: UNLOAD (DEVICE) MTA0: and Press the RETURN Key.

To rewind and unload the tape on MTA0:, type UNLOAD and press the ESC key. The system prints (DEVICE). Type MTA0: and press the RETURN key.

```
ESC  
!  
$UNLOAD (DEVICE) MTA0:<RET>  
$
```

Step 32: Give the Command: DEASSIGN (DEVICE) MTA0: and Press the RETURN Key.

To remove the device MTA0: from your job, type DEASSIGN and press the ESC key. The system prints (DEVICE). Type MTA0: and press the RETURN key. The system prints the \$ prompt.

```
<ESC>  
!  
$DEASSIGN (DEVICE) MTA0:<RET>  
$
```

NOTE

If you performed Step 12, which removed a tape drive from system's usage, perform Steps 33 through 36. Otherwise, continue at Step 37.

Step 33: Give the Command: POP and Press the RETURN Key.

To return to OPR command level, type POP and press the RETURN key. The system prints the prompt OPR>

```
$POP<RET>
```

OPR>

Step 34: Give the OPR Command: SET TAPE-DRIVE MTAn: AVAILABLE and Press the RETURN Key.

To return the tape drive you removed from system usage in Step 12, give the OPR command SET TAPE-DRIVE MTAn: AVAILABLE and press the RETURN key. MTA0: is used in the example:

```
OPR>SET TAPE-DRIVE MTA0: AVAILABLE<RET>
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 35: Give the OPR Command: PUSH and Press the RETURN Key.

To return to TOPS-20 command level and continue the installation procedures, type PUSH and press the RETURN Key. The system prints the Command Processor's Version number and the @ prompt.

```
OPR>PUSH<RET>
```

```
TOPS-20 Command Processor 5.1(1640)
@
```

Step 36: Give the Command: ENABLE (CAPABILITIES) and Press the Return Key.

To enable your capabilities, type ENABLE and press the ESC key. The system prints (CAPABILITIES). Press the RETURN key. The system prints the \$ prompt.

```
<ESC>
|
@ENABLE (CAPABILITIES)<RET>
$
```

A.1.1 Renaming the Version 5.1 Monitor

In case you ever need to revert to the Version 5.1 monitor, you must rename it before copying the Version 6.0 monitor into <SYSTEM>MONITR.EXE.

Step 37: Give the Command: RENAME (EXISTING FILE)
PS:<SYSTEM>MONITR.EXE (TO) PS:<SYSTEM>5.1-MONITR.EXE and
Press the RETURN Key.

To rename and save the Version 5.1 monitor, type RENAME and press the ESC key. The system prints (EXISTING FILE). Type PS:<SYSTEM>MONITR.EXE and press the ESC key. The system prints (TO BE). Type PS:<SYSTEM>5-1-MONITR.EXE and press the RETURN key. When the rename is successfully completed, the system prints a message specifying that the file was renamed correctly.

```
ESC                                ESC
|                                |
$RENAME (EXISTING FILE) PS:<SYSTEM>MONITR.EXE (TO BE)
PS:<SYSTEM>5-1-MONITR.EXE<RET>
<SYSTEM>MONITR.EXE.1 => <SYSTEM>5-1-MONITR.EXE.1 [OK]
$
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 38: Give the Command: COPY (FROM) PS:<NEW-SYSTEM>montyp.EXE
(TO) PS:<SYSTEM>MONITR.EXE and Press the RETURN Key.

To copy the Version 6.0 monitor into PS:<SYSTEM>, type COPY and press the ESC key. The system prints (FROM). Type PS:<NEW-SYSTEM>montyp.EXE and press the ESC key. (Montyp designates the type of monitor you have selected for your system, for example 2060-MONBIG; refer to Chapter 2, Section 2.3 of this manual for information about choosing a monitor for your system.) The system prints (TO). Type PS:<SYSTEM>MONITR.EXE and press the RETURN key. When the copy is successfully completed, the system prints a message specifying that the file was copied correctly.

```

          ESC                      ESC
          |                      |
$COPY (FROM) PS:<NEW-SYSTEM>montyp.EXE (TO) PS:<SYSTEM>MONITR.EXE<RET>

<NEW-SYSTEM>montyp.EXE. => <SYSTEM>MONITR.EXE.1 [OK]
$
    
```

Step 38A: Give the Command: COPY (FROM) PS:<NEW-SYSTEM> IPALOD.EXE
(TO) PS:<SYSTEM>IPALOD.EXE and Press the RETURN Key.

The file IPALOD.EXE must be in the directory <SYSTEM> in order for the CI-20 microcode to be loaded properly in Step 55 of this Appendix. To do this, type COPY and press the <ESC> key. The system prints (FROM). Type PS:<NEW-SYSTEM>IPALOD.EXE and press the <ESC> key. The system prints (TO). Type PS:<SYSTEM>IPALOD.EXE and press the RETURN key. When the copy is successfully completed, the system prints a message specifying that the file was copied correctly.

```

          <ESC>                    <ESC>
          |                      |
$COPY (FROM) PS:<NEW-SYSTEM>IPALOD.EXE (TO) PS:<SYSTEM>IPALOD.EXE<RET>

<NEW-SYSTEM>IPALOD.EXE.n => <SYSTEM>IPALOD.EXE.n [OK]
    
```

A.1.2 Creating the File <NEW-SYSTEM>6-CONFIG.CMD

You must create the file <NEW-SYSTEM>6-CONFIG.CMD to declare system parameters. Before performing the next step, be sure you are connected to system.

Step 39: Give the Command: EDIT (FILE) PS:<SYSTEM>5-1-CONFIG.CMD.1
(OUTPUT AS) PS:<NEW-SYSTEM>6-CONFIG.CMD.

To edit PS:<SYSTEM>5-1-CONFIG.CMD and have the changes placed in PS:<NEW-SYSTEM>6-CONFIG.CMD, type EDIT and press the ESC key. The system prints (FILE). Type PS:<SYSTEM>5-1-CONFIG.CMD and press the ESC key. The system prints the generation number of that file and (OUTPUT AS). Type PS:<NEW-SYSTEM>6-CONFIG.CMD and press the RETURN key. The system prints: EDIT: <SYSTEM>5-1-CONFIG.CMD and the EDIT prompt.

```

          ESC                      ESC
          |                      |
$EDIT (FILE) PS:<SYSTEM>5-1-CONFIG.CMD.1 (OUTPUT AS)
PS:<NEW-SYSTEM>6-CONFIG.CMD<RET>
    
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

The system prints

```
EDIT: <SYSTEM>5-1-CONFIG.CMD.1
```

```
*
```

Step 40: Give the Edit Command: P^:* and Press the RETURN Key.

To print the contents of PS:<SYSTEM>5-1-CONFIG.CMD, type P^:* and press the RETURN key. The system prints the entire 5-1-CONFIG.CMD file and then the EDIT prompt.

```
EDIT: <SYSTEM>5-1CONFIG.CMD.1
```

```
*P^:*<RET>
```

A.1.3 Changing System Parameters

Read Chapter 3 of this manual (Tailoring the System), and make any changes to the system parameters that are necessary. Three parameters that must be added are the definitions for the logical names SYS:, SYSTEM:, and SERR:. Add the following commands to the 6-CONFIG.CMD file.

```
DEFINE SYS: PS:<NEW-SUBSYS>,PS:<SUBSYS><RET>
DEFINE SYSTEM: PS:<NEW-SYSTEM>, PS:<SYSTEM><RET>
```

NOTE

When you are making a change to existing lines of the 5-1-CONFIG.CMD file, use the EDIT command R line number. Any changes made to the system parameters are made only in <NEW-SYSTEM>6-CONFIG.CMD. The file <SYSTEM>5-1-CONFIG.CMD remains the same.

Step 41: Press the ESC Key, Type EU and Press the RETURN Key.

After you make all the necessary changes to the system parameters, press the ESC key, type EU, and press the RETURN key. This command ends the EDIT program and saves the file. The system prints the name of the output file.

```
*EU<RET>
```

```
[<NEW-SYSTEM>6-CONFIG.CMD.1]
```

NOTE

Before bringing up the system under Version 6, you should check the Version 6 PTYCON.ATO file against the Version 5.1 PTYCON.ATO file. You do not have to compare these files if you have not changed the Version 5.1 file. However, if you have made your own changes to the Version 5.1 PTYCON.ATO file and you wish those changes to exist under Version 6.0, you must add the changes to the Version 6.0 PTYCON.ATO.

A.1.4 Setting a User Group for the Operator

You must be certain that the operator is a member of user group 100. Do so by giving the following command.

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Step 42: Give the Command: ^ECREATE (DIRECTORY NAME) PS:<OPERATOR>
and Press the RETURN Key.

Type CTRL/E CREATE and press the ESC key. The system prints (DIRECTORY NAME). Type PS:<OPERATOR> and press the RETURN key. The system prints [Old], then the subcommand prompt.

```
CTRL/E  ESC
!      !
$^ECREATE (DIRECTORY NAME) PS:<OPERATOR><RET>
[Old]
$$
```

Step 43: Type USER 100 and Press the Return Key.

At the subcommand prompt type USER, press the space bar, then type 100. Press the RETURN key.

```
$$USER 100<RET>
$$
```

Step 43A: Give the subcommand: IPCF and Press the RETURN key.

```
$$IPCF<RET>
$$
```

Step 44: Press the RETURN Key.

To exit from the subcommand level, press the RETURN key.

```
$$<RET>
$
```

Step 45: Give the Command: ^ECEASE (TIMESHARING AT) +1 (RESUMING AT)
Date and Time and Press the RETURN Key.

To bring the system down, type CTRL/E CEASE and press the ESC key. The system prints (TIMESHARING AT). Type +1 and press the ESC key. The system prints (RESUMING AT). Type the date and time and press the RETURN key.

```
CTRL/E  ESC          ESC
!      !              !
$^ECEASE (TIMESHARING AT) +1 (RESUMING AT) date and time<RET>
System shutdown scheduled for 2-MAR-84 13:47:00,
System going down in one minute!!
System down, up again at 2-MAR-84 13:48:00
```

Shutdown complete

NOTE

Wait for the system to print Shutdown complete.

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Step 46: Type CTRL/\
.

At the console terminal, type CTRL/\
 to return to the front-end
Command Parser. When you are at Command Parser command level, the
system prints the prompt PAR>.

```
Shutdown complete
CTRL/\  
PAR>
```

Step 47: Type SHUTDOWN and Press the RETURN Key.

To stop the TOPS-20 monitor, type SHUTDOWN and press the RETURN key.
The system prints a list of messages.

```
PAR>SHUTDOWN<RET>
** HALTED **
%DECSYSTEM-20 NOT RUNNING
```

Step 48: Type CTRL/\
.

Type CTRL/\
 to return to the front-end Command Parser. Because the
system is not running now, you will see the prompt PAR%. If you see
the prompt PAR> instead, go back to Step 46.

```
CTRL/\  
PAR%
```

Step 49: Type MCR PIP and Press the RETURN Key.

To load the PIP program and start it, type MCR PIP and press the
RETURN key. After 1 second, PIP is ready for you to type commands.
The system prints the prompt PIP>:

```
PAR%MCR PIP<RET>

PIP>
```

Step 50: Type KL.CFG;*/DE and Press the RETURN Key.

You must delete any existing front-end configuration file from your
front-end file system before bringing up the Version 5.1 front-end
monitor.

```
PIP>KL.CFG;*/DE<RET>
PIP>
```

NOTE

If the system prints PIP -- NO SUCH FILE(S), then you
did not have a front-end configuration file in your
front-end file system. Proceed with Step 51.

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Step 51: Type CTRL/Z and CTRL/\.

To end PIP and return to the front-end Command Parser, type CTRL/Z followed by CTRL/\.

```
CTRL/Z
|
|
PIP>^Z
CTRL/\
PAR%
```

Step 52: Mount Version 6.0 System Floppy A in Floppy Drive 0 and Version 6.0 System Floppy B in Floppy Drive 1.

Step 53: Set the Switch Register to 000007 (Switches 0, 1, and 2 Up), and Press the ENABLE and SWITCH-REGISTER Buttons Simultaneously.

To bring up the Version 6 front-end file system, press the ENABLE and SWITCH-REGISTER buttons simultaneously. The system prints:

```
RSX-20F VB15-20 6:11 5-MAR-84
[SYO: REDIRECTED TO DX0:]
[DX0: MOUNTED]
[DX1: MOUNTED]
```

```
KLI -- Version VB15-12 RUNNING
KLI -- KL10 S/N:2102., MODEL B, 60 HERTZ
KLI -- KL10 HARDWARE ENVIRONMENT:
      MOS MASTER OSCILLATOR
      EXTENDED ADDRESSING
      INTERNAL CHANNELS
      CACHE
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>
```

Step 54: Type NO and Press the RETURN Key.

To tell the front-end monitor that you want it to take default answers to dialog questions, type NO and press the RETURN key. The front end prints messages as the system is reloaded, and the bootstrap program gives the BOOT> prompt.

```
KLI -- ENTER DIALOG [NO,YES,EXIT,BOOT]?
KLI>NO<RET>
KLI -- MICROCODE Version 352 LOADED
KLI -- % NO FILE - ALL MEMORY BEING CONFIGURED
```

```
LOGICAL MEMORY CONFIGURATION.
ADDRESS  SIZE  INT TYPE CONTROLLER
00400000 768K  4  MF20  11
```

```
KLI -- % NO FILE - LOADING BOOTSTRAP
KLI -- CONFIGURATION FILE ALTERED
KLI -- BOOTSTRAP LOADED AND STARTED
```

```
BOOT V10.0(167)
[BOOT:LOADING] [OK]
```

```
BOOT>
```

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Step 55: Press the RETURN Key.

To tell the bootstrap program to restart the system, press the RETURN key. The system prints [PS MOUNTED] and System restarting, wait... before prompting for the date and time.

BOOT><RET>

[PS MOUNTED]

System restarting, wait...

ENTER CURRENT DATE AND TIME:

Step 56: Type the Date and Time, Then Press the RETURN Key.

After the prompt, type the date and time in the format day-month-year hhmm. Then press the RETURN key.

ENTER CURRENT DATE AND TIME: 5-MAR-84 1112<RET>

The system prints

YOU HAVE ENTERED WEDNESDAY, 5-MARCH-84 11:12AM, IS THIS CORRECT (Y,N)

Step 57: Type Y or N and Press the RETURN Key.

If you have entered the correct date and time, type Y and press the RETURN key. Otherwise, type N and press the RETURN key. The system will ask for the date and time again.

IS THIS CORRECT (Y,N) Y<RET>

The system prints

WHY RELOAD?

Step 58: Type NEW and Press the RETURN Key.

WHY RELOAD? NEW<RET>

The system prints

<SYSTEM>ACCOUNTS-TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED

RUN CHECKD?

NOTE

The system prints the message SYSTEM ACCOUNTS TABLE.BIN NOT FOUND - ACCOUNT VALIDATION IS DISABLED because the ACTGEN program has not been run. (Refer to Chapter 6 of the TOPS-20 System Manager's Guide for more information.)

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Step 59: Type N and Press the RETURN Key.

The CHECKD program examines the entire disk file system, reports any errors, and tries to correct the errors. You do not have to run the program unless the system crashes unexpectedly or you suspect that there may be disk errors. Type N and press the RETURN key. The system runs the DDMP program. The DDMP program is a background task that moves pages from the disk swapping area to the disk file system.

RUN CHECKD? N<RET>

RUNNING DDMP.

SYSJOB 6(10) STARTED AT 5-MAR-84 1112
 RUN SYS:ORION
 RUN SYS:QUASAR

5-MAR-84 11:12:09 - TGHA V2(6) IS RUNNING FOR THE FIRST TIME.

RUN SYS:MOUNTR
 RUN SYS:INFO
 RUN SYS:MAILER
 RUN SYS:MAPPER
 RUN SYS:LPTSPL
 RUN SYS:CDRIVE
 RUN SYS:SPRINT
 JOB 0 /LOG OPERATOR XX OPERATOR
 ENA

^ESET LOGIN PSEUDO
 ^ESET LOGIN CONSOLE
 ^ESET OPERATOR

PTYCON
 GET SYSTEM:PTYCON.ATO

/
 JOB 1 /LOG OPERATOR XX OPERATOR
 ENA

RUN SYS:BATCON

/

SJ 0:
 SJ 0: 3/5-INSTALLATION-TEST SYSTEM, TOPS-20 MONITOR 6(5050)
 SJ 1:
 SJ 1: 3/5-INSTALLATION-TEST SYSTEM, TOPS-20 MONITOR 6(5050)
 SJ 0: @LOG OPERATOR OPERATOR
 SJ 1: @LOG OPERATOR OPERATOR
 SJ 0: JOB 1 ON TTY206 5-MAR-84 11:12:22
 SJ 0: @ENA
 SJ 0: \$^ESET LOGIN PSEUDO
 SJ 0: \$^ESET LOGIN CONSOLE
 SJ 0: \$^ESET OPERATOR
 SJ 0: \$PTYCON
 SJ 1: JOB 2 ON TTY207 5-MAR-84 11:12:23
 SJ 1: @ENA
 SJ 0: PTYCON> GET SYSTEM:PTYCON.ATO
 SJ 0: PTYCON> SILENCE
 SJ 1: \$RUN SYS:BATCON

[From OPERATOR on line 210: SYSTEM IN OPERATION]

SJ 0: PTYCON.LOG.1
 SJ 0: PTYCON> W ALL
 SJ 0: OPR(0) 3 OPERATOR OPR TI 0:0:1
 SJ 0: PTYCON> CONN OPR
 SJ 0: [CONNECTED TO SUBJOB OPR(0)]

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

A.2 REVERTING TO VERSION 5.1

If you must revert to running the TOPS-20 Version 5.1 software, follow the steps in this section. If you want the UETP files when you revert to Version 5.1, you must restore the UETP files from either the Version 5.1 Installation Tape or the latest backup tape.

Step 1: Log In to the System with OPERATOR or WHEEL Capabilities.

```
          ESC          ESC          ESC
          |            |            |
@LOGIN (USER) OPERATOR (PASSWORD) password (ACCOUNT) account<RET>
@
```

Step 2: Give the Command: ENABLE (CAPABILITIES) and Press the RETURN Key.

To perform the next step you must enable your capabilities. Type ENABLE and press the ESC key. The system prints (CAPABILITIES). Press the RETURN key.

```
          ESC
          |
@ENABLE (CAPABILITIES)<RET>
$
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 3: Give the Command: RENAME (EXISTING FILES)
PS:<SYSTEM>5-1-MONITR.EXE (TO BE) PS:<SYSTEM>MONITR.EXE and
Press the RETURN Key.

In Section A.1.1, you renamed the Version 5.1 monitor to
PS:<SYSTEM>5-1-MONITR.EXE. If you are reverting to Version 5.1, you
must put this monitor back into PS:<SYSTEM>MONITR.EXE. Type RENAME
and press the ESC key. The system prints (EXISTING FILE). Type
PS:<SYSTEM>5-1-MONITR.EXE and press the ESC key. The system prints
the generation number and (TO BE). Type PS:<SYSTEM>MONITR.EXE and
press the RETURN key. When the rename has been successfully executed,
the system prints a message specifying that the file has been renamed
correctly.

```
          ESC                      ESC
          |                      |
$RENAME (EXISTING FILE) PS:<SYSTEM>5-1-MONITR.EXE (TO BE)
PS:<SYSTEM>MONITR.EXE<RET>

<SYSTEM>5-1-MONITR.EXE.1=> <SYSTEM>MONITR.EXE [OK]
```

NOTE

Before reverting to Version 5-1, examine the
PS:<SYSTEM>5-1-CONFIG.COMD file. Be sure it contains a
definition of logical name SYSTEM:, and that this
definition does not include the directory,
PS:<NEW-SYSTEM>. If it does include the directory,
PS:<NEW-SYSTEM>, when you revert to Version 5-1 the
Version 5-1 monitor attempts to operate programs that
do not function properly in a Version 5-1 system. If
the PS:<SYSTEM>5-1-CONFIG.COMD file does not contain a
definition of logical name SYSTEM:, insert the
following command into the file:

```
DEFINE SYSTEM: PS:<SYSTEM>
```

Step 3A: Give the Command: DELETE PS:<SPOOL>
PRIMARY-MASTER-QUEUE-FILE.QUASAR and Press the RETURN key.

Before reverting to the old GALAXY system, you must delete the master
spooling file. Type DELETE PS:<SPOOL>PRIMARY- and press the ESCAPE
key. The system prints MASTER-QUEUE-FILE.QUASAR.1 and gives a message
verifying the deletion.

```
          <ESC>
          |
$DELETE PS:<SPOOL>PRIMARY-MASTER-QUEUE-FILE.QUASAR<RET>
PS:<SPOOL>PRIMARY-MASTER-QUEUE-FILE.QUASAR.1 [OK]
$
```

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Step 4: Give the Command: ^E (TIMESHARING AT) Date and Time (RESUMING AT) Date and Time and Press the RETURN Key.

To bring the system down, type CTRL/E CEASE and press the ESC key. The system prints (TIMESHARING AT). Type the date and time and press the ESC key. The system prints (RESUMING AT). Type the date and time you want timesharing to start again and press the RETURN key. The system prints a list of messages; the last message is Shutdown complete.

```
CTRL/E  ESC                               ESC
  |      |                               |
  |      |                               |
  $^E (TIMESHARING AT) date and time (RESUMING AT) date and time<RET>

Shutdown complete
```

Step 5: Type CTRL/\
.

At the console terminal, type CTRL/\
 to return to the front-end Command Parser. When you are at Command Parser command level, the system prints the prompt PAR>.

```
CTRL/\  
PAR>
```

Step 6: Type SHUTDOWN and Press the RETURN Key.

To stop the TOPS-20 monitor, type SHUTDOWN and press the RETURN key. The system prints a list of messages.

```
PAR>SHUTDOWN<RET>
** HALTED **
```

```
%DECSYSTEM-20 NOT RUNNING
```

Step 7: Reload the Version 5.1 Monitor Using the Version 5.1 Floppies or the Version 5.1 Disk.

To reload the Version 5.1 monitor using the Version 5.1 floppies, mount System Floppy A in floppy drive 0, press the ENABLE and FLOPPY buttons simultaneously, and answer the usual start-up questions.

To reload the Version 5.1 monitor using the Version 5.1 disk, press the ENABLE and DISK buttons simultaneously, and answer the usual start-up questions.

NOTE

You can reload the Version 5.1 monitor from disk only if the Version 5.1 front-end software is still on the disk.

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

A.3 MAKING THE VERSION 6.0 MONITOR THE PRIMARY MONITOR

In case you are presently using the Version 5-1 monitor, you must rename it in Step 4, below, before copying the Version 6.0 monitor into <SYSTEM>MONITR.EXE.

Step 1: Log in to the System with OPERATOR or WHEEL Capabilities.

```
          ESC          ESC          ESC
          |            |            |
@LOGIN (USER) OPERATOR (PASSWORD) password (ACCOUNT) account<RET>
@
```

Step 2: Give the Command: ENABLE (CAPABILITIES) and Press the RETURN Key.

To perform the next few steps you must enable your capabilities. Type ENABLE and press the ESC key. The system prints (CAPABILITIES). Press the RETURN key.

```
          ESC
          |
@ENABLE (CAPABILITIES)<RET>
$
```

Step 3: STOP.

Proceed with Step 4 if you have reverted to a Version 5.1 system, and your present monitor is a Version 5.1 monitor. You must rename this monitor in Step 4 in case you ever need to revert to Version 5.1 again.

Skip to Step 6 if your present monitor is a Version 6.0 monitor. You do not need to rename your present monitor in Step 4. This action was already performed in Section A.1.1, Step 37.

Step 4: Give the Command: RENAME (EXISTING FILE) PS:<SYSTEM>MONITR.EXE (TO BE) PS:<SYSTEM>5-MONITR.EXE and Press the RETURN Key.

To rename and save the Version 5.1 monitor, type RENAME and press the ESC key. The system prints (EXISTING FILE). Type PS:<SYSTEM>MONITR.EXE and press the ESC key. The system prints (TO BE). Type PS:<SYSTEM>5-1-MONITR.EXE. When the Version 5.1 monitor is successfully renamed, the system prints a message specifying that the file has been renamed correctly. Continue with Step 5.1.

```
          ESC          ESC
          |            |
$RENAME (EXISTING FILE) PS:<SYSTEM>MONITR.EXE (TO BE)
PS:<SYSTEM>5-1-MONITR.EXE<RET>

<SYSTEM>MONITR.EXE.1 => <SYSTEM>5-1-MONITR.EXE.1 [OK]
```

\$

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Step 5: Give the Command: COPY (FROM) PS:<NEW-SYSTEM>montyp.EXE (TO) PS:<SYSTEM> MONITR.EXE and Press the RETURN Key.

To copy the Version 6.0 monitor into PS:<SYSTEM>, type COPY and press the ESC key. The system prints (FROM). Type PS:<NEW-SYSTEM> montyp.EXE and press the ESC key. (Montyp designates the type of monitor you have selected for your system.) The system prints (TO). Type PS:<SYSTEM>MONITR.EXE and press the RETURN key. When the copy is successfully completed, the system prints a message specifying that the file was copied correctly.

```
ESC          ESC
|           |
$COPY (FROM) PS:<NEW-SYSTEM>montyp.EXE (TO) PS:<SYSTEM>MONITR.EXE<RET>
<NEW-SYSTEM>montyp.EXE. => <SYSTEM>MONITR.EXE.1 [OK]
```

Step 6: Give the Command: ^ECEASE (TIMESHARING AT) Date and Time (RESUMING AT) Date and Time and Press the RETURN key.

Shut down the system by typing CTRL/E CEASE and pressing the ESC key. The system prints (TIMESHARING AT). Type the date and time you want timesharing to cease and press the ESC key. The system prints (RESUMING AT). Type the date and time you want timesharing to start again and press the RETURN key.

```
CTRL/E  ESC          ESC
|       |           |
$^ECEASE (TIMESHARING AT) date and time (RESUMING AT)
date and time<RET>
```

Step 7: Put the Version 6.0 Front-End Software on Disk.

Start at Step 112 of this manual to put the Version 6.0 front-end software on disk.

NOTE

When the Version 6.0 front-end software is put on disk, the Version 5.1 front end is destroyed. In order to use the Version 5.1 front-end software again, you must reinstall it using the Version 5.1 floppies.

A.4 MAKING THE VERSION 6.0 MONITOR THE PERMANENT MONITOR

The steps in this section should be performed when you feel comfortable with the Version 6.0 software.

Step 1: Log In to the System with OPERATOR or WHEEL Capabilities.

```
ESC          ESC          ESC
|           |           |
@LOGIN (USER) OPERATOR (PASSWORD) password (ACCOUNT) account<RET>
@
```

UPDATING THE DECSYSTEM TO TOPS-20 VERSION 6.0 SOFTWARE

Step 2: Give the Command: ENABLE (CAPABILITIES) and Press the RETURN Key.

To perform the next step you must enable your capabilities. Type ENABLE and press the ESC key. The system prints (CAPABILITIES). Press the RETURN key.

```
ESC
|
@ENABLE (CAPABILITIES)<RET>
```

Step 3: Give the Command: COPY (FROM) PS:<NEW-SYSTEM>*. * (TO) PS:<SYSTEM>*. * and Press the RETURN Key.

To copy the directory <NEW-SYSTEM> to <SYSTEM>, type COPY and press the ESC key. The system prints (FROM). Type PS:<NEW-SYSTEM>*. * and press the ESC key. The system prints (TO). Type PS:<SYSTEM> and press the ESC key. The system prints *. *. Press the RETURN key. The system prints a message specifying that each file has been copied correctly.

```
ESC          ESC          ESC
|            |            |
$COPY (FROM) PS:<NEW-SYSTEM>*. * (TO) PS:<SYSTEM>*. *<RET>
```

Step 4: Give the Command: COPY (FROM) PS:<NEW-SUBSYS>*. * (TO) PS:<SUBSYS> and Press the RETURN Key.

To copy the directory <NEW-SUBSYS> to <SUBSYS>, type COPY and press the ESC key. The system prints (FROM). Type PS:<NEW-SUBSYS>*. * and press the ESC key. The system prints (TO). Type PS:<SUB and press the ESC key. The system prints SYS>*. *. Press the RETURN key. The system prints a message specifying that each file has been copied correctly.

```
ESC          ESC
|            |
$COPY (FROM) PS:<NEW-SUBSYS>*. * (TO) PS:<SUBSYS>*. *<RET>
```

Step 5: Give the Command: CONNECT (TO DIRECTORY) PS:<SYSTEM> and Press the RETURN Key.

Connect to the directory PS:<SYSTEM> by typing CONNECT and pressing the ESC key. The system prints (TO DIRECTORY). Type PS:<SYSTEM> and press the RETURN key.

```
ESC
|
$CONNECT (TO DIRECTORY) PS:<SYSTEM><RET>
$
```

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| Step 6: Give the Command: EDIT (FILE) PS:<SYSTEM>6-CONFIG.CMD and Press the RETURN Key.

| To edit the 6-CONFIG.CMD file, type EDIT and press the ESC key. The system prints (FILE). Type PS:<SYSTEM>6-CONFIG.CMD and press the RETURN key.

```
      ESC
      |
      | $EDIT (FILE) PS:<SYSTEM>6-CONFIG.CMD<RET>
```

The system prints:

```
| EDIT: 6-CONFIG.CMD
| *
```

Step 7: Give the EDIT Command: P^:* and Press the RETURN Key.

| To print the entire 6-CONFIG.CMD file, type P^:* and press the RETURN key.

```
*P^:*<RET>
```

Step 8: Give the EDIT Command: R Line Number and Press the RETURN Key.

The parameters DEFINE SYS: PS:<NEW-SUBSYS>, PS:<SUBSYS> and SYSTEM: PS:<NEW-SYSTEM>, PS:<SYSTEM> must be replaced by DEFINE SYS: PS:<SUBSYS> DEFINE SYSTEM: PS:<SYSTEM> respectively. To do this, type an R and the line number where DEFINE SYS: PS:<NEW-SUBSYS>, PS:<SUBSYS> is located; then press the RETURN key. Do the same thing for SYSTEM: The system prints the line number you entered in the R command. In the example below, the parameter is located at line 00500.

```
*R500<RET>
```

The system prints

```
. 00500
```

Step 9: Type DEFINE SYSTEM: PS:<SYSTEM> and Press the RETURN Key.

To define SYSTEM: as PS:<SYSTEM>, type DEFINE SYSTEM: PS:<SYSTEM> and press the RETURN key. Also, be sure to use the EDIT program's D command to delete any line giving another definition of SYSTEM:.

```
00500 DEFINE SYSTEM: PS:<SYSTEM><RET>
```

The system prints

```
1 LINES (00500/1) DELETED
*
```

Step 10: Type EU and Press the RETURN Key.

| To end the EDIT program and save the file, type EU and press the RETURN key. The system prints <SYSTEM>6-CONFIG.CMD.2 and the TOPS-20 command prompt.

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*EU<RET>
| <SYSTEM>6-CONFIG.COMD.2
\$

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Step 11: Give the Command: CONNECT and Press the RETURN Key.

Connect back to your log-in directory by typing CONNECT and pressing the RETURN key.

```
$CONNECT<RET>
$
```

Step 12: Give the Command: DELETE (FILES) PS:<NEW-SYSTEM>*.*.* and Press the RETURN Key.

To delete the files in the directory PS:<NEW-SYSTEM>, type DELETE and press the ESC key. The system prints (FILES). Type PS:<NEW-SYSTEM>*.*.* and press the RETURN key. The system prints an [OK] message for each file it deletes.

```
ESC
|
$DELETE (FILES) PS:<NEW-SYSTEM>*.*.*<RET>
.
.
.
.
.
.
.
$
```

Step 13: Give the Command: DELETE (FILES) PS:<NEW-SUBSYS>*.*.* and Press the RETURN Key.

To delete the files in the directory PS:<NEW-SUBSYS>, type DELETE and press the ESC key. The system prints (FILES). Type PS:<NEW-SUBSYS>*.*.* and press the RETURN key. The system prints an [OK] message for each file it deletes.

```
ESC
|
$DELETE (FILES) PS:<NEW-SUBSYS>*.*.* <RET>
.
.
.
.
.
.
.
.
.
.
$
```

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Step 14: Give the Command: ^ECEASE (TIMESHARING AT) Date and Time
(RESUMING AT) Date and Time and Press the RETURN Key.

Shut down the system by typing CTRL/E CEASE and press the ESCAPE key. The system prints (TIMESHARING AT). Type the date and time you want timesharing to cease and press the ESCAPE key. The system prints (RESUMING AT). Type the date and time you want timesharing to start again and press the RETURN key. The system prints a list of messages. The last message is Shutdown complete.

```
CTRL/E ESC          ESC
  |           |           |
  |           |           |
$^ECEASE (TIMESHARING AT) date and time (RESUMING AT)
date and time<RET>
```

Shutdown complete

Step 15: Type CTRL/\
.

At the console terminal, type CTRL/\
 to return to the front-end Command Parser. When you are at Command Parser command level, the system prints the prompt PAR>.

```
Shutdown complete
CTRL/\  
PAR>
```

Step 16: Type SHUTDOWN and Press the RETURN Key.

To stop the TOPS-20 monitor, type SHUTDOWN and press the RETURN key. The system prints a list of messages.

```
PAR>SHUTDOWN<RET>
** HALTED **

%DECSYSTEM-20 NOT RUNNING
```

Step 17: Press the ENABLE and DISK Buttons Simultaneously.

| To run the Version 6.0 software from disk, press the ENABLE and DISK
| buttons simultaneously. Follow the steps in Chapter 5 of this manual.

NOTES

1. If you ever need to revert to Version 5.1, you must reinstall Version 5.1, using the Version 5.1 floppies and tapes.
2. If you are installing any unbundled software, perform the steps specified in the appropriate installation guide that accompanies each optional software product.

| Step 18: Start Timesharing.

APPENDIX B

TAILORING YOUR SYSTEM FOR ARPANET

Perform the steps in this appendix only if you are using the ARPA network.

At this point you have installed the ARPANET software.

Step 1: Give the Command: CONNECT (TO DIRECTORY) PS:<SYSTEM> and Press the RETURN Key.

If you are part of the ARPA network, you must add your Internet Address to the SITE-ADDRESS.TXT file. Type CONNECT and press the ESC key. The system prints (TO DIRECTORY). Type PS:<SYSTEM> and press the RETURN key.

```
ESC
|
$CONNECT (TO DIRECTORY) PS:<SYSTEM><RET>
$
```

Step 2: Give the Command: EDIT (FILE) SITE-ADDRESS.TXT.1 and Press the RETURN Key.

If you are using the ARPA network you must enter your Internet address into the SITE-ADDRESS.TXT file. To do this, type EDIT and press the ESCAPE key. The system prints (FILE). Type SITE-ADDRESS.TXT and press the RETURN key.

```
<ESC>
|
$EDIT (FILE) SITE-ADDRESS.TXT<RET>
```

Step 3: Give the EDIT Command: I line-number and Press the RETURN key.

To insert the Internet address into the SITE-ADDRESS.TXT file type I followed by the line number you selected then press the RETURN key.

```
*I2150<RET>
02150
```

Step 4: Type Your Internet Address Number and Press the RETURN Key.

Type your Internet Address and press the RETURN key.

```
02150 AN20 0, n n n n, PACKET:1004<RET>
*
```

TAILORING YOUR SYSTEM FOR ARPANET

where n n n n = the decimal octets number of the Internet address.

Step 5: Type EU and Press the RETURN Key.

To save the file without the line numbers, type EU and press the RETURN key.

```
*EU<RET>  
[SITE-ADDRESS.TXT.1]  
$
```

APPENDIX C

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

C.1 INTRODUCTION

This appendix shows you how to generate a TOPS-20 batch and spooling (GALAXY) system specifically tailored for your installation. To do this you must have already installed a standard Release 5 GALAXY system. The standard GALAXY system is satisfactory for most sites. The procedures shown in Chapters 1 through 7 of this manual, or in Appendix A or B, show you how to install Release 6.0 TOPS-20 software, including a standard Release 5 GALAXY system. After performing those procedures, you can use the steps in this appendix if you need to generate a GALAXY system having different parameters from the standard one.

NOTE

While the steps in generating a tailored Release 5 GALAXY system can be used with timesharing users logged in, the critical phase of stopping the standard Release 5 system and starting up your tailored one (Steps 29-56) should, for safety reasons, be performed on a stand-alone system. The queues need not be empty, however, as long as a Release 5 (as opposed to Release 4.2 or earlier) GALAXY system is already running.

The following paragraphs summarize the procedure for generating and starting up a new GALAXY system. The actual steps you would perform are shown in the next section.

1. Run the DUMPER program to transfer the GALAXY source files from the TOPS-20 bundled system software tape (also called the TOPS-20 Distribution Tape) to a disk directory. This directory is referred to as the build area. In addition to the source code, this directory contains a special batch control file called GALAXY.CTL.
2. Run the GALGEN program to create a file containing the new GALAXY system parameters. The name of the parameter file is GALCNF.MAC.

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

3. Submit the control file GALAXY.CTL to your currently running batch system. The batch job that is created by GALAXY.CTL reads the parameter file created by GALGEN and generates a new set of GALAXY files of type .EXE in a temporary area. The batch job creates a log file that should be saved for reference, at least until the new GALAXY system is correctly operating.
4. Stop all the components of the currently running GALAXY system (QUASAR, LPTSPL, etc.).
5. Copy all old GALAXY files from their current area (usually SYS:) to some other area.
6. Copy all new GALAXY files from the temporary area to SYS:.
7. Start up the components of the new batch system.
8. When you are sure that the new batch system is operating correctly, you can delete the .EXE files of the old system. If you want to be cautious, you can save the old .EXE files on tape. You can also delete the GALAXY source files (and the unrelated files restored along with them from the Distribution Tape) from the build area. However, if your installation can spare the disk space, it is more convenient to leave the sources on disk. Then, if any code patches must be made to the batch system, you have the sources readily available. Otherwise, you have to restore the sources from the software tape if patching is required.

NOTE

The procedures described below assume that you have a Release 5 GALAXY system currently running. These procedures can be carried out during normal timesharing.

C.2 RESTORING THE GALAXY FILES

NOTE

These procedures assume that you are using the console terminal (CTY) and are attached to the system PTYCON job.

Step 1: Give the Command: WHAT ALL and Press the RETURN Key.

To find out which PTYCON subjob is running the OPR program, give the PTYCON command WHAT ALL and press the RETURN key. The system responds with a list of PTYCON subjobs, followed by the PTYCON> prompt.

```
PTYCON>WHAT ALL<RET>
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 2: Give the Command: CONNECT (TO SUBJOB) 0 and Press the RETURN Key.

To connect to the subjob running the OPR program, type CONNECT and press the ESC key. The system prints (TO SUBJOB). Type OPR and press the RETURN key. The system prints the OPR prompt.

```
      ESC
      |
PTYCON>CONNECT (TO SUBJOB) OPR<RET>

OPR>
```

Step 3: Give the Command: SHOW STATUS TAPE-DRIVE /ALL and Press the RETURN Key.

To find out which tape drives are not in use, give the SHOW STATUS TAPE-DRIVE /ALL command, and press the RETURN key. The system responds with a list of tape drives and their status.

```
OPR>SHOW STATUS TAPE-DRIVE /ALL<RET>
```

Step 4: Give the Command: SET TAPE-DRIVE MTAO: UNAVAILABLE and Press the RETURN Key.

To allow the use of a tape drive without the intervention of the MOUNTR program, give the command SET TAPE-DRIVE, and insert the number of a tape drive that is not presently in use (MTAO: is only an example). Type UNAVAILABLE and press the RETURN key. The system prints, Enter Text and Terminate with ^Z.

```
OPR>SET TAPE-DRIVE MTAO: UNAVAILABLE<RET>
```

Enter Text and Terminate with ^Z

Error: If you see an error message similar to ?Tape drive allocation is not enabled, your site does not have tape drive allocation enabled. Therefore, you do not have to set any drives unavailable. Skip to Step 6.

Step 5: Type USING GALGEN PROCEDURE ^Z.

To give a reason for setting a tape drive unavailable, enter USING GALGEN PROCEDURE and type a CTRL/Z. The system prints ^Z and gives the OPR> prompt.

Enter Text and Terminate with ^Z

```
      <CTRL/Z>
      |
USING GALGEN PROCEDURE ^Z

OPR>
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 6: Type PUSH and Press the RETURN key.

Type PUSH to move to another level and press the RETURN key.

```
OPR>PUSH<RET>  
@
```

Step 7: Type ASSIGN MTA0: and Press the RETURN Key.

Assign to your job the tape drive that you set unavailable in Step 4.

```
@ASSIGN MTA0:<RET>  
@
```

NOTE

The examples in this manual show MTA0: as the tape drive used to restore files from the Distribution Tape. However, you can assign and use any tape drive. Be sure to use the name of the tape drive you assign in this step whenever MTA0: appears in this appendix.

Step 8: Type ENABLE and Press the RETURN Key.

```
@ENABLE<RET>  
$
```

Step 9: Give the Command: ^ECREATE (DIRECTORY NAME) PS:<BUILD> and Press the RETURN Key.

Create a directory to hold the GALAXY source files. Although you can give it any name, a reasonable name for this directory is PS:<BUILD>, because it is also known as the build area. Type CTRL/E CREATE and press the ESC key. The system prints (DIRECTORY NAME). Type PS:<BUILD> and press the RETURN key. The system prints [NEW] and the subcommand prompt (\$\$).

```
CTRL/E ESC  
! !  
$^ECREATE (DIRECTORY NAME) PS:<BUILD><RET>  
[NEW]  
$$
```

Step 10: Give the Subcommands: WORKING 3000 and PERMANENT 3000 and Press the RETURN Key.

Assign sufficient storage space to the directory to allow copying of the entire fourth save set (not just the GALAXY sources). Then complete the command with a final carriage return.

```
$$WORKING 3000<RET>  
$$PERMANENT 3000<RET>  
$$<RET>  
$
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 11: Mount the Distribution Tape on MTA0:.

To restore the GALAXY files from tape, mount the Distribution Tape (the TOPS-20 bundled system software tape) on the tape drive you assigned in Step 7. If you need help, refer to Chapter 2, Section 2.1.1, Step 9, of this manual.

Step 12: Type DUMPER and Press the RETURN Key.

You need the DUMPER program to restore the GALAXY source files from tape. Type DUMPER and press the RETURN key. The system prints the DUMPER> prompt.

```
$DUMPER<RET>
```

```
DUMPER>
```

Step 13: Give the Command: TAPE (DEVICE) MTA0: and Press the RETURN Key.

To tell the DUMPER program the tape drive you are using, type TAPE and press the ESC key. The system prints (DEVICE). Type the name of the tape drive on which you mounted the Distribution tape in Step 16 (MTA0: is only an example). Press the RETURN key. The system prints the DUMPER> prompt.

```
ESC
```

```
!
```

```
DUMPER>TAPE (DEVICE) MTA0:<RET>
```

```
DUMPER>
```

Step 14: Give the Command: SKIP 3 and Press the RETURN Key.

To skip over the first three save sets on the Distribution Tape, give the command SKIP 3 and press the RETURN key. The DUMPER program prints a message identifying each save set it skips, and then gives the DUMPER> prompt. Be prepared for a 5- to 10-minute wait while DUMPER positions the tape.

```
DUMPER>SKIP 3<RET>
```

```
DUMPER>
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 15: Give the Command: RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<BUILD>*** and Press the RETURN Key.

To restore all the files from the fourth save set (including the GALAXY source files), type RESTORE and press the ESC key. The system prints (TAPE FILES). Type PS: and press ESC. The system prints <*>*** (TO). Type PS:<BUILD> and press ESC. The system prints ***. Press the RETURN key. The system prints a message identifying the tape and then the message, Loading file(s) into PS:<BUILD>. Be prepared for a wait of approximately 10 minutes between this message and the next DUMPER> prompt.

```

                ESC                ESC                ESC
                |                |                |
DUMPER>RESTORE (TAPE FILES) PS:<*>*** (TO) PS:<BUILD>***<RET>

```

Error: If DUMPER does not print a message identifying the save set as "Language Sources for TOPS-20 V6.0", the tape is not positioned at the correct save set. Give the REWIND cmdmd to DUMPER and begin again at Step 14.

Error: If the message, Loading files into PS:<BUILD>, does not appear, no files are being restored from tape. Be sure that the correct tape is mounted on the tape drive you have assigned to your job. Then begin again at Step 9. If errors persist, the tape may be bad. Contact your DIGITAL Field Service Representative for assistance.

Step 16: Give the DUMPER Commands: REWIND and EXIT.

Once the fourth save set has been restored from tape, rewind the tape and exit from DUMPER. Give the DUMPER command REWIND, and press the RETURN key. The DUMPER program prints the DUMPER> prompt. Give the DUMPER command EXIT. The DUMPER program finishes, and the system prints the TOPS-20 enabled prompt (\$).

```
DUMPER>REWIND<RET>
```

```
DUMPER>EXIT<RET>
```

```
$
```

Step 17: Give the Command: INFORMATION (ABOUT) DISK-USAGE (OF DIRECTORY) PS:<BUILD> and Press the RETURN Key.

To verify that you have restored all the files from the fourth save set of the TOPS-20 Distribution Tape, type INFO and press the ESCAPE key; the system prints RMATION (ABOUT). Type DIS and press the ESCAPE key; the system prints K-USAGE (OF DIRECTORY). Type PS:<BUILD> and press the RETURN key. The system prints information about the amount of disk space used by the directory.

```

<ESC>                <ESC>
  |                |
$INFORMATION (ABOUT) DISK-USAGE (OF DIRECTORY) PS:<BUILD><RET>
PS:<BUILD>
2865 Pages assigned
3000 Working, 3000 Permanent pages allowed
7971 Pages free on PS:
$

```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 18: STOP.

If the number of pages assigned does not approximately match the number shown in this manual, you may not have restored all the files necessary for creating a GALAXY system. Check to be sure you have the correct tape mounted, then begin again at Step 12.

Step 19: Give the Commands: UNLOAD (DEVICE) MTAO: and DEASSIGN (DEVICE) MTAO: and Press the RETURN Key.

Once the GALAXY source files have been restored from the Distribution Tape, you should unload the tape and return the tape drive to the pool of available resources. Type UNLOAD and press the ESC key; the system prints (DEVICE). Type MTAO: (or the name of the tape drive on which you mounted the Distribution Tape in Step 11) and press the RETURN key. The system prints the TOPS-20 enabled prompt (\$). Type DEASSIGN and press the ESC key; the system prints (DEVICE). Type MTAO: and press the RETURN key. The system prints the TOPS-20 enabled prompt.

```
ESC
|
$UNLOAD (DEVICE) MTAO:<RET>
|
<ESC>
|
$DEASSIGN (DEVICE) MTAO:<RET>
|
$
```

You can now remove the Distribution Tape from the tape drive. If you need help, refer to Chapter 2, Section 2.5, Step 57 of this manual.

Step 20: STOP.

If in Step 4 you set unavailable the tape drive you used, you should make it available again to timesharing users: go on to Step 21. Otherwise, skip to Step 24.

Step 21: Type POP and Press the RETURN Key.

To return the tape drive to the pool of tape drives under control of the MOUNTR program, you must return to the previous level. Type POP and press the RETURN key. The system prints the OPR> prompt.

```
$POP<RET>
OPR>
```

Step 22: Give the Command: SET TAPE-DRIVE MTAO: AVAILABLE and Press the RETURN Key.

```
OPR>SET TAPE-DRIVE MTAO: AVAILABLE<RET>
OPR>
```

Step 23: Give the Command: PUSH and Press the RETURN Key.

```
OPR>PUSH<RET>
$
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

C.3 RUNNING THE GALGEN PROGRAM

Step 24: Type GALGEN and Press the RETURN Key.

You must run the GALGEN program to create the GALAXY configuration file PS:<BUILD>GALCNF.MAC, which will contain the parameters describing the tailored GALAXY system you are building. Type GALGEN and press the RETURN key. The GALGEN program responds by giving its name and version number, and then printing several paragraphs of information.

```
$GALGEN<RET>
```

```
GALGEN Version 5(2031)
```

```
[Starting GALAXY Generation Procedure for TOPS-20 System]  
[Writing GALAXY Configuration File PS:<BUILD>GALCNF.MAC.3]
```

In the following dialog, all questions are of the form:

```
Text of question (List or range of answers) [Default answer]
```

The line starts with the actual text of the question. Following the question is a description of the possible answers enclosed in parentheses. This description might be a range of numbers, a list of keywords, or a textual description. Following this description is the default answer, enclosed in square brackets. The default will be assumed if you only press the RETURN key.

You have the choice of carrying on a LONG dialog in which an explanation of each question is provided automatically, or a SHORT dialog in which it is assumed that you are familiar with the GALAXY generation procedure. In either case, you can always obtain the help text by typing a question mark (?) in response to any question.

Answer the following question either LONG (for a long dialog) or SHORT (for a short one). Simply pressing the RETURN key implies SHORT.

```
Dialog Length (SHORT, LONG) [SHORT]
```

Step 25: STOP.

You have the option of a long dialog, in which GALGEN explains the choices it offers you, or a short one, in which only the choices themselves are displayed. If you are an experienced user of GALGEN, you may want the short dialog, which is faster; in this case, press the RETURN key and skip to Step 35.

Step 26: Type LONG and Press the RETURN key.

To request the long dialog with GALGEN, type LONG and press the RETURN key. GALGEN responds with some information and then the first question about GALGEN parameters.

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 27: Answer the Questions in the GALGEN Display.

GALGEN presents a series of questions, one at a time, for you to answer. If you asked for a long dialog in Step 26, an explanation of each question is included. Otherwise, you see only the questions, the range of choices, and the default answer. The default answer is the one that appears in brackets ([]). This value is used if you answer the question by pressing the RETURN key.

Below is a sample of the dialog you would see if you typed LONG in Step 26. Press the RETURN key when you want to see the next question in the GALGEN dialog.

NOTE

You must supply the correct values for your own system.

Administrative Controls and Parameters

The questions in this section determine absolute GALAXY parameters, which cannot be overridden by user or operator controls.

The system logs all operator interactions in a disk file in the spooling area. Your answer to the following question specifies the name to be used for this file.

Operator log filename(3-20 Characters) [OPERATOR-SYSTEM]

Users can specify a priority for their batch and spooling requests with the /PRIORITY switch. The allowable values on this parameter range between 1 (representing lowest priority) and 63 (representing the highest). The following two questions relate to this switch. The first question requests the maximum priority that may be specified by a non-privileged user.

Maximum priority non-privileged users may specify(10-63) [20]

You can specify the value to be used if the user does not specify a /PRIORITY switch. This value must be between 1 and the maximum that you specified in the previous question.

Default for /PRIORITY on batch and spooling requests(1-63) [10]

This value is to control the number of objects (printers, batch streams, etc.) that can be controlled by a single command in OPR. This value should be at least the maximum number of objects of a single type you may have. The value must be at least 1.

Maximum number of objects that can be controlled with one command (1-100) [6]

Specify the highest number that a batch stream can be on the system. The value must be greater than zero and less than or equal to 10000.

Highest number a batch stream can be on the system (1-10000) [100]

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Applications

The following section establishes parameters for applications supported by GALAXY (for example, NCP). These applications will be accessible through OPR, the operator interface.

You can enable applications through your answers to the following questions.

Will you be running applications?(YES,NO) [YES]

Each application must be associated with an application table name (for example, NCPTAB).

Application name or carriage return to exit(1-20 characters)

Batch Job Defaults

The questions in this section are used to define default values for the various options that a user can specify when submitting a batch job.

The batch user can specify a maximum runtime for his batch job using the /TIME switch. If he does not specify this switch, the following default will be used:

Default batch job runtime limit (5-9999 Seconds) [300]<RET>

Every batch job has maximum limits for each type of spooled output. These limits can be set by the batch user with appropriate switches to the SUBMIT command. If the user doesn't specify these switches, the following defaults will be used:

Line printer output limit(0-9999 pages) [200]
Card punch output limit(0-9999 cards) [1000]
Paper tape punch output limit(0-5000 feet) [200]
Plotter output limit(0-5000 minutes) [30]

The user can specify whether or not the batch log file should be printed after the job terminates by using the /OUTPUT switch to the SUBMIT command. The action is specified by: LOG to always print the log file, NOLOG to never print the log file, and ERROR to print the log file only if the job ended with an unhandled error. If the user doesn't specify this switch, the following value will be used:

Default for batch SUBMIT/OUTPUT (LOG,NOLOG,ERROR) [LOG]

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Line Printer Defaults and Parameters

The questions in this section are used to set default values for the line printer spoolers.

Job banner pages printed at the beginning of each print request. The user's name and any /NOTE value is printed on them.

Number of job banner pages (0-5) [2]

Job trailer pages are printed at the end of each print request. The user's name and any spooler checkpoint information is printed on them.

Number of job trailer pages(0-5) [2]

File header pages are printed before each file or copy in each print request. The file name is printed in BOLD letters on each header page.

Number of file header pages(0-5) [2]

The user can specify a special form for a print request with the /FORMS switch. If this switch is not specified, the following default will be used:

Name for standard output forms (of 4-6 characters) [NORMAL]

The number of characters that uniquely identifies a form is compared with the current form name to determine if a forms change is required for a specific user request.

Number of characters that uniquely identifies form(2-6) [4]

Tape Label Action

The system administrator can allow non-privileged users to bypass label processing.

Allow bypassing for non-privileged users?(YES,NO) [NO]

Miscellaneous Defaults and Parameters

The questions in this section refer to general GALAXY parameters.

The following section establishes default bias and disk-page-to-spooler unit conversion factors.

Do you want the standard limit computation(YES,NO) [YES]

The default action to be taken when output exceeds the specified limit for an output spooler may be to ABORT the job and ignore all remaining output, ASK the operator what to do, or PROCEED to finish processing the job.

Default output-limit-exceeded action(ABORT,ASK,PROCEED) [ASK]
ABORT<RET>

[End of Galgen Dialog]
\$

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

C.4 ASSEMBLING THE NEW GALAXY SYSTEM

Step 28: Give the Command: SUBMIT (BATCH JOB) GALAXY.CTL
/TIME:0:30:00/RESTARTABLE.

In the last step you completed the GALGEN program, which produced the GALAXY parameter file, GALCNF.MAC. This file contains your choice of options for a tailored batch and spooling system. To create this batch and spooling system you must submit the GALAXY control file, GALAXY.CTL, to your present batch system. GALAXY.CTL reads GALCNF.MAC and generates the files and programs for a tailored GALAXY system.

Type SUBMIT and press the ESC key; the system prints (BATCH JOB). Type GALAXY and press the ESC key; the system prints .CTL.1. Type /TIME:0:30:00/RESTARTABLE and press the RETURN key. The system prints a message giving the job name, the request I.D., and the time limit of the batch job.

```
          <ESC>          <ESC>
          |              |
$SUBMIT (BATCH JOB) GALAXY.CTL.1 /TIME:0:30:00/RESTARTABLE<RET>
[Job GALAXY Queued, Request-ID 170, Limit 0:30:00]
$
```

NOTE

If assembly is unsuccessful, examine the appropriate .LOG file to see if you can find the problem. If you can, correct it (which might involve editing the control file), delete the .LOG file, and resubmit the specified .CTL file. If you are unable to determine what caused the failure, consult your systems programmer or software specialist.

When the GALAXY system assembly succeeds, you see a series of messages similar to the following printed on your terminal:

```
LPTSPL ASSEMBLY SUCCESSFUL
```

```
CDRIVE ASSEMBLY SUCCESSFUL
```

```
·
·
·
```

A message is printed for each control file generated.

The new batch system can now be run. However, before you proceed to the next step, it is advisable to check the .LOG files to be sure that no problems arose during batch system generation. It is conceivable that a %-type (warning) error occurred. Such an error might not cause processing of GALAXY.CTL to be unsuccessful, but could create problems later when you attempt to use the new batch system. Therefore, it is important that you correct any problems now, before you stop running the current batch system.

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

C.5 SHUTTING DOWN THE OLD GALAXY SYSTEM

Once you have checked the .LOG files to be sure that no errors occurred during the build procedure, you are ready to stop all old GALAXY programs and start the new ones.

NOTE

During the following steps, Steps 29-56, it is important not to have timesharing users logged in to the system, as their jobs could initiate batch or spooling requests during the critical period of changeover. However, it is acceptable for requests to be present in the queues at the time of Step 29 as long as the old GALAXY system is a Release 5 system.

Step 29: Type POP and Press the RETURN Key.

To return to the OPR program so you can stop the old GALAXY objects type POP and press the RETURN key. The system prints the OPR> prompt.

```
$POP <RET>
```

```
OPR>
```

Step 30: Give the Command: SHOW STATUS and Press the RETURN key.

To determine which GALAXY objects are in use, give the SHOW STATUS command, and press the RETURN key. The system responds with a list of GALAXY objects.

```
OPR>SHOW STATUS
```

```
OPR>
```

```
13:42:58
```

```
-- System Device Status --
```

```
Printer Status:
```

```
Unit      Status
```

```
-----  
0 Idle
```

```
Batch-Stream Status:
```

```
Strm      Status
```

```
-----  
0 Idle  
1 Idle  
2 Idle
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 31: Give SHUTDOWN Commands for Each Component of the GALAXY System.

To be sure that each GALAXY object has been shut down, you must give a SHUTDOWN command for each GALAXY object shown in Step 30.

```

      <ESC>                <ESC>
      |                    |
OPR>SHUTDOWN (SCHEDULING FOR) PRINTER (unit number) 0<RET>

      <ESC>                <ESC>
      |                    |
OPR>SHUTDOWN (SCHEDULING FOR) BATCH-STREAM (stream number) 0:2<RET>

      .
      .
      .
```

Error: If you see a message similar to:--THERE ARE NO DEVICES STARTED--, you can ignore this message and go on to the next SHUTDOWN command. The message means only that your site was not using the specified device.

Step 32: Give the Command: SHOW STATUS and Press the RETURN key.

To verify that all parts of the GALAXY system have been shut down, give the SHOW STATUS command, and press the RETURN key.

```
OPR>SHOW STATUS<RET>
OPR>
13:44:55          -- There are no devices started --
OPR>
```

Step 33: Give the Command: EXIT and Press the RETURN Key.

To return to TOPS-20 command level so you can kill the GALAXY components, type PUSH and press the RETURN key. The system prints the enabled prompt.

```
OPR>EXIT<RET>
$
```

Step 34: Give the Command: ^ESPEAK and Press the RETURN Key.

To kill the GALAXY components you must give the ^ESPEAK command. Type CTRL/E SPEAK and press the RETURN key. The system prints, [PLEASE TYPE SYSJOB COMMANDS - END WITH ^Z].

```
<CTRL/E>
|
$^ESPEAK<RET>
[PLEASE TYPE SYSJOB COMMANDS - END WITH ^Z]
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 35: Give the KILL Command for each GALAXY Component.

You should KILL all the components referenced in SYSJOB.RUN. You should also KILL BATCON, which normally runs as a separate job under SYSJOB.

```
[PLEASE TYPE SYSJOB COMMANDS - END WITH ^Z]
KILL QUASAR<RET>
KILL ORION<RET>
KILL MOUNTR<RET>
```

```
.
.
.
```

Step 36: Type CCJOB 1, and Press the RETURN key.

```
CCJOB 1<RET>
```

Step 37: Type STATUS and Press the RETURN Key.

```
STATUS<RET>
```

Step 38: Type ^Z and Press the RETURN Key.

To return to TOPS-20 command level, type CTRL/Z. The system prints the TOPS-20 enabled prompt.

```
<CTRL/Z>
!
^Z
$
```

Step 39: Give the Command: ^E CREATE (DIRECTORY) PS:<OLD-GALAXY> and Press the RETURN Key.

You should create a directory to store your old GALAXY system before copying your new one into SYS:. Type CTRL/E CREATE and press the ESCAPE key. The system prints (DIRECTORY). Type PS:<OLD-GALAXY> and press the RETURN key. The system prints [NEW] and the enabled subcommand prompt.

```
<CTRL/E> <ESC>
! !
$^E CREATE (DIRECTORY NAME) PS:<OLD-GALAXY><RET>
[NEW]
$$
```

Step 40: Press the RETURN Key.

To create a directory with default characteristics, press the RETURN key.

```
[NEW]
$$<RET>
$
```

GENERATING A TAILORED BATCH AND SPOOLING SYSTEM

Step 41: Give the Command: COPY (FROM) SYS:QUASAR.EXE (TO)
PS:<OLD-GALAXY> and Press the RETURN Key.

To copy your old QUASAR program into the back-up directory that you just created, type COPY and press the ESCAPE key. The system prints (FROM). Type SYS:QUASAR.EXE and press the ESCAPE key. The system prints (TO). Type PS:<OLD-GALAXY> and press the RETURN key. The system prints a message verifying that it has copied the file.

```

      <ESC>                <ESC>
      |                    |
$COPY (FROM) SYS:QUASAR.EXE (TO) PS:<OLD-GALAXY> <RET>

PS:<SUBSYS>QUASAR.EXE.1 => PS:<OLD-GALAXY>QUASAR.EXE.1 [OK]

$
```

Step 42: Copy the other files of Your GALAXY System into
PS:<OLD-GALAXY>.

Repeat Step 41 as many times as necessary to copy all the files of your present GALAXY system into PS:<OLD-GALAXY>. You must copy all of the following files, if they exist.

QUASAR.EXE
BATCON.EXE
CDRIVE.EXE
GLXLIB.EXE
SPRINT.EXE
LPTSPL.EXE
OPR.EXE
ORION.EXE
PLEASE.EXE
QMANGR.EXE
SPROUT.EXE
MOUNTR.EXE

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C.6 STARTING UP THE NEW GALAXY SYSTEM

Now you are ready to replace the old GALAXY system on SYS: with your new tailored system.

Step 43: Give the Command: COPY (FROM) PS:<BUILD>QUASAR.EXE (TO) PS:<SUBSYS>QUASAR.EXE and Press the RETURN Key.

To copy the QUASAR.EXE component of the new GALAXY system into the system area, type COPY and press the ESCAPE key. The system prints (FROM). Type PS:<BUILD>QUASAR.EXE and press the ESCAPE key. The system prints (TO). Type PS:<SUBSYS>QUASAR.EXE and press the RETURN key. The system prints a message verifying the file it has copied correctly.

```
          <ESC>                      <ESC>
          |                          |
$COPY (FROM) PS:<BUILD>QUASAR.EXE (TO) PS:<SUBSYS>QUASAR.EXE<RET>
PS:<GALAXY>QUASAR.EXE.1 => PS:<SUBSYS>QUASAR.EXE.1 [OK]
$
```

Step 44: Copy the other components of the GALAXY system into the system area.

Repeat Step 43 as many times as it is necessary to copy all the files of your new GALAXY system into PS:<SUBSYS>. You must copy all the files listed in Step 42.

Step 45: Give the Command: ^ESPEAK and Press the RETURN Key.

To start the new GALAXY system you must give the ^ESPEAK command. Type CTRL/E SPEAK and press the RETURN key. The system prints, [PLEASE TYPE SYSJOB COMMANDS - END WITH ^Z]

```
<CTRL/E>
|
$^ESPEAK<RET>
[PLEASE TYPE SYSJOB COMMANDS - END WITH ^Z]
```

Step 46: Give the RUN Command for each component in the new GALAXY system.

To be sure that all components of the GALAXY system are started, you must give the RUN command for each component shown in Step 35.

```
[PLEASE TYPE SYSJOB COMMANDS - END WITH ^Z]

RUN SYS:QUASAR<RET>
RUN SYS:ORION<RET>
RUN SYS:BATCON<RET>
```

.
.
.
.

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Step 47: Type JOB 1 / and Press the RETURN Key.

```
RUN SYS:QUASAR
RUN SYS:ORION
RUN SYS:BATCON
```

```

.
.
.
JOB 1 /<RET>
```

Step 48: Give the Command: RUN SYS:BATCON and Press the RETURN Key

```
JOB 1 /
RUN SYS:BATCON<RET>
```

Step 49: Type / and Press the RETURN Key.

```
JOB 1 /
RUN SYS:BATCON
/<RET>
```

Step 50: Give the Command: STATUS and Type ^Z and Press the RETURN Key.

```
RUN SYS:BATCON
/
  <CTRL/Z>
  |
STATUS ^Z<RET>
$
```

Step 51: Type OPR and Press the RETURN Key.

You must return to OPR command level to start the components of your new GALAXY system. At TOPS-20 command level, type OPR and press the RETURN key. The system prints the OPR prompt.

```
$OPR<RET>
OPR>
```

Step 52: Type TAKE SYSTEM:SYSTEM.CMD and Press the RETURN key.

To start all the components of the new GALAXY system, type TAKE SYSTEM:SYSTEM.CMD and press the RETURN key.

```
OPR>TAKE SYSTEM:SYSTEM.CMD<RET>
OPR>
```

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Step 53: Give the Command: SHOW STATUS and Press the RETURN key.

To verify that each component of your GALAXY system is running properly, you should now give a SHOW STATUS command and press the RETURN key.

```
OPR>SHOW STATUS<RET>
```

Step 54: Type PUSH and Press the RETURN key.

To move to another level, type PUSH and press the RETURN key.

```
OPR>PUSH<RET>  
0
```

Step 55: Type ENABLE and Press the RETURN key.

```
0ENABLE<RET>  
$
```

C.7 MAKING YOUR NEW GALAXY SYSTEM THE PERMANENT SYSTEM

Once your new system is successfully running, you may want to delete all the files from PS:<BUILD>, PS:<GALAXY>, and PS:<OLD-GALAXY> to make more disk space available.

Step 56: Give the Command: DELETE PS:<BUILD>*.*, PS:<OLD-GALAXY>*.* and Press the RETURN Key.

```
<ESC>  
!  
$DELETE (FILES) PS:<BUILD>*.*, PS:<OLD-GALAXY>*.*<RET>
```

Step 57: Type POP and Press the RETURN key.

To return to OPR level to supervise your new GALAXY system, type POP and press the RETURN key.

```
$POP<RET>  
OPR>
```