PLAN 4000™

File Server
Installation and Operation Manual

NESTAR

NESTAR SYSTEMS, INCORPORATED

PLAN 4000 (TM)

FILE SERVER
INSTALLATION AND OPERATION MANUAL

DISCLAIMER OF WARRANTIES

How To Use This Manual

This edition of the File Server Installation and Operation Manual is designed for experienced programmers who are familar with the computers and programming systems supported by the Nestar PLAN 4000 system.

This manual assumes that the reader has a working knowledge of the PLAN 4000 system and understands the user-oriented system manuals: the General Information Manual, the File Server User's Manual, and the User's Machine/Operating System Guides. A bibliography of PLAN 4000 system manuals and guides appears at the end of this manual.

The objectives of this manual are two-fold: to help the System Manager bring up the network's file servers for the first time, and to act as a reference manual for maintaining the file servers.

Hardware layout and installation for the network are covered in the PLAN 4000 Physical Planning and Installation Manual.

The material in this document applies to Version 2.0 of the File Server software.

We welcome criticisms and suggestions. Forms for reporting program bugs and documentation inadequacies are included at the back of this manual.

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Chapter One

Software Installation

1.0 File Server Software

The software components of the PLAN 4000 file
server subsystem are:

1. Software, running on the server controller,
   that   handles   requests   from   users   at
   workstations for access of shared hard disks.
   Users make their requests from within their
   particular   workstation   operating   system
   environments.

2. Software, running on user workstations, that
   issues such requests to the file server.

3. "Offline" server software that aids in system
   maintenance.

1.1 Distributed Software

File server software is shipped on a hard disk,
which is part of the file server hardware. The
disk is named /MAIN, but can be renamed using
the "examine/ modify" disk utility option.

The /MAIN distribution hard disk is a bootable
file server disk containing the following file
hierarchy:

    /MAIN
    [Root directory]
    /MAIN/BOOTS/...
    [A collection of user station boot programs]
    /MAIN/SYSTEM/FILESERVER
    [file server, boot program, and utilities]

/MAIN/SYSTEM/HELP   [help files]
/MAIN/SYSTEM/ERRORS [error messages]
/MAIN/SYSTEM/PATHNAMES (optional)
[paging area for names of mounted files]
/MAIN/SYSTEM/SETPROFILE
[software to establish boot profiles for
 Apple // workstations]
/MAIN/SYSTEM/PROFILE/$ØØ
[default user station profile (used by BOOT)]

SOME OF THESE FILES ARE PROTECTED BY PASSWORDS
AND HAVE RESTRICTED ACCESS RIGHTS. You can
determine the protection status of a file by
using the SHOW PROTECTION command when the file
server is running. IN ALL CASES, IF A PASSWORD
IS USED ON A FILE ON THE DISK AS DISTRIBUTED BY
NESTAR, THAT PASSWORD IS "NESTAR". You may want
to change these passwords for your installation
(using the PROTECT command).

/MAIN/BOOTS is a directory of binary files
containing boot programs for those user stations
capable of booting from the network. Boot is
described in an appendix of appropriate User
Guides.

/MAIN/SYSTEM/FILESERVER is the virtual volume
that the file server boots from, and contains
the file server program and file server
utilities used to maintain the file system.

The rest of /MAIN/SYSTEM contains:

ERRORS   - the text for all the error
             messages.

HELP   - a directory of files containing
             the text for the HELP command for
             the HELP command.

PATHNAMES - a paging area for names of mounted

files (optional).

TRACE   – storage area for file server command trace data (optional).

PROFILE/$ØØ – the default user station profile for BOOT.

FSCMD   – a list of file server commands that are executed when the file server is powered on.

To verify the presence of pathnames on your disk, issue a LIST command once the file server has been booted (see File Server User's Manual, Chapter 5, for a discussion of LIST).

Chapter 2

File Server Startup

2.1 File Server Startup

File server software will be found on the
primary hard disk when the system hardware is
installed. The file server subsystem includes a
high speed cartridge tape drive and several
utility programs to be used to back up the hard
disks. A backup tape containing file server
software is also distributed with the system.

System hardware should be installed as described
in the Physical Planning and Installation
Manual. However, for the file server's initial
startup, connection to the rest of the network
should be disabled. To accomplish this, open
the back door panel of the cabinet labeled "file
server" and disconnect the coaxial cable at the
bottom of the back panel. This cable may run to
an outside LID or to a connector on one of the
internal LID boards.

2.2 Accessing The File Server With a Console or Terminal

Instructions for connecting a console or
terminal to the server controller are found in
the Physical Planning and Installation Manual.

Before attaching your terminal to the file
server, follow the terminal manufacturer's
instructions, setting it up as follows:

```
TRANSMIT DATA RATE    9600
RECEIVE DATA RATE     9600
STOP BITS             1
PARITY ENABLE         OFF
PARITY SENSE          OFF
DATA LENGTH           8
DUPLEX                FULL
EOM CHAR              CR
XON/OFF               OFF
AUTO LF/CR            OFF
AUTO WRAP             ON
```

See MODEM ON/OFF (Sections 3.1 and 4.12) for modem use with the file server.

2.3 Powering On the File Server

1. Plug in the file server.

2. To power on, turn the key at the bottom front of the cabinet labeled "File Server" clockwise (to a horizontal position), press in, and turn back (to vertical position). This locks the power switch in the "ON" position.

   Two keys are shipped with the system. The file server cannot be turned on without a key, so make duplicates as needed, keeping one in a safe place.

   Make sure, before powering on the file server, that the hard disks have been unlocked, and that all other system installation procedures have been completed. These procedures are described in the System Physical Planning and Installation Manual.

3. At power on, check to see that the fans in

the file server and storage cabinets are operating.

4. Check the power indicator light on the front panel. If the light flickers or goes out, contact your network service representative.

5. The hard disk drives have a warm-up period of about 1 minute, before which they will not respond to disk accesses. To avoid this wait, we recommend that the hard disks be left on at all times, except when they are moved.

   During the hard disk warmup period, the ROM boot program polls each unit (1,2,...) and attempts to boot units that are ready. If any errors are encountered, you will see error codes displayed on your monitor at the bottom of the screen:

   Disk error code $XX $XX stn $XX unit n

   See Appendix A for a description of error codes.

   Most problems in booting from any particular disk unit will cause the ROM to try the next unit in the sequence.

6. At power on, you will see a welcome banner. You will be given an opportunity at power on (5 seconds), to press a key on your file server console or terminal. If no key is pressed, all further software will be executed using the default system hard disk. If any key is pressed, the boot menu will appear:

```
T = Boot from tape drive
1 = Boot from drive 1
2 = Boot from drive 2
3 = Boot from drive 3
4 = Boot from drive 4
```

Which drive?

Do not press a key this time.

Next, you will be given 10 seconds to press the spacebar. If the spacebar is not pressed, the file server software will execute. If the spacebar is pressed, a menu of network utilities will be displayed. These utilities are described in Chapter 4. Do not press the spacebar. The file server program will now execute.

To set the date on the clock/calendar card, use the SET DATE console command described in Chapter 4.

Unless specified in FSCMD, the file server does not ask for a console password when booting; the default is that no console password is necessary. Use the PASSWORD console command to set or change the console password. Console passwords are discussed in the following section.

Unless specified in FSCMD, the file server does not ask whether the console display is to be on or off. The default is off. Use the console DISPLAY command discussed below to turn on the console display. The system console will then display file server commands being processed.

2.4 System Console Passwords

A console password can be set to prevent
unauthorized users from issuing console commands
to the file server.

When a console password has been set, it must be
entered before each console command. The console
password and console commands are entered in the
following sequence:

- press the <Esc> key
- type the exact console password
- press <Return>
- type the console command and <Return>

If the password sequence is entered incorrectly,
it can be restarted by pressing the <esc> key.
Until a valid password is entered by the above
procedure, the file server will not accept
console commands and will continue to service
network requests. The password being entered is
not shown on the console display.

To set a password at startup or at any time
during   operation, use   the console command
PASSWORD. By   using this   command,   console
passwords can be set, disabled, or changed
without stopping the file server.   To set the
console password, enter

        PASSWORD PPPPP <RETURN>

where PPPPP is the desired password (up to 16
characters). The PASSWORD command is protected
with the current password if one is in effect.

When PASSWORD password <Return> is entered, the
password will remain displayed. This will allow
the system manager to confirm that the password
has been entered correctly. To then clear the

screen,   the   password   must   be   employed   by
entering

    <Esc>password<Return>CLEAR<Return>

That is, enter the current password, followed by
a CLEAR command.

To turn off console password protection, enter

    <ESC>password<Return><PASSWORD><Return>

If the console display is on (see initialization
above and DISPLAY console command below), the
system console screen displays the most recently
executed file server command and its return code
and message:

    nn--> Network Command
    nn <-- rr,return message

where   nn is the station number of the station
that originated the command.

The console display can be reinitialized by
entering the console command CLEAR.

The system console can also be used as a network
station   to   enter   file   server   commands.   In
general all of the commands that are available
to ordinary network stations may be entered at
the system console.   There is also a set of
privileged commands which are only accepted at
the system console (discussed below).

The format and details of I/O errors that can
occur at the system console are presented in
Appendix A.

2.5 Testing the System

2.5.1 Testing the File Server

Before running the network, check for errors in
installation   and   configuration   of   the   file
server by bringing   up the file   server with   no
other   stations connected to it.   Once the file
server is   operating   correctly,   user   stations
should be added to the network one by one, after
reconnecting the coaxial cable at the bottom of
the back panel to one of the internal LID BNC
connectors above or to an external LID.

2.5.2 Testing User Stations

Turn   on   a   user station   and   verify   that the
Nestar logo appears on   the user station   screen
(if   the station uses the network BOOT program),
or that the station attaches to the network (if
the station boots from a local diskette).

Stations   that   boot from   the network   can boot
using the   shared   library volume.   For   others,
prepare a boot diskette containing the necessary
network   drivers (see   environment appendices in
this manual) and boot the workstation using it.

On   the   LID   to   which   the   user   station   is
attached,   the   light—emitting   diode   (led)
corresponding to the user station will come on
and   stay   on if the connection is successful.
(Whenever   the   LID   "sees"   a   workstation   is
powered   on, it turns on the   led. The led has a
"timeout" that keeps   it on for   .5 second   each
time that it is turned on.   A new workstation on
the   net "jams" the net for .2 second; you will
then see the led on for .5 second. The net   then
"reconfigures",   which takes   .8 seconds   or so;

here, the led is off for .3 second. Finally, the led comes on and stays on.)

Confirmation of communication with the network is seen if the boot process takes place successfully (i.e., if the workstation doesn't suspend activities during booting).

If network communication is not successful, make sure that the network card in the user station is in the appropriate slot and has a valid address. User station installation is discussed in the System Physical Planning and Installation Manual. Connect all user station microcomputers in this way, one-by-one, confirming with each that it has attached to the network.

2.6   Backing Up The System

A backup tape of system software is distributed with the system. For future backups, see the "Full Tape Dump/Restore" option in Chapter 4.

2.7   Bringing Down the File Server

To bring down the file server:

1. Type <ESC><password><Return> followed by QUIT <Return>.
2. Power off hard disks by running the "power down disk drive(s)" option of the utility menu.
3. Turn off the power by turning the key on the front of the cabinet clockwise.

Chapter 3

Console Commands

3.0 System Console Commands

All Network Commands (CREATE, DELETE, etc.) except BSAVE, BLOAD, BRUN and OFF, can be used at the system console.

Privileged commands used <u>only</u> at the system console are:

    CLEAR
    DISPLAY ON/OFF
    MODEM ON/OFF
    QUIT
    PASSWORD
    SET TIME
    SHOW TIME
    SHOW ALL MOUNTS
    SUPER cmd
    $nn cmd

(MODEM OFF can be entered at a remote terminal). Commands are entered at the system console by typing them in, preceded by the console password if one has been set. No prompt or cursor will appear, however, until after the first character has been typed. Then the prompt:

    ENTER CMD?

will appear on the console screen, followed by the character you just typed. Finish typing in the command and follow it by <return>. The command will execute and print any error code and error message on the screen.

Press DEL<Return> to erase a mistyped command.
Retype your command correctly.

3.1 Privileged Console Commands.

Listed on the following pages are descriptions
of the privileged console commands.

CLEAR

Clear system console display

Parameters and Defaults

   None

Error Messages

   None

Discussion

CLEAR rewrites the system console screen with blanks.

DISPLAY Switch

Turns the console network traffic display off or
on

Parameters and Defaults

Switch: the keyword ´OFF´ or ´ON´. Default
is OFF.

Error Messages

   None

Discussion

The console display is used to show current
command activity being handled by the file
server. This display is turned on by entering
DISPLAY ON and turned off by DISPLAY OFF. The
default at startup is display off.

Note that having the console display enabled
(DISPLAY ON) has some effect on system
performance. The file server will run faster if
the display is off.

MODEM ON/OFF

Allows the file server program, file server console commands and file server utilities to be used from a remote location. (See also Section 4.12, for modem use when the file server is not running.)

Parameters and Defaults

Switch: the keyword "OFF" or "ON".
         Default is "OFF"

Error Messages

    None

Discussion

Connect a Hayes Smartmodem to the file server cabinet using the right RS232 connector at the rear of the cabinet labeled "MODEM". Connect the Smartmodem to the phone lines according to the instructions in the modem's user manual.

At the remote site, from which you wish to use the file server program or utilities, or issue commands to the file server, connect any modem. Since the Smartmodem has autoanswer capability, you can establish your connection with the file server manually from a remote location by dialing the file server and placing your phone receiver in an acoustic coupler, or by using your modem's dialing capabilities. First however, the command MODEM ON must be issued at the console. MODEM OFF can be issued at the file server or at the remote site.

Transactions in this mode occur at a rate of 1200 baud, even to the local console (which is normally 9600 baud), because of modem transmission speeds. This is only true while the phone connection is in effect. Speed reverts to 9600 baud when the connection is broken, even if MODEM OFF is not issued.

QUIT

Quit the file server

Parameters and Defaults

    None

Error Messages

    None

Discussion

QUIT instructs the file server to halt
operation. All user volumes currently mounted
are unmounted. Hence, this command should only
be used when the system is to be shut down. A
menu of disk utilities will then be presented.

To bring down the system completely, select the
"power down disk drive(s)" option of the utility
menu and power down any hard disks present.
Complete power down is not necessary unless the
system is to be moved.

PASSWORD [pw]

Sets console password

Parameters and Defaults

Default is no password. Passwords are subject to
the same restrictions as filenames: 1-15
characters; no commas, command characters,
slashes, colons, carriage returns, or
unprintable characters. Embedded blanks are
ok.

Error Messages

None

Discussion

The console password can be set, disabled, or
changed without bringing down the file server,
by using the console command PASSWORD. To set
the console password, enter PASSWORD ppppp
where ppppp is the desired password. Console
commands are then not allowed unless the console
password is entered. The password command itself
is protected with the current password if one is
in effect.

WARNING: there is no way to change or override
the console password once it is enabled except
by entering that password followed by the
PASSWORD command. If the console password is
forgotten, the remedy is to restart the file
server by powering it off and back on again.

To use the console password to enter a console
command:

- press the <esc> key
- type the exact console password
- press <return>
- type the console command and <return>

If the password sequence is entered incorrectly, it may be restarted by pressing the <esc> key. Until a valid password is entered by the above procedure, the file server will not accept console commands and will continue to service network requests. The password being entered is not shown on the console display. To turn off console password protection, enter PASSWORD <return>.

When

    PASSWORD password <return>

is entered, the password will remain displayed. This will allow the system manager to confirm that the password has been entered correctly. To then clear the screen, enter a null command. The password must be employed by entering

    <esc> password <return>CLEAR<return>

SET TIME [yymmdd][,hh[mm]]

Set the clock/calendar

Parameters and Defaults

First parameter (optional) is year/month/day. Day of the week is automatically calculated by the file server.

Second parameter is the hour of the day with an optional minute of the hour.

The comma must appear before the "hh" if that parameter appears.

There is no default. A SET TIME without parameters is a null command.

Error Messages

1, ILLEGAL COMMAND

   (if typed at a user station without a valid console password)

58,USE: SET TIME [YYMMDD][,HH[MM]]

Discussion

This command can be typed at either the local console or (if a console password is set) at a remote console via modem, or at a user station. The values in brackets are optional (year,month,day,hour,minutes)

If the date is to be set, all elements

(mm,dd,yy) must be supplied. All two digit parameters must contain a leading zero if appropriate.

Example:

    SET TIME 070482,1205

sets the time to July 4, 1982, 12:05 PM

    SET TIME ,15

sets the hour to 3 PM without changing the date or minutes (useful for Daylight Savings Time changes)

SHOW TIME

Returns current date and time.

Parameters and Defaults

None

Error Messages

None

Discussion

This command returns

80, Day DD-Mon-19YY HH:MM:SS

SHOW ALL MOUNTS [pathname]

Display all mounts of all stations using this
file server

Parameters and Defaults

Optional parameter ´pathname´

Error Messages

     None

Discussion

This command displays the same information as
SHOW MOUNTS   but does   so for   the system   as   a
whole.   All   current mounts on   the file server
are displayed.

This command may cause many lines of display to
be written. If the final state of the screen is
unsatisfactory, the CLEAR command can be used to
clean it up.

If the optional pathname parameter is given,
only mounts of the corresponding volume are
shown.

Examples

SHOW ALL MOUNTS would generate a screen similar
to:

```
NAME    DRV ACCESS T VOL   SIZE STN USE
/MAIN/LIB/APPLE2/UCSD/PASCAL
        5 RO,SHR P    0   280B 02   2
/MAIN/USERS/ME
        4 RW,EXC D   32   455S 41   1
/MAIN/STUFF
       27 RW,SHR D    0   455S 41   1
/MAIN/LIB/APPLE2/UCSD/PASCAL
        9 RO,SHR P    0   280B 03   2
```

SHOW ALL MOUNTS /MAIN/LIB/APPLE2/UCSD/PASCAL
would generate:

```
NAME    DRV ACCESS T VOL   SIZE STN USE
/MAIN/LIB/APPLE2/UCSD/PASCAL
        5 RO     P    0  2200B 02   3
/MAIN/LIB/APPLE2/UCSD/PASCAL
        5 RO     P    0  2200B 41   3
/MAIN/LIB/APPLE2/UCSD/PASCAL
        5 RO     P    0  2200B 34   3
```

SUPER cmd

Overrides file server passwords on network files.

Parameters and Defaults

   None

Error Messages

   None

Discussion

The prefix SUPER can be used with console commands to override file server passwords on file server files. The scope of the SUPER prefix is limited to the command entered on the same line. All password protection on files is overridden during a SUPER command. This may be useful for changing forgotten file passwords, etc. The console password should be set in environments where SUPER might be misused.

The station number ($nn) and super prefixes can be used together in a console command if the station number prefix is entered first: $nn SUPER cmd.

The SUPER prefix has no effect on the console password; it applies only to passwords on file system volumes.

$NN COMMAND

Execute a command for a network user station

Parameters and Defaults

nn: station number to be simulated must be between $1 and $FF. Number must be entered in hex preceded by a ´$´.

Error Messages

        1,ILLEGAL COMMAND
        5,ILLEGAL STATION NUMBER

Discussion

The $nn command allows the system console to simulate network requests of other network stations.This causes the file server to execute the entered command as if it had been sent over the network from station nn. This command should be used very carefully, since its use may affect the operation of a user station in ways that the user does not expect. The commands BLOAD, BSAVE, BRUN, and OFF cannot be simulated using the $nn cmd command.

The station number and super prefixes can be used together in a console command if the station number prefix is entered first: $nn SUPER command.

Examples

This command is helpful, for example, if a user is running an editor and discovers that there is

not enough room to write out the file being
edited.   The System Manager can enter the
following on the system console:

    $03 MOUNT /MAIN/EMPTYDISK,D9,RW

where $03, in this example, is the user´s
station number. The file could then be written
out to EMPTYDISK.

Similarily, $nn command is useful for unlocking
locks held by stations that have caused a
deadlock, mounting a virtual disk SHaRed rather
than EXClusive, etc.

Chapter 4

Utilities

4.0   File Server Disk Utility Programs

A set of file server utilities is provided with
the   PLAN 4000 system. These are used for
maintenance of the file system and file server
resources.

These utilities run on the file server, via the
file server console or terminal, and are located
on the   virtual volume /MAIN/SYSTEM/FILESERVER.
They cannot be run while other file server
operations are in progress. Online   network
utilities, which are run from user stations
while the file server is in operation, are
described in the file server user guides.

To use a utility, power on the file server. The
file server network software waits 5 seconds
before attempting to boot from the first disk
drive. Press any key and the boot menu will
appear:

Boot Menu

```
        T - Boot from tape drive
        1 - Boot from drive 1
        2 - Boot from drive 2
        3 - Boot from drive 3
        4 - Boot from drive 4
```

This menu will also appear if an error is
encountered during the subsequent boot process.

Select the unit from which you wish to boot, or
allow the default disk (#1) to be selected. (You
will use utilities from tape or from a disk

other than the boot disk when, for example, the default boot disk is to be examined for damaged areas.)

The file server now waits 10 seconds before executing the file server software. To use a utility, press the console space bar during this waiting period. A menu of utilities will come up on the screen.

If the file server software is aready running, type [<ESC><password><Return>]QUIT<Return> to quit the program, and the utility menu will come up (brackets indicate optional password has been set).

          File Server Utility Menu

          a) file server
          b) partial tape dump/restore
          c) full tape dump/restore
          d) copy partial disk to disk
          e) copy full disk to disk
          f) power down disk drive(s)
          g) list disk contents
          h) examine/modify disk contents
          i) check disk consistency
          j) repair disk
          k) format disk
          l) add or modify tape dump
             instruction files
          m) modem on/off
          n) edit file server startup file

Make your selection by typing the appropriate letter, followed by <return>.

a) FILE SERVER causes the file server software to execute.

b) PARTIAL TAPE DUMP/RESTORE (Section 4.1, followed by ADD or MODIFY TAPE DUMP INSTRUCTION FILES, Section 4.2) copies selected hard disk files to and from backup tape cartridges. Note: The tapes used by this utility are incompatible with those used by the utility option c.

c) FULL TAPE DUMP/RESTORE (Section 4.3) copies all the files on a hard disk onto backup tape cartridges, and restores all copied files from tape to disk. Note: The tapes used by this utility are incompatible with those used by the utility option b.

d) COPY PARTIAL DISK TO DISK (Section 4.4) copies data from one disk location to another. Structural changes in the file server hierarchy can be accomplished using this utility.

e) COPY FULL DISK TO DISK (Section 4.5) copies entire volumes of data between media that are of identical size.

f) POWER DOWN DISK DRIVE(S) (Section 4.6) sequences down hard disks prior to turning off the disks.

g) LIST DISK CONTENTS (Section 4.7) creates a list of some or all of the disks attached to a file server.

h) EXAMINE/MODIFY DISK CONTENTS (Section 4.8) is used for a variety of disk maintenance and diagnostic purposes.

i) CHECK DISK CONSISTENCY (Section 4.9) verifies the state of file server hard disks.

j) REPAIR DISK (Section 4.10) searches for and

fixes bad sectors and tracks on hard disks.

k) FORMAT DISK (Section 4.11) initializes disks
   for use with the file server. Hard disks are
   shipped already formatted, and should not be
   reformatted except under special
   circumstances.

   Do not reformat a disk without first
   contacting your network service
   representative.

l) ADD OR MODIFY TAPE DUMP INSTRUCTION FILES
   (Section 4.2, following PARTIAL TAPE
   DUMP/RESTORE, Section 4.1) allows you to
   predefine Partial Tape Dump/Restore
   operations (used in option b).

m) MODEM ON/OFF (Section 4.12) allows you to use
   a modem and remote console, for file server
   diagnostics via telephone (see also MODEM
   ON/OFF, Chapter 3).

n) EDIT FILE SERVER STARTUP FILE (Section 4.13)
   allows you to edit the file server startup
   command file FSCMD.

REMEMBER TO RECORD ANY ERROR CODES AND MESSAGES
RECEIVED WHEN USING NETWORK UTILITIES (OR THE
FILE SERVER SOFTWARE). These will be important
should you need to contact your network service
representative.

4.1 PARTIAL TAPE DUMP/RESTORE

The PLAN 4000 system includes a high-speed
cartridge tape for backup use. The drive uses
1/4-inch, 450 foot tape cartridges, which hold
over 45 Megabytes of formatted data.

A part of the file server station, the tape
drive operates in the "streaming" mode. Using
the Partial Tape Dump option, it requires from
30 minutes to an hour and a half to create a
backup tape for data on a 60 megabyte hard
disk.

The streaming drive checks data as it is being
recorded on tape. Checking is accomplished by a
system of double tape heads: as one head writes
the data, a second head reads and verifies the
newly written data. If an error is detected, a
signal is given to rewrite the block in
question. (Newly written data is verified by the
hardware. However, use the program's "Verify"
option to insure that tape and disk data are
actually identical, and that no data has been
lost or garbled during transmission.)

This utility is used to create backups of
network hard disks on the cartridges and to
restore that data to the hard disks. The program
is also used, (sometimes in conjunction with
other utilities), to recover from hard disk
crashes.

To transfer the data between a file server hard
disk and a cartridge tape, use the partial tape
dump option, which transfers a binary image of
the desired data from tape to disk (or vice
versa). This menu option can:

  a. Save virtual volumes onto tape according to
     how recently they have been modified.

   b. Purge virtual volumes from the disk according to how recently they have been accessed (for read or write).
   c. Save only selected virtual volumes.
   d. Save virtual volumes under specific directories.
   e. Restore only selected virtual volumes.
   f. Restore virtual volumes under specific directories.

(c. through f. give the same capability for disk to tape transfers that the "Copy Partial Disk to Disk" utility gives.)

Tapes made with Partial Tape Dump (option B) are not compatible with Full Tape Dump tapes (option C).

The following introductory pages discuss when to use the partial dump/restore option:

Discussion of Partial Dump/Restore includes:

Section 4.2, ADD OR MODIFY TAPE DUMP INSTRUCTION FILES (option L in the utilities menu), includes Sections:

When to Use This Option

Because of its flexibility, you can use the
Partial Tape Dump/Restore option in a variety of
ways. This section describes the uses of the
option in typical situations. When you can use
Full Tape Dump/Restore as an alternative, we
also describe any advantages of the Partial Tape
Dump/Restore compared to Full Tape Dump/Restore.
In general, Full Tape Dump is much faster, in
transferring a whole disk, while Partial Tape
Dump allows restoration of individual volumes.

Daily Backup

The most common way you would use the Partial
Tape Dump/Restore is to incrementally back up
the hard disks on your system. You can do this
using Full Tape Dump/Restore but you would have
to copy all all of the disk bit for bit. You
may find it advantageous to do this operation
with the Partial Tape Dump/Restore because:

- daily backups are usually smaller (require
  less data) than complete backups.

This smaller size means:

- the time to run a daily backup is shorter;
- the backup will in general require fewer
  tapes. In most cases, a daily backup will not
  require more than one 45MB tape;
- an implication of the daily backup normally
  fitting onto one tape is that the whole
  process usually requires no ´babysitting´ by
  the operator and in most cases can be set up
  to run automatically overnight.

This is true because :

- the tape may not need to be changed;
- the partial dump option allows you to specify multiple disk backups as one operation (which full dump does not).
- you can restore part of the backup tape; with full dump, you must restore the whole tape onto a disk. Selective restoring using Full Tape Dump requires two hard disks of the same size:

  - back up Disk A (the disk you will not be restoring selectively).
  - restore the backup tape, containing the files to be selectively restored, to Disk A;
  - use the Copy Partial Disk option to copy the files across from Disk A to Disk B.
  - restore Disk A to its original state.

Obviously, it is easier to do this sequence as a single operation with the partial tape dump option. Unless you have two hard disks of the same size, you cannot do selective restoring at all without using this option.

Archive and Purge

You can use the this option to archive files and then purge them from your hard disks. The normal way to do this is to do an occasional archive/purge run that saves and then deletes files that have not been used since the last archive/purge run; this could be done every month. Three common variations on this theme are:

- to do a daily backup at the same time
- to do a backup of all files that have been changed since the last run this would give a

monthly base to go back to. Monthly backups,
saving data over time periods of years, prove
valuable when bad data of long standing has
been discovered.
- to archive and purge a related group of
  files. This may be appropriate when a large
  project has been finished and is not likely
  to be changed or used soon.

The reason for purging files is to free up disk
space, and so make better use of this resource.

Software Distribution

We mentioned archiving a related group of files
in the previous section. You can also use the
partial dump option to do software distribution
using this mechanism. You just omit the ´purge´
step. There are a number of advantages to
distributing software on cartridge tape compared
to distributing it on diskettes:

- it is easier for the user to load it up,
  because the complete transfer can be done in
  a single partial ´restore´ operation
- it is administratively easier for the
  distributor, because all relevant software
  can be loaded onto a single shippable unit;
  most large systems will not fit onto a single
  floppy disk
- for extra security, the distributor can put
  two copies of each file onto the tape.

The disadvantage of using the partial dump
option for software distribution is that it only
operates on virtual volumes (´data files´); it
cannot transfer only selected files (e.g. UCSD
files) within a given virtual volume.

Disk Compaction

As virtual volumes are deleted and others added,
the disk may become fragmented. In other words,
the free space on the disk eventually becomes
split into many small areas that cannot be
allocated as a single volume. Compaction is the
cure for fragmentation, and this utility option
allows you to compact a disk.

4.1.1 How To Use This Option

To use this option, power on the file server.
Press any key if you want to use the utility
from tape or any disk other than the default
disk (#1). Whether you use the default disk or
not, press the console space bar when the "10
seconds" prompt appears; the utility menu will
appear. (Select option B from the utility menu
that appears (by typing B <return>.)

If the file server is running, type
[<ESC><password><Return>]QUIT<Return> to leave
the program and reach the menu (brackets
indicate an optional password).

When you have typed B <return>, a welcome banner
appears, followed by a question about the size
of your tape drive (default is 45MB). Enter the
size of your tape drive (A=45MB, B=20MB).

Next, a menu of partial dump/restore operations
will appear:

      S(ave, R(estore, L(ist, Q(uit:

To specify an operation, type the first letter
of the operation only and then <Return>. If you
want to quit the program, type ˆQˆ and

<Return>. All the other operations run portions of the partial tape dump; see ´Operations´ (Section 4.1.2) for a description of how the other commands work. These other commands sometimes return to the option´s ´command level´ after an error or if you quit a specific operation.

How To Input Responses

To input a response, you must type your information and then follow it with a <Return>.

You can sometimes input a ´null line´. To input a null line, just type <Return>.

At most prompts, the program also allows you to input <Esc> (i.e. type <Esc> <Return>, to signify that you want to escape from this line of questioning). When the program recognizes <Esc>, it jumps back to the previous round of questions.

Date/Time Values

System dates consist of the date and time as a 12 digit number of the form.

    YYMMDDhhmmss

where ´YY´ is the last two digits of the year and ´ss´ is seconds. To input a date, you must either enter the date as six digits or else all 12 digits. The program does do some validity checking on date values you enter (although this is not exhaustive). If your input fails this validity checking, the program responds ´?NOT A VALID DATE´ and prompts you for the date again.

Screen Display

When the program has finished asking you
questions and moved on to process the requested
operation, it lays out the screen in a well
defined way. Most of the display should be
self-explanatory.

4.1.2 Operations

This Section includes:

4.1.2.1 S(AVE

The S(AVE operation saves data on the hard disks
by transferring it to tape.

The S(AVE operation uses 11 different types of
parameters to govern how it selects and
transfers virtual volumes. For your convenience
and safety, you can specify most of these
parameters as one of eight ´canned operations´
and have them brought in from disk each time you
use the partial tape dump option.

The following section describes the two modes of
specifying the parameters in more detail. The
section after that describes what each of the
parameters mean. When you use a canned
operation, you must know how to identify it, and
also how the parameters are set. Some parameters
are always set from the canned operation; others
will sometimes be set directly or the program
will prompt you for them; and the labels are
always set from your input. This section

describes this process and the operation of the program once you have set the S(AVE operation going.

Canned And Special Operations

The Partial Tapedump utility includes a number of predefined operations (called "canned" operations). Option m in the utility menu, Add or Modify Tape Dump Instructions (Section 4.2), allows you to add to or change these operations.

When you do not use one of the canned S(AVE operations, you have to use the ´Special´ S(AVE operation. In this operation, the program will ask you for values to all the parameters that S(AVE needs to run.

You need to supply much less detail if you use a canned operation. Here is how canned operations work in general.

1. A file called IA.DEFAULT has space for eight canned operations, and five of these are initialised on the distributed version to a set of standard canned operations. The five standard canned operations are listed in Section 4.2.2.

2. You can alter the distributed IA.DEFAULT by using option m of the utility menu, Add or Modify Tape Dump Instructions. Option m is described in Section 4.2.

3. When you run the partial tape dump option and use the S(AVE operation, it first asks you

   WANT TO USE A CANNED OPERATION (Y/N): Y

The default here is ´Y´, to use a canned operation. If you take this default the program will then try to find the file IA.DEFAULT. If this is not present (for example, if you have not copied it onto the disk you booted from) then the program responds

   CAN´T FIND ´IA.DEFAULT´ FILE

Then, the program asks again if you wish to use a canned operation.

If a IA.DEFAULT file is found, the program will ask you to identify the canned operation.

4. Once you have identified a canned operation, the program will print a description of the operation and ask you to verify that it is the correct one. If there are any dates to be entered, the program will ask for them.

S(ave´s Parameters

By setting S(AVE parameters, you can control how S(AVE will operate. The following five subsections describe in detail the meaning of these parameters; the remaining subsection points out some interactions between the parameters.

Selection Directives

The three selection directives tell the S(AVE operation how to select files for saving:

1. Date Dependency

The main reason files are selected for saving is
that they have been modified. The first S(AVE
parameter tells the program which date, if any,
to use in deciding whether or not a virtual
volume should be saved. The program asks you
for this parameter with the prompt

Select files by:

B(ackup date - files that have been
modified since they were last backed up.

Y(our date - files that have been
modified after a date you imput.

A(ll - backup all files, regardless
of when they were last modified.

You must enter one character from ´B´,´Y´ or
´A´; or you can enter null to choose the default
of ´B´. The responses and their meanings are:

A: All files. All requested virtual volumes are
   selected, regardless of when they were last
   modified.

B: Backup date. The file server keeps a ´last
   backup date´ for each virtual volume. If you
   choose this option, the program compares the
   ´last backup date´ against the ´last modified
   date´ for the virtual volume and selects the
   file for saving if the ´modify´ date is after
   the ´backup´ date. In other words if the
   virtual volume has been changed since it was
   last backed up, it will be saved. This option
   is the default because it will be what you
   normally want to use if you are doing
   incremental saves.

Y: Your date. You wish to input a date that the
   program will compare against the ´last
   modified date´ for each virtual volume.
   Virtual volumes that have been modified after
   your date will be selected for saving.

2. Modify Date

If you choose the ´Y(our date´ option on the
previous question, the program prompts you for
your date with the question

       YOUR DATE:

You must enter a date here; see Section 4.1.1
for details of entering dates. If you enter a
date that is after today´s date, the program
types

       ?IMPOSSIBLE - AFTER TODAY´S DATE

and asks you for your date again.

If you choose the ´B(ackup date´ or A(11´
options on the previous question, the program
does not ask you for ´Your DATE´.

3. ´DONT SAVE´ Name List

The ´Dont Save´ Name List is a list of filenames
that you do not want to be selected for saving.
The idea of this field is to save a lot of time
on a DAILY BACKUP run by excluding transient
virtual volumes from consideration. Two common
examples of transient files are ´QUEUE´ files
and ´NEWMAIL´ files. To specify that you do not
want virtual volumes that have these filenames
in their pathname to be saved, you should enter

NEWMAIL, QUEUE

to the prompt

DON'T SAVE NAME LIST:

The 'Don't Save' Name List is an important factor in speeding up the daily backup if you use the Messenger program, because it can create very large numbers of small NEWMAIL files. You should also consider examining the files in your installation to see if there are applications producing transient files that you could exclude via the 'Dont Save' mechanism.

The following rules apply to the 'Dont Save' Name List;

- it must not be longer than 80 characters

- separate filenames with commas;

- you can enter characters in lower case, they will be converted to upper case;

- a pathname will be excluded from the save process if one of its filenames below the main pathname is the same as one of the filenames in the 'Dont Save' Name List.

Note the phrase 'below the main pathname' in this last rule. This means that if the 'Don't Save' Namelist contains 'QUEUE' and you specify '/MAIN/SYSTEM/QUEUE' as one of the main pathnames, it will be saved in the normal way — the 'QUEUE' filename will not stop it being saved. (This is different from the action of the 'Don't Purge' Namelist described below, which would stop this from being purged). The reasoning behind this policy is that if you explicitly specify a pathname, you want to save

it, even if it does conflicts with the ´Don´t Save´ Namelist.

Transfer Directives:

1. RENAME PATHNAMES

The program asks you this question with the prompt

    RENAME PATHNAMES ON TAPE (Y/N): N

If you enter ´N´ or null, the virtual volumes will be given exactly the same pathname on tape as they have on disk. If you enter ´Y´, you will be able to rename virtual volumes as they are put on the tape. See the subsection ´Pathnames´ below for more details on renaming.

2. VERIFY

If you want to verify that the data on the tapes matches the information on the disk, you can request that a verification phase be included in the S(AVE operation by entering ´Y´ in response to the prompt

    VERIFY TAPES AFTER SAVING (Y/N): N

If you respond with ´N´ or null, the verification phase is omitted.

Note: Although a tape dump without verification will be completed approximately three times as fast as with verify, its use is not normally recommended except in special, occasional circumstances where the additional verification time would otherwise make the tape dump operation impossible to perform.

Purge Directives:

1. PURGE

The first purge question you will be asked is

WANT TO DO ANY PURGING (Y/N): N

If you respond with ´N´ or null to this question, the S(AVE operation will omit all the other questions in this section and will not do any purging.

2. PURGE DATE

The program asks you for the purge date with the prompt

PURGE FILES NOT ACCESSED SINCE:

You must enter a date here; see Section 4.1.1 for details of entering dates. All virtual volumes that have not been read or written after the data you input will be purged (on the assumption that they are no longer being used).

The utility allows you to enter a date in the future in answer to this question. As no virtual volumes will have been accessed since that date, all files will be purged.

3. ´DON´T PURGE´ NAME LIST

The ´Dont Purge´ Name List allows you to list the filenames that should never be purged. This does the same for the purge phase as the ´Don´t Save´ Name List does for the save phase. See the ´Dont Save´ Name List Section above for the

format and content of a Name List. Note that
filenames in the ´Dont Save´ Name List are also
implicitly included in the ´Dont Purge´ Name
List; see the ´Interactions Between Directives ´
section below for details of this.   For your
convenience and safety the program gives you a
default of ´SYSTEM´ for the ´Dont Purge´
Namelist.

4. CONFIRM

The final question about purging is

    WANT TO CONFIRM EVERY DELETE (Y/N): Y

If you enter ´Y´ or null, the program will ask
you to confirm the deletion of every file. If
you do not wish to be asked these confirmation
questions, enter ´N´.

Pathnames

You can specify a number of pathnames that you
wish to have saved. If you have answered ´Y´ to
the ´Rename Pathnames´ question, you will also
have to specify a pathname to rename files on
tape with. Here is an example of the original
pathnames without renaming:

    PATHNAME 1: /MAIN
    PATHNAME 2: /ALT
    PATHNAME 3:

Note that a null pathname ends the questioning.
An example with renaming is:

    PATHNAME 1: /MAIN/PASCAL
    RENAME TO: /COPY1/PASCAL
    PATHNAME 2: /MAIN/PASCAL

RENAME TO: /COPY2/PASCAL
PATHNAME   3:

This example shows how you can use renaming to
get   two   copies   of   the   same   files   on   a
distribution tape.

The maximum number of pathnames you can save is
16.

This   does   not   mean   that   you   can   only save
sixteen virtual volumes on the tape.   The
pathnames you specify can be directories (as in
our examples above) in which case every virtual
volume below the pathname will be eligible for
saving. For example, if ´/MAIN/PASCAL´ is   the
path name you specify, ´/MAIN/PASCAL/ LIB´ is a
virtual volume below ´/MAIN/PASCAL´ and so is
eligible for saving.

Label Entries

When   the S(AVe operation writes to the tape, it
puts   a label at   the   front   of   each   tape
cartridge.   The label contains three comments of
forty columns each.   The   last three questions
the S(AVE operation asks you for are these
comments.   You can   enter up to 40 characters
for each comment to describe the tape.   For
example:

LABEL 1: VRX 1.0
LABEL 2: SOURCE CODE AND DOC
LABEL 3: MADE BY: DIST/ANL

Note this example does not include a date:
another part of the label holds today´s date,
which is automatically displayed whenever the
label comments are displayed.

Interactions Between Directives

There are two interactions between S(AVE´s
directives that you should take note of.

The first interaction is that the ´Don´t Save´
Name List also implies that files affected by
this list will not be purged either. This
interaction is a result of how the ´Don´t Save´
Name List is used. When the program is
searching a directory for files to consider, any
filename that is in the ´Don´t Save´ Name List
is ignored. The program does this so that it
can ignore the whole tree of pathnames below
that filename, and so speed up its operation. A
side-effect of this implementation is that the
program ignores the whole sub-tree for purge
selection as well. One way to think of this is
that the ´Dont Save´ Name List is automatically
appended to the ´Don´t Purge´ Name List.

The other interaction is this: if a virtual
volume is selected to be purged but is not
selected to be saved, the program will save the
virtual volume before purging it.

There are two reasons for doing this. One is
for added security. It is not possible with this
utility to remove a file without trace. The
other reason is that the program should support
an ´Archive and Purge´ mode of operation. This
mode will normally operate on files that have
not been accessed at all, and this is how the
purge directives work. But the save selection
directives are oriented towards files that have
changed, and and so will not select files
eligible for purging. The program takes care of
this discrepancy by forcing the saving, or
archiving, of files that are about to be
purged.

How Canned Operations Work

If you want to use a canned operation and the program can find a defaults file, the S(AVE operation will display the reference numbers and names of the canned operations and ask you to identify the canned operation by number. For example, using the distribution IA.DEFAULTS file you would see:

          1 DAILY BACKUP
          2 ARCHIVE / PURGE
          3 SOFTWARE DISTRIBUTION
          4 LARGE VOLUME INTERCHANGE
          5 DISK COMPACTION

          WHICH CANNED OPERATION
          IDENTIFY BY NUMBER (0):

If you wanted to do a daily backup, you would enter ´1´ and the program would respond with

          OPERATION = DAILY BACKUP
          OK (Y/N):

Enter ´Y´ here if you have got the right operation; if not, enter ´N´, and the program will ask you for the canned operation´s number again.

Once you have identified the canned operation you want, the program fills out and verifies the information in the canned operation. It does this in the following steps:

1. If the date dependency is to select files for saving by Y(our Date, the program asks you for ´Your Date´.

2. If canned operation includes purge
   directrives, the program asks you for the
   purge date with the prompt.

   PURGE FILES NOT ACCESSED SINCE:

3. If the canned operation specifies any
   pathnames, the program checks that they exist
   on hard disk.

4. If the canned operation does not include any
   pathnames or if any of the pathnames are
   invalid, the program prompts you for the
   pathnames.

All other information that the S(AVE operation
needs is taken without modification from the
canned operation's values.

Other Phases Of S(AVE

Once the S(AVE program has gathered the
information necessary to operate, it will
confirm that you wish to start the program by
asking you

    OK TO GO (Y/N):

If you enter 'Y', the S(AVE operation will start
on others phases, as follows:

1. The program lays out the screen and asks you
   to put in the first tape.

2. The program writes some 'list records' and
   then some 'virtual volumes'. The 'list
   records' are recorded to make the L(IST
   operation (described below) fast; the
   'virtual volumes' hold the actual data saved.
   Because the 'list records' must be at the

front of the tape, the utility program always starts a new tape you cannot append onto an existing tape.

3. The tape is rewound.

4. If you have specified that verification be done, the program does a verify phase that matches steps 1 to 3:

   - if the save process took more than one tape, it asks you to re- insert the first tape;
   - it verifies the list records and then the virtual volumes;
   - the tape is rewound.

5. Having successfully completed the save and verify operations, the program now sets the ´last backup date´ for each virtual volume that has been saved.

6. If you want to purge some files, the program enters a ´Purging Unused Files´ phase.

If you want more detailed information on how the program works, see Section 4.1.5.

Note that if all the saved data fits on one tape and there is no need to confirm purges, the program will do all the phases of the program without any further interaction necessary after the tape has been loaded. This will make the normal daily backup operation, where both these conditions should apply, particularly convenient.

4.1.2.2 R(ESTORE

The R(ESTORE operation transfers data from the tape to the disk. We call this operation

´R(ESTORE´ because its main use is to retrieve
from tape programs that have been purged (or
accidentally lost) from the hard disk. The
following two subsections describe R(ESTORE´s
parameters and its operation.

R(estore´s Parameters:

1. Confirmation

R(ESTORE first asks you what type of
confirmation you want to use with the prompt:

> WHICH FILE DO YOU WANT
> TO CONFIRM RESTORE FOR:
>
> A(LL O(VERWRITE N(ONE (O):

You must enter one character from ´A´, ´O´ or
´N´; or you can enter null to choose the default
of ´O´. The responses and their meanings are:

A: You will be asked to confirm each file before
   it is transferred to disk.

O: You will be asked to confirm the transfer of
   files that will overwrite existing files.
   This gives you the chance to select specific
   files from a group of files.

N: You will not be asked to confirm any
   transfers. If you specify this option, you
   will be asked the question described in the
   following subsection.

2. No Overwriting

If you answer ´N´ (for no confirmation) to the previous prompt, the program then asks you:

WANT TO OVERWRITE ANY EXISTING FILES (Y/N): N

If you enter ´N´ or null, the program will not transfer files that already exist on the hard disk; if you answer ´Y´ the program will transfer these files.

The advantage of answering ´N´ in the previous question is that the program will process each saved tape without operator intervention. The disadvantage of this usage is that the program may do things you don´t expect: in the ´no overwrite´ case, the program may not transfer files that you expected to be transferred; and in the ´overwrite´ case, it may encounter files on tape you had forgotten about and overwrite existing files. Obviously, the automatic overwriting mode of operation is potentially dangerous and you should use it with care.

3. Rename Pathnames

The program asks you this question with the prompt

RENAME PATHNAMES ON DISK (Y/N):N

If you enter ´N´ or null, the virtual volumes will be given exactly the same pathname on disk as they are on tape, if you enter ´Y´, you will be able to rename virtual volumes as they are put on disk. See the next section for details on this.

4. Pathnames

You can specify a number of pathnames that you wish to have restored. If you have answered ´Y´ to the ´Rename Pathnames´ question, you will also have to specify a pathname to rename files on disk with. The prompting for these pathnames is exactly the same as for the S(AVE operation. The maximum number of pathnames you can specify here is 16. This does not mean you can only restore four specific virtual volumes, because you can restore complete directories. The next section describes how directories are restored.

Other Phases Of R(estore

Once the program has asked the above questions, it prompts you with

OK TO RESTORE (Y/N):

You must enter ´Y´ or ´N´ here: ´N´ quits R(ESTORE back to the main prompt; ´Y´ lets the program continue, as follows:

1. The program lays out the screen and asks you to put in the first tape.

2. Now the program must find some files on the tape that are eligible to be restored. To show how it does this, assume we have the following saved tape:

```
MAIN PATHNAME = /MAIN/USERS/ME
/MAIN/USERS/ME/1
/MAIN/USERS/ME/2

MAIN PATHNAME = /ALT/WORK/YOU
/ALT/WORK/YOU/D
/ALT/WORK/YOU/P
```

```
MAIN PATHNAME = /ALT/WORK/BETA
/ALT/WORK/BETA

MAIN/PATHNAME = /ALT/LIB
/ALT/LIB/PASCAL/SOURCE
/ALT/LIB/PASCAL/OBJECT
/ALT/LIB/PASCAL/CODE
/ALT/LIB/CPM/1
```

And also assume you have specified the following pathnames to search for:

1. /MAIN/USERS/ME
2. /ALT/WORK
3. /ALT/LIB/PASCAL
4. /ALT/LIB/DOS

Here is how R(ESTORE would operate:

a. It would find the main pathname ´/MAIN/USERS/ME´ on the tape, which exactly matched a pathname to restore. It would therefore try to restore all the virtual volumess in this group, and mark the first pathname to restore as being completed.

b. The next pathname on tape is ´/ALT/WORK/YOU´, which is below the second pathname to restore, /ALT/WORK. The program tries to restore all the data files in the group, but it does not mark ´/ALT/WORK´ as being completed. This is because there may be more files on the tape other than those below ´/ALT/WORK/YOU´ that are below ´/ALT/WORK´ (for example, ´/ALT/WORK/BETA´).

c. The program does exactly the same for

´/ALT/WORK/BETA´ when it finds it on the
tape as for the group below
´/ALT/WORK/YOU´.

d. Now the program finds ´/ALT/LIB´ on the
tape. This is not matched in the pathname
at or above it; so the program should not
restore all the virtual volumes in this
group on the tape. However, there are two
subdirectories of /ALT/LIB we are looking
for, /ALT/LIB/PASCAL´ and ´/ALT/LIB/DOS´.
So the program must partially restore this
group of virtual volumes:

- it tries to restore all the
  ´/ALT/LIB/PASCAL´ files
- when it encounters ´/ALT/LIB/CPM/1´, it
  marks the third pathname to restore
  ´ALT/LIB/PASCAL´, as complete
- it ignores ´/ALT/LIB/CPM/1´
- and on reaching the end of the group,
  knows it will never satisfy the fourth
  pathname to restore, ´/ALT/LIB/DOS´.

3. What does the program do to ´try to restore´
a given file? First, it will generate the
name to use for the file on disk, if you have
specified renaming of files. If this new
name is more than 80 characters, the program
will issue the error message.

　　?RENAMED PATHNAME WOULD BE TOO LONG

and move onto the next file on tape. Next,
the program will ask you to confirm that you
want to transfer the file, if that is
appropriate. It does this by displaying, for
example;

　　GOING TO TRANSFER
　　/ALT/LIB/PASCAL/SOURCE

on the bottom portion of the screen, and prompts you with

OK TO DO TRANSFER?

just above it.

If you answer ´Y´, the program then tries to re-create the file on disk.

If there is not enough space to create the new file, the program prints an error message like

NOT ENOUGH SPACE TO CREATE
/ALT/LIB/PASCAL/SOURCE

Note that, if you get this message, the program will have already deleted any existing file of the same name. This means:

- if you are replacing an existing file of the same size, you should never get the ´NOT ENOUGH SPACE´ message
- if you do get this message and there was an existing (smaller) file, it will have been lost.

If the file is successfully created and restored, you should be aware of the following points:

- any necessary intermediate directories are created. If you are restoring files without renaming them, the program creates any necessary intermediate directories up to and including the tape group´s pathname. In all other cases, the program creates only necessary intermediate directories with the file server´s default access rights. The

'other cases' referred to here are: when
virtual volumes are being renamed as they are
being restored; and when directories must be
created above the tape group's pathname. Note
that the restoration process never overwrites
a directory.
- most of the attributes of the virtual volumes
are copied directly from the tape onto the
disk. The implications of this are:
- that passwords and access rights will be the
same. Therefore, if you are doing a
distribution tape, you should make sure that
the passwords you use internally are removed
for any distributed files
- because the 'last modified date' is the same,
any files restored from long term archives
will not be saved by a daily backup run
- the original creation date is kept. We prefer
to do this rather than update the creation
date with the date of the restore.

The only date that is altered is the 'last
accessed date', which is set to today's date.
The program does this so that the file will not
be purged at the next 'Archive and Purge' run.

4. The program does try to stop searching the
tape as soon as possible. It can stop when it
knows for each pathname that it has completed
the restore for that pathname or that it will
never find it.

5. When the R(ESTORE is finished, the program
lists any files it has not found, e.g.

        NOT FOUND:
        /ALT/LIB/DOS

4.1.2.3 L(IST

The L(IST command allows you to list the names of the virtual volumes on a set of tapes generated by the S(AVE operation. First, the program asks you if you want to spool the listing to the printer with the prompt

    CREATE PS LISTING OF FILE (Y/N):Y

(PS refers to the PLAN 4000 Print System.)

If you answer ´Y´ or null, the program prompts you with

    FOR SPOOLED FILE, ONE SECTOR HOLDS
    INFORMATION ON APPROX, 3 VIRTUAL VOLUMES

    LISTING FILE SIZE IN SECTORS (400):

If you enter null, the listing file will be able to hold information on about 160 virtual volumes. If the tape holds more than 160 volumes, you should enter a correspondingly larger number. Finally for spooled listings, the program creates the listing file and writes a message like.

    SPOOL FILE WILL BE WRITTEN TO:
    /MAIN/SYSTEM/QUEUE/NEW/25200000A.LIST

This type of spool file will be automatically printed by the network print server.

The program asks you to input the first tape in the set, and then does a display on the screen. The display shows the main pathnames, and then the type and name of each file on the tape under that pathname. The display uses the list records that are written by S(AVE especially for the L(IST operation. This means that the program

does not have to search through the data to do
the listing, and so will only use the first tape
to do the list.

The list command displays the pathnames quite
quickly if you are not having a spooled listing
created. If you want to look at the display at a
given point, you can type control/S to freeze
the display (and another CTRL-Q to unfreeze).

4.1.3 Special Cases

This Section includes:

Startup	4-34
Save	4-35
Restore	4-35

This section describes some special cases that
the utility program must be aware of. You will
not normally need to worry about the cases
described here; so if you are reading this
manual for planning purposes, you can skip this
section and refer back to it if you need to.

Startup: Two Hard Disks Have Same Name

When you first start the partial tape dump
option, it will read the names of all hard disk
units. If any two drives have the same name, the
program will write something like

    /1 AND /4 ARE BOTH CALLED /MAIN

and quit the program. It does this because it
restores from tape using symbolic names, and it
would not know which disk to restore (e.g) /MAIN
files to. To change a disk´s name, you can use
the Examine Disk Contents utility (option h in

the utility menu).

Save: Maximum Number Of Names Per Pathname

The partial tape dump option can handle up to
some fixed number of intermediate directories in
a pathname, currently 7. This implies that the
maximum number of file names in all is 9.

If the program tries to process an eighth
intermediate directory, it will ignore the
directory and print e.g.

?FOLLOWING DIRECTORY EXCEEDS MAXIMUM LEVEL
/MAIN/USERS/ME/DATA/A/V1/TSKC/LIB/SO/PB

This is more restrictive in theory than the file
server, which will let you create any number of
intermediate directories. In practice, most
users of the system only use up to six-name
pathnames anyway. If you do hit this
restriction, you can get around it by saving a
lower pathname. For example, the above virtual
volumes would be saved successfully if you
specified ´/MAIN/USERS´ as the main pathname to
be saved.

Restore: Of Boot Volume

Because the boot volume has a special
significance on a disk, the partial dump utility
program will prevent you from overwriting an
existing boot program. In addition, it does not
set the boot program up even if you restore
/MAIN/SYSTEM/BOOT (i.e it will not enable the
disk to boot automatically). If you do want to
restore a boot volume from tape, you must:

- restore the boot volume to a different name,

such as

/MAIN/SYSTEM/NEW BOOT

- to let the system boot from this volume, use the SET BOOT option of utility h, Examine/Modify Disk contents

- if you now want to rename the boot volume to /MAIN/SYSTEM/BOOT, do so using option h or the user station NET program (after deleting the old /MAIN/SYSTEM/BOOT).

Restoring Below Non Directory Pathnames

It may happen that you try to restore below a non-directory pathname. This can happen if you are renaming pathnames when restoring them, or if the directory structure has been altered. In this case, the program will not be able to restore the volume. It will print (for example)

INTERMEDIATE PATH NOT A DIRECTORY
/MAIN/USERS/ME/1

4.1.4 Usage: Strategy And Tactics

The previous sections describe how you operate the partial tape dump/restore utility. The following sections describe in detail some ways of using the utility. The first section discusses how you can combine various uses of the partial and full tape dump utilities in a backup strategy; the second section describes how you operate the partial dump utility to put it to certain uses.

1. Backup Strategy

The ´system manager´ is the person responsible for ensuring that an installation´s hard disks are backed up. Any backup strategy should:

1. Allow single files to be restored in case of data loss on a small area of the disk or after accidental deletion.

2. Give protection against catastrophic disk errors like head crashes.

3. Use the hard disk effectively by archiving and purging unused files.

4. Give protection against fire.

5. Give value for money. This means you should match the cost of your backups (in tape cost, operator time and system down-time) against the value of the information on the hard disks.

Obviously, the system manager must decide how to achieve this last objective, because the number and frequency of backups will vary between installations. However, we can propose the following scheme of backups that will meet the first four requirements:

1. Do daily backups using the utility to save valuable changed files (in order to be able to restore single files).

2. Do a weekly full tape dump (to protect against catastrophic disk failures).

3. When a disk becomes full (or every three months):

- do a full tape dump
- delete any unwanted files
- purge any files that have not been accessed in the last two or three months and compact the full disk. There are two possible ways to do this, as described in the ´Disk Compaction´ of Section 4.1. This will ensure that the disk is used effectively.

4. Keep all backup tapes protected from fire in the computer room, either by putting them in a fire-safe or taking them off-site.

Note that each step number above satisfies the strategic objective with the same number. Within this framework, we can define two extremes of frequencies and costs for the backups. The low-cost backup strategy is:

1. Ignore daily backups entirely.

2. Do a weekly full dump using alternate sets of tapes. (Be sure to rotate the tapes).

3. When you need to compact a disk, use the weekly tapes to do it with: use one set for the full tape dump and the other set for the partial tape dump.

The high-cost strategy is:

1. Do a daily backup of valuable changed files every day, which should only require one tape for most installations. Have one tape for each day of the week, except for the weekly full tape dump. This will require 4 or 5 tapes.

2. Do a weekly full tape dump and have three complete sets of full dump tapes.

3. Keep four rotating 3-monthly full dump tapes. This will give you the capability if necessary of retrieving tapes from up to one year ago.

4. When you have to compact a disk, keep each partial dump tape that has archived and purged files on it for three months.

You will probably consider both these ends of the cost spectrum to be unacceptable to you; if you do, it is up to you to define an intermediate frequency.

Note that we have only discussed system-wide backups here. You may find some user groups will require you to back-up very valuable or sensitive material more frequently than the average.

Remember, when you are calculating the number of tapes you will need, that every partial dump S(AVE takes an integral number of tapes. You cannot squeeze a number of small backup runs onto one tape.

How To Do Partial Tape Dump Jobs

Daily Backup and IAEXEC

Canned operation number 1 on the distributed IA.DEFAULT file implements ´daily backup´. You may want to customize this.

- the "Don´t Save" Name list is ´NEWMAIL,QUEUE´. The intent here is to save time on the daily backup by avoiding these small, transitory files that (in the case of

NEWMAIL files) can account for a large percentage of the number of files on a disk. If your installation generates any other files of this nature, you may want to add them to the ´Don´t Save´ Name list;

- the verify indicator is ´N´, again to save time. You may want to change this to ´Y´, which will take longer but be more secure. (The hardware automatically verifies that data is written onto the tape correctly. However, if the data that arrives is somehow incorrect - garbled in transmission, for instance - the "verify" option will detect the difference between disk and tape);

- you should probably change the pathnames to use the correct symbolic names of your disks.

Archive and Purge

Canned operation number 2 on the distributed IA.DEFAULT file implements the ´archive and purge´ operation. The idea here is to save and then delete (purge) unused virtual volumes.

Points to note:

- we also have included here a daily backup, because we have specified ´save depending on ´backup date´. You may want to alter this to ´your date´ or ´(all files)´.

- we have included NEWMAIL and QUEUE files in the ´Don´t Save´ Namelist, and SYSTEM and MAIL files in the ´Don´t Purge´ Namelist. None of these file names will be eligible for purging. You may want to add file names to the ´Don´t Purge´ Namelist:

- you should probably change the pathnames to
  use the correct symbolic names of your
  disks.

Software Distribution

Canned operation number 3 on the distributed
IA.DEFAULT file gives a framework for software
distribution. The only point of interest here is
the ´Rename Pathnames´ indicator, which is set
to ´Y´. We have done this on the assumption
that, for added data security, software
distribution tapes should contain two copies of
the same information. The way to do this is to
use the ´Rename´ option, specify the same
pathname to save twice, and rename it on tape to
two different pathnames, e.g.:

        Pathname   1:   /MAIN/PASCAL
        Rename to   :   /MAIN/PASCAL
        Pathname   2:   /MAIN/PASCAL
        Rename to   :   /BACKUP/PASCAL

Then if the user of the tape cannot restore the
/MAIN/PASCAL files, he or she can try to restore
the /BACKUP/PASCAL files.

Recreating a Disk

You may want to recreate a disk from its
individual files for two reasons. One reason is
if the disk has become unusable for some reason
and you have a complete save of the disk made by
the utility that is more recent than the last
full dump tapes. The other reason is if the free
space on the disk is highly fragmented: by
recreating the disk from the individual files,
you will collect all the free space into bigger

areas.

You can recreate a usable disk using the full
tape dump, full disk to disk, and partial disk
to disk utility options, if you have two disks
of the same size. If you do not have two disks
of the same size, or one is unusable, you can
recreate a disk from a partial dump tape
containing a complete save of the disk. Canned
operation number 5 on the distributed IA.DEFAULT
shows a ´COMPLETE SAVE´.

You may want to amend the pathnames on this
canned operation to their symbolic names. And,
if you have more than one hard disk, you may
want to split the complete save into separate
canned operations, one for each disk (e.g. ´SAVE
MAIN´ and ´SAVE ALT´).

To recreate the disk, you have to:

 - use the format utility to initialize it

 - run partial tape dump to copy all files from
   the tape to the disk

 - use the "Examine Disk Contents" utility and
   use its SET BOOT operation to allow the disk
   to be booted.

The descriptions of the save and restore
algorithms in the following two sections give
detailed information about what these programs
do to implement the functions described in the
previous sections. We have tried to address all
common usages of the partial dump option. We
have included the algorithms so that, if you
want to use the utility in a way we have not
anticipated, you can use the algorithms to
determine what it will do in special situations
that are not otherwise discussed.

4.1.5 Statistics

Space Overheads

The program writes delimiters on the tape to keep track of the different phases of its operation. These delimiters use 10 blocks (2048 bytes) each on the tape. The usage of these delimiters is:

- 2 per run;

- 2 per tape;

- 2 per group to save;

- 1 per data file saved.

S(AVE Timing

The timing of the elements in a S)AVE operation are:

- time per delimiter: 5 seconds;

- time to transfer 1KB from disk to tape: 1/30th second (i.e. the transfer rate is 30Kbytes/second);

- time to find and process a data file in the file system: .75 seconds (approximate average).

These elements must be multiplied by the number of times they occur. For example, on a daily backup operation without verify, each data file is processed three times; and on a daily backup

operation with verify, each data file is processed five times and all tape operation times are doubled. The following table shows aggregate timings for various multipliers:

Type	Baseline	Daily (sm files)	Daily (lg files)	
Files	1	100	100	250
Searched	1	100	100	
Files	1	20	20	250
Saved	1	20	20	
MB	0.5	2.5	12.0	33
Data	0.5	2.5	12.0	
Verify	No	No	No	Yes
	Yes	Yes	Yes	
Total	1	8	13	83
Time	2	14	24	

4.2   Add or Modify Tape Dump Instruction Files

Option 1 of the utility menu allows you to
specify your own Partial Tape Dump canned
operations to the utility´s S(AVE operation
(Section 4.1.2.1). The canned operations are
contained in the file IA.DEFAULT. This Add
Instructions Option gives you a controlled way
of manipulating this file.

IA.DEFAULT has space for eight canned
operations. Initially, five of the eight slots
are set up with ´standard´ canned operations,
and three slots are unused. See Section 4.2.2
for the names and contents of the five ´standard
slots´.

We recommend you try to define all your normal
save operations as canned operations, because
this will make your archiving operations much
more foolproof.

4.2.1   Using This Option

To use this option, power up the file server.
Press any key if you want to use the utility
from tape or any disk other than the default
disk (#1). Whether you use the default disk or
not, press the console space bar when the "10
seconds" prompt appears; the utility menu will
appear. Select option L from the utility menu.

If the file server is running, type
[<ESC><password><Return>]QUIT<Return> to reach
the utility menu (brackets indicate optional
password).

The first thing IADEFBUILD does is look for the
defaults file, IA.DEFAULT. If it cannot find
this, the program prints the error message:

CAN'T FIND DEFAULTS FILE "IA.DEFAULT".

Then the program asks if the user would like to create one on current volume.

If IA.DEFAULT is found, the program lists the current canned operations and then displays the main prompt, which is:

```
I(NPUT
U(PDATE
D(ISPLAY
L(IST
R(EMOVE
H(ELP
Q(UIT

WHICH (D):
```

To specify an operation, type the first letter of the operation only (or null to get the default of DISPLAY) and then <RETURN>. You must type <RETURN> here for the program to do anything. If you want to quit the program, type 'Q' and <RETURN>. The other operations are described below.

Identifying Canned Operations

Some operations ask you to identify a canned operation. You can do this by entering:

- the slot number for this canned operation, as shown by the L(IST operation
- the whole name
- or the first few characters of the name, as long as it unambiguously identifies one of the canned operations. For example, to identify the 'DAILY BACKUP' canned operation, you could

probably identify it uniquely with just ´DA´.
(Note that this facility is only present in
the IADEFBUILD program.

IADEFBUILD´s Operations

The two most important operations are I(NPUT and
U(PDATE, which both allow you to set the
contents of a canned operation. I(NPUT finds an
empty slot (if there is one) and blanks out the
canned operation´s contents; if there is no
empty slot, you cannot use I(NPUT. U(PDATE asks
you to identify the existing slot you want to
change; you cannot use U(PDATE on an empty slot.
These operations then prompt you for these
fields:

 - the operation´s name
 - the date dependency
 - the ´Don´t Save´ name list
 - the /Rename Pathnames/indicator
 - the Verify indicator
 - the Purge indicator
 - if purging is to be done
 - the ´Don´t Purge´ name list
 - the ´Confirm Purges´ indicator
 - the pathnames (and rename pathnames, if
   appropriate)
 - the three comments fields

The defaults on these fields will be standard
null defaults for the I(NPUT operation, and the
existing values for the canned operation on
U(PDATE. These operations are designed to look
as similar to the special version of the
utility´s S(AVE operation as possible. There are
three differences between them:

 - you are not asked for dates in the canned
   operation (specifically, the modify and purge

dates), as we assume they will change depending on when the canned operation is invoked;

- you can specify no pathnames in the cannned operations. If you omit them, the utility program will prompt the operator for them when the canned operation is invoked;

- if you do not specify one or more pathnames they are not checked against the current hard disks by the IADEFBUILD. Instead, they are checked by the utility when the canned operation is invoked. The R(EMOVE operation allows you to remove an existing canned operation. L(IST lists the eight slots, showing their numbers and names (or ´(EMPTY)´). D(ISPLAY shows the current values in a given canned operation.

Save It

Once you have generated your own IA.DEFAULT file, it will be automatically saved. If you want to keep your old IA.DEFAULT, change its name before using the instruction file option.

4.2.2 Contents of Incremental Archiver Default

Canned Operation #1

```
Operation Name          : DAILY BACKUP
Save Depending on       : BACKUP DATE
Don't Save Namelist     : NEWMAIL, QUEUE
Rename Pathnames        : N
Do Verify               : N
Do Purge                : N
Tape Labels:
   Label 1              : DAILY BACKUP
   Label 2              :
   Label 3              :
Pathnames to Transfer
   /MAIN
```

Canned Operation # 2

```
Operation Name          : ARCHIVE AND PURGE
Save Depending on       : BACKUP DATE
Don't Save Namelist     : NEWMAIL, QUEUE
Rename Pathnames        : N
Do Verify               : Y
Do Purge                : Y
Don't Purge Namelist    : SYSTEM,MAIL
Confirm Purges          : Y
Tape Labels
   Label 1              : ARCHIVE AND PURGE
   Label 2              : (INCLUDES DAILY BACKUP)
   Label 3              :
Pathnames to transfer:
   /MAIN
```

Canned Operation #3

Operation Name	: SOFTWARE DISTRIBUTION
Save Depending On	: (SAVE ALL FILES)
Don't Save Namelist	:
Rename Pathnames	: Y
Do Verify	: Y
Do Purge	: N
Tape Labels	
Label 1	: (YOUR COMPANY NAME)
Label 2	: (YOUR PROD.NAME, VER.)
Label 3	: (c) 1982,(YOUR COMP.)

Canned Operation # 4

Operation Name	: VOLUME INTERCHANGE
Save Depending On	: (SAVE ALL FILES)
Dont Save Namelist	:
Rename Pathnames	: N
Do Verify	: Y
Do Purge	: N
Tape Labels:	
Label 1	: VOLUME INTERCHANGE
Label 2	:
Label 3	:

Canned Operation # 5

Operation Name	: COMPLETE SAVE
Save Depending On	: (SAVE ALL FILES)
Don't Save Namelist	:
Rename Pathnames	: N
Do Verify	: Y
Do Purge	: N
Tape Labels:	
Label 1	: COMPLETE SAVE
Label 2	:
Label 3	:
Pathnames to Transfer	
/MAIN	

4.3 Full Tape Dump/Restore

The PLAN 4000 system includes a high-speed
cartridge tape for backup use. The drive uses
1/4-inch, 450 foot tape cartridges, which hold
45 Megabytes of formatted data.

The tape drive operates in the "streaming" mode,
writing 45 megabytes of data onto one cartridge
in less than 12 minutes. A part of the file
server station, the tape drive requires less
than 18 minutes, for example, to create a backup
tape for data on a 60 megabyte hard disk, using
2 tapes on a 45 MB drive.

The streaming drive checks data as it is being
recorded on tape. Checking is accomplished by a
system of double tape heads: as one head writes
the data, a second head reads and verifies the
newly written data. If an error is detected, a
signal is given to rewrite the block in
question.

This utility is used to create backups of
network hard disks on the cartridges and to
restore that data to the hard disks. The program
is also used, (sometimes in conjunction with
other utilities), to recover from hard disk
crashes.

NOTE: tapes made with the full tape dump (b) and
those made with partial tape dump (c) options
are not compatible with each other.

4.3.1 Making or Restoring Backups

Turn on the file server. Press any key if you
want to use the utility from tape or any disk
other than the default disk (#1). Whether you
use the default disk or not, press the console

space bar when the "10 seconds" prompt appears.
When the utility menu appears, type C.

If the file server is currently running, type
[<ESC><password><Return] QUIT <Return> to reach
the utility menu (brackets indicate optional
password). Select the Full Tape Dump/Restore
option (C).

NOTE: Pressing <ESC><RETURN> to any prompt
aborts the program.

A prompt will appear

        HARD DISK UNIT NUMBER (1,2...):

Enter the unit number of the disk to be dumped
or restored. The current date and time and a
menu of choices will appear

        02-JUN-1983 15:29:40

        D(UMP TO TAPE)
        R(ESTORE TO DISK)
        T(ENSION) TAPE
        H(EADERS)
        Q(UIT)
                    WHICH?

The Tape Tension option "T" winds and unwinds
the tape to adjust its tension. This takes 6
minutes, and should be done for tapes that have
been in storage for more than a few weeks, or if
a high error rate is occurring.

The Headers ("H") option displays information
about hard disks, as specified above, and the
backup tape cartridge. The format is

DISK "EXAMPLE", SIZE 63840 SECTORS
LAST BACKUP WAS 04-JUN-1983 18:27:47

and, after asking if the tape is ready,

THIS IS TAPE #1 OF DISK "EXAMPLE"
MADE ON 15-MAY-1983 11:53:27

Dumping From Hard Disk To Tape

Pressing "D"<Return> for dump in response to the
prompt above causes the utility to display

DISK "EXAMPLE", SIZE 63840 SECTORS
LAST BACKUP WAS 04-JUN-1981 18:27:47

Here, the source disk is named "EXAMPLE". The
disk is 63840 sectors in size.

INSERT TAPE # 1 OF DISK "EXAMPLE"
IS TAPE READY (Y/N)?

More than one cartridge will be necessary to
back up a hard disk. The exact number of
cartridges will depend upon the capacities of
the tape and hard disk in question.

A "N" to the prompt will cause the prompt to be
repeated. Only when the reply is "Y" will the
utility execute the dump, displaying the words

DUMPING...

If the write-protect screw on the tape cassette
has been turned to "SAFE", no dump from disk to
tape is possible and an error message will be
returned:

TAPE IS WRITE PROTECTED

When a hard disk is being dumped, the utility
will prompt

> THIS TAPE IS FULL
> REMOVE IT AND PUT IN ANOTHER ONE

after a portion of the hard disk has been
dumped. Remove the cartridge and insert
another, which will become tape #2 of the dump.

NOTE: The write-protect screw on the tape
cartridge should be turned to SAFE immediately
after a backup has been made.

After the successful dump of each tape. If tape
and hard disk data agree, the utility will go on
to the next tape or redisplay the option menu.
To exit, type "Q".

To dump from another hard disk, quit and
re-enter the program.

4.3.2 Restoring a Hard Disk From Tape

Responding to the prompt

> D(UMP TO TAPE)
> R(ESTORE TO DISK)
> T(ENSION) TAPE
> H(EADERS)
> Q(UIT)
>   WHICH?

with "R" <RETURN> causes the utility to display

> DISK "EXAMPLE", SIZE 63840 SECTORS
>   LAST BACKUP WAS 04-JUN-1981 18:27:47
>
>   INSERT TAPE #1 OF DISK "EXAMPLE"
>   IS TAPE READY (Y/N)?

Entering "N" will cause the prompt to be repeated. With a "Y", the utility will verify that the tape is a dump of the disk and ask

   OK TO RESTORE?

Error messages that may appear at this point are described below. A "Y" causes the program to restore the contents of the cartridge tape to the designated hard disk (destroying any information already on the disk). As this is accomplished, the message

   RESTORING...

will appear on the screen to indicate read/write activity on tape and disk. The number of cartridges is required to restore a hard disk will depend upon the capacities of the cartridges and hard disks in question. Data will be restored at the rate of 5 MB/Min. After the successful restore from each tape. If tape and hard disk data agree, the utility will go on to the next tape or redisplay the option menu. To exit, type "Q".

To restore to another hard disk, quit and re-enter the program.

Errors encountered during the verify procedure are discussed below.

4.3.3   Error Messages in Tape Dump Utility

During the Restore procedure, one of three different error messages may appear on the screen after the user has responded to the question "IS TAPE READY?" with "Y".

1. THIS IS TAPE # 1 OF DISK "EXAMPLE"
      MADE ON 15-MAY-1982   11:53:27
   THIS IS A DUMP OF A DIFFERENT SIZE DISK

2. THIS IS THE WRONG TAPE NUMBER.

3. THE TAPE IS NOT A DUMP OF THIS DISK.

The first message is displayed if tape and disk
sizes are not the same; the second if the #2
tape is inserted for the restore before the #1
tape; the third if disk and tape have different
names. Errors #1 and #2 are fatal, and the
program will prompt for another tape. For error
#3, the utility will continue as described
above, asking

    OK TO RESTORE (Y/N)?

If "Y", the name of the disk being restored will
be changed to the name on the cartridge, if the
two are different, and the data on the tape will
be restored to the disk.

If, during the verify procedure, the utility
detects any difference between tape and disk
data other than in their headers, the program
will display a message like

    *** TAPE ERROR:
    NO DATA DETECTED
    UNRECOVERABLE DATA ERROR
    BLOCK IN ERROR NOT FOUND

This error signifies that a blank space or
unreadable data exists on the tape in a location
where data is expected, and is most often
encountered when a tape has been partially (or
never) written. With this message, the utility
will abort.

Remember to record exact error codes and
messages when they appear. These will prove
useful to your network service representative.

4.3.4 Recovering From a Catastrophic Hard Disk Crash

In the event that the system hard disk is
inadvertently erased or reformatted, or should
the portion of it containing the system
utilities become unreadable, it will be
necessary to examine the disk using the "Check
Disk Consistency" utility, to determine the
extent of the damage. In the case of partial
loss of disk contents, the "Partial Tape
Dump/Restore" option will be used to restore
lost volumes.

If disk utilities are lost, it will be necessary
to reboot the file server from tape to use
them.

Never reformat the hard disk and restore the
lost hard disk files from a backup tape using
the Full Tape Dump/Restore utility without
explicit instructions from your local network
service representative.

4.3.5 How to Write Protect a Cartridge

Locate the screw on the cartridge with an arrow
on it. Turn the screw until the arrow points to
the word ´safe´.

4.3.6 Backup Strategy

To determine the frequency with which hard disk
backups should be made at your installation,

compare the cost of data replacement for a given
time period with cost of backup tapes for the
same period. Remember that for any computer
system, data loss is increasingly probable as
the system is used. Error-free periods of
operation often cause system managers to
overestimate the long-term reliability of their
systems. Further, the most reliable system is
susceptible to human error. We strongly
recommend that backups of all hard disks be made
at least once a week.

4.4 Copy Partial Disk To Disk

The Copy Partial Disk To Disk option copies files and directory structures from one physical device (the SOURCE) to another (the DESTINATION). This utility will copy from any unit to any unit (including back onto the source unit). The utility can be used for the following and other tasks:

1. Copying a single file or directory sub-hierarchy from one device to another.

2. Copying from a hard disk of any size to another hard disk.

4.4.1 How to Use This Utility

1. Turn on the file server. Press any key if you want to use the utility from tape or any disk other than the default disk (#1). Whether you use the default disk or not, press the console space bar when the "10 seconds" prompt appears; the utility menu will appear. Select option D.

   If the file server is currently running, type [<ESC><password><Return>]QUIT<return> to reach the utility menu (brackets indicate optional password). Select the Copy Partial Disk option (D).

2. The first question to be answered is what file or directory structure is to be copied:

        ENTER SOURCE PATH
        (USE /N FOR ENTIRE UNIT)
        :

   Enter the full path name, starting with the

drive number or volume name, of the file or directory to be copied. For example, enter:

/1   to copy all of disk unit 1

/1/USER/FDR   to copy all the files in
                        FDR´s directory

/1/USER/FDR/DOS   to copy only the file DOS
                        (assuming it is not itself
                        a directory)

The utility will check the directory and determine the type of object you are trying to copy.

This utility is privileged in that it can override normal password and access controls. You will not be refused access to any file on the source, or asked to supply any passwords in any pathname. (Since the utility can only be run on the file server, this does not represent a breach of security). Files created on the destination will, with the exception of implicitly created directories as noted below, have all the passwords and access rights of the originals.

The escape key can be used to abort a copy in progress. Pressing ESC in the middle of a copy will cause the utility to ask whether you want the file copy in progress to complete before aborting.

4.4.2 Copying Single Files

In the simple case where a file (rather than a directory) has been specified, you will be asked:

ENTER DESTINATION NAME :

and you simply enter the path name that you want for the new file, again starting with the drive number or volume name. For example,

/MAIN/FDR/OLDDOS

Any subdirectories in the path name which do not already exist, will be created. If the file already exists, you will be asked:

ERASE DUPLICATE (Y/N)?

If you say ´Y´ then the existing file will be deleted, and the new file created in its place. If you say ´N´, then you get a chance to change disks or to respecify the name:

CREATED PATHNAME WILL BE: /1/USERS/FDR/OLDDOS
OK (Y/N)?

If you say ´Y´, then it tries again with the same name. If you say ´N´, then it asks for a new name:

ENTER NEW PATHNAME OF FILE :

Enter a new name (on any physical volume) and the utility will try again.

Copying Directory Structures
_____

In the case where the SOURCE path specifies a directory (rather than a file), you will be asked

ENTER PREFIX FOR DESTINATION FILES
(USE "/N" FOR ROOT)
:

Enter the initial part of the pathname that you wish all of the copied directories and files to have. The pathname you specify is the name of the directory in which entries will be made for the objects at the top level of the SOURCE.

For example, suppose you have specified /1/USER as the SOURCE, and the directory structure is

```
/1/USER
        /FILE1
        /DIRECTORY
                    /FILE2
                    /FILE3
        /FILE4
    ...other files in /1/USER...
```

If you specify /2/USER/FDR as the DESTINATION, then the resulting file structure will be

```
/2/USER/FDR
                /FILE1
                /DIRECTORY
                            /FILE2
                            /FILE3
                /FILE4
```

Note the general rule: files and directories underneath the specified SOURCE directory are copied and added to the DESTINATION directory. As usual, directories in the DESTINATION pathname may or may not already exist.

An important particular case of this general rule applies when you want to copy ALL of a physical disk and leave the directory structure intact. In that case both the SOURCE and DESTINATION specify only the root directory; for example using "/1" as the SOURCE and "/2" as the DESTINATION will copy all of disk 1 into the

hard disk at the top level. Any existing files or directories already at the top level will remain undisturbed, as will the name and attributes of the root directory.

After asking about the source and destination paths, the utility will ask some question about how each directory or file is to be processed.

ASK ABOUT EACH FILE (Y/N)?

If you say ´Y´, then each file or directory will be listed before it is copied, and you will get a chance to copy it or skip it. If you say ´N´, then all files in the SOURCE structure will be copied, but in this case the utility asks first how duplicate names should be handled.

ERASE DUPLICATES (Y/N)?

If you say ´Y´, then a file which already exists on the DESTINATION with the same name as a file being created will be erased. (If a subtree of files is being copied and a non empty duplicate directory is encountered, the utility will use the existing directory rather than aborting because a non empty directory cannot be deleted.) If you say N, then you are asked:

SKIP DUPLICATES (Y/N)?

If you say ´Y´, then any file which can´t be copied because the new name already exists will be skipped.

If you say ´N´ to both the ERASE DUPLICATES and SKIP DUPLICATES questions, then you will be asked about each duplicate name as it arises. If you expect no duplicates, the prudent course is to answer ´N´ to both these questions.

You will now be asked whether the "last backup" dates of the source files should be set to today's date (and time) to indicate that a backup was made:

    UPDATE BACKUP DATES (Y/N)?

After these initial questions, the utility will proceed to search the SOURCE structure and copy files to the DESTINATION. It announces each item name and size as it is processed:

    FILE: /1/USER/FILE1,SIZE=212S

or

    DIRECTORY: /1/USER/DIRECTORY,SIZE=3S

If you have asked to be asked about each item, then for files the utility will ask:

    COPY (Y/N)?

and you respond appropriately. If you say ´Y´, then it shows the name and size of the file it is about to create, and gives you a chance to change its pathname.

    CREATED PATHNAME WILL BE:
    /1/USERS/FDR/FILE1,SIZE=212S
    OK (Y/N)?

If you say ´Y´ the file is created and copied, but if you say ´N´ you are asked for the new name:

    ENTER NEW PATHNAME OF FILE
    :

The file is created and you are kept informed of the blocks being copied as the transfer progresses:

COPYING 110 TO 129 OF 1200

The units are in sectors (256 bytes), and since
there are N+1 sectors in the range from 0 to N,
the last message will look something like

COPYING 1180 TO 1199 OF 1200

If any errors are encountered in creating the
file or copying the data, the error message is
reported and you are asked

OK TO SKIP IT (Y/N)?

If you say ´N´, the utility attempts to create
and copy the file again because there was not
enough room on the destination disk, you will be
specifically prompted about using a new disk.

TRY AGAIN WITH NEW DISK (Y/N)?

When a directory is encountered in the source,
and you wanted to be asked about each file, then
you will be asked separately if you (a) want to
create the directory now, in which case it will
inherit all of the passwords and access rights
of the original directory, and (b) if you want
the directory searched.

CREATE THIS DIRECTORY (Y/N)?

SEARCH THIS DIRECTORY (Y/N)?

The questions are independent; for instance you
may choose not to create the directory but to
search it, because you will rename all of the
files that are copied. Conversely, you may
choose to create the directory (with all the
passwords and access rights copied) but not
search it to copy files that it currently
contains.

If you do not choose to CREATE the directory when it asks, but do search it and copy some files with their original names, then the directory will be created implicitly in the normal fashion if it does not already exist. The difference is that the password and access rights will not be copied from the SOURCE, but rather implied from the file being copied.

4.4.3   Copying File Server Bootable Volumes

Virtual volumes from which the file server can be booted have special identification information in the header record. After the utility has copied a virtual volume which is identified .as the boot virtual volume of the source disk, it asks whether you want the newly created copy to be the boot virtual volume of the destination disk:

        THIS IS THE BOOT PROGRAM OF THE
        SOURCE DISK. SHOULD IT BE THE
        BOOT PROGRAM OF THE DESTINATION DISK (Y/N)?

If you intend to boot the system from the destination disk, you should answer 'Y'. The only reason to answer 'N' is if the destination disk already has an identified virtual boot volume that you do not want to disturb.

NOTE: File server utilities use the term "File" to mean a virtual volume as opposed to a file within a virtual volume. When a "file" is being copied, a virtual volume and all files that it contains are being copied.

If a subtree of files is being copied without asking about each file, and a file which is the boot volume of the source is copied, then it

will be made the boot volume of the destination without asking you about it. This allows an entire volume to be copied without asking any questions at all once the copy has started. If you later wish to change the boot volume of the destination disk, you can use the FILDEBUG utility to do so.

4.4.4 The Simple Special Cases

The question and answer dialog that is expected by the utility is complicated to explain because there are many variations in the general problem of copying substructures of one directory hierarchy to another. Although an effort has been made to have it ask the relevant questions at the right place, it is important to note that there are two simple special cases which require only a few answers.

1. Copy a single file from one disk to another:

   Specify the full pathname of the file to be copied as the SOURCE, and the full pathname of the new file. You will be asked no other questions unless something goes wrong.

2. Copy a single file on the same disk

The utility can be used to copy or duplicate files on the same physical disk by simply using the same root directory for both source and destination.

4.5 Copy Full Disk to Disk

This utility menu option is used to make a full
copy of a hard disk to another already formatted
hard disk.

The   sizes of   source and   target must be
identical.

The utility will permit you to select the volume
name of the target disk you are creating. This
name can be chosen to be the name previously
recorded on the target, to be the name recorded
on the source volume, or to be a new name that
you enter from the keyboard (the "/" symbol is
not allowed).

The utility does not preserve any of the files
that may already be present on the target disk.
They are totally replaced by an exact image copy
of the entire source disk. For a more selective
form of backup and copy procedures, you   should
refer to the section on Copy Partial Disk, which
provides   more   flexible   control   over   copying
subsections of disks, renaming file server files
as they are being copied, and   preserving the
existing files on a target disk.

This utility is privileged in that it can
override normal password and access   controls.
You will not be refused access to any file on
the source, or asked to supply any passwords in
any pathname. (Since the utility can only be run
on the file server, this does not represent a
breach of security).

4.5.1 How to Use This Utility

1. Turn on the file server. Press any key if you
   want to use the utility from tape or any disk

other than the default disk (#1). Whether you
use the default disk or not, press the
console space bar when the "10 seconds"
prompt appears; the utility menu will
appear.

If the file server is currently running, type
[<ESC><password><Return>]QUIT<return>   to
reach the utility menu (brackets indicate
optional password).

In either case, select E from the menu that
is displayed.

2. You will then see a banner and three lines:

        [Enter <esc><cr> to abort at any time]

        READY DISKS FOR COPYING

        ENTER SOURCE DISK NUMBER:

Enter the source disk unit number.

When you see the prompt:

        ENTER TARGET DISK NUMBER:

enter the drive number of the disk you wish
to create using this utility.

3. At this time, the system will read the
directory information from the two disks you
have specified. Several checks are made to
ensure that these are valid file server
disks. Once this is completed, the utility
will display:

```
*** Source is: MASTER1
*** Size = ?????

*** Target is: MASTER.BAK
*** Size = ?????
```

(Of course the actual display will show the names of the disks you have specified in place of MASTER1 and MASTER.BAK, and the sizes will be the corresponding actual sizes.

4. Then you see the prompt:

KEEP TARGET NAME: MASTER.BAK (Y/N)?

replying ´Y´ will cause all the data from the source to be copied to the target, while preserving the name of the target disk.

If you reply ´N´, you will see the prompt

KEEP SOURCE NAME: MASTER1 (Y/N)?

Replying ´Y´ will cause the copy to have the same name as the original disk being copied.

If you reply ´N´ again, you will see the prompt

ENTER NEW NAME (MAX. 15 CHARS)
:

to which you can supply a new name, different from the current name of either of the two disks you are copying.

5. Once you have satisfactorily supplied á name as required in Step 5, the utility will proceed to copy the entire source to target. It will keep you informed of its progress by

displaying the current range of data it is
copying, and the total amount to be copied.

There is nothing more for you to enter, until
you see the prompt:

    DO YOU WANT TO COPY
      ANOTHER DISK (Y/N)?

If you wish to exit the utility, enter ´N´;
otherwise to begin again enter ´Y´, which
will reprompt you as described above in step
three.

It takes approximately 3 minutes to copy 60
MB, and to verify the result.

How to Abort The Utility

Whenever the utility requests a reply from you,
you may elect to abort the current stage of
copying, and start from the beginning of the
program. This is done by pressing the <esc> and
the <return> keys in succession.

It is also possible to abort during the data
copying phase, by pressing the <esc> key (only).
If you do so, you must reinitialize the target
disk using the Format Disk option, or else
recopy a source disk to the target using this
utility successfully. The information on the
target disk is inconsistent if you exit during
the copying process, and can cause a variety of
unpredictable effects. Never use such a disk
without using the Format Disk utility option to
create a new empty directory.

4.6   Power Down Disk Drives

This menu option is used to sequence down a hard
disk prior to turning off the disk. It is
recommended that the following procedure be used
whenever the disk is to be shut off:

- Type [<ESC><password><Return>]QUIT<return> to
  quit the file server (brackets indicate
  optional password).

  Select option F from the menu that is
  displayed.

- You will be asked to "Enter number of drive to
  power down (1...4). Respond with 1,2,3,4 as
  desired.

- The disk heads will be retracted to a landing
  zone, the platter motor will be turned off,
  and the brake will be energized. The File
  Server Utility Menu will return to the
  screen.

Once a disk has been powered down, it will be
  powered back up automatically if a menu option
  is selected that directs disk input or output
  to the powered down drive.

If you want to turn the file server off, wait
two minutes after power down of disk(s). Then
key off the main power switch in lower left hand
corner of the front panel.

4.7 List Disk Contents

This utility creates a list of some or all of the files on any of the disks attached to that server.

This utility is privileged in that it can override normal password and access controls. You will not be refused access to any file on the source, or asked to supply any passwords in any pathname. (Since the utility can only be run on the file server, this does not represent a breach of security).

Turn on the file server. Press any key if you want to use the utility from tape or any disk other that the default disk (#1). Whether you use the default disk or not, press the console space bar when the "10 seconds" prompt appears.

If the file server is currently running, type [<ESC><password><Return>]QUIT<return> to reach the utility menu (brackets indicate optional password).

Select option G from the utility menu that is displayed.

You will be asked for the name of the output file to contain the listing, as follows:

    ENTER PATHNAME FOR OUTPUT FILE
    RETURN FOR DEFAULT, ESC TO EXIT
    DEFAULT: /MAIN/SYSTEM/QUEUE/NEW/NNNNNNN.LIST:

The default pathname is the input queue for the print server, and nnnnnnn is a timestamp to insure that the name is unique. If you accept the default name by pressing <RETURN>, then when the file server is run any print server which

examines the queues on that file server will
discover the listing file and print it with no
further operator action required. If you wish to
assign a different pathname, perhaps so that a
separate processing program can read the listing
file, then override the default pathname by
supplying your own and pressing <RETURN>. If you
wish to terminate the utility at this point, or
at any other prompt for input, type <ESC>
<RETURN>.

The output file must be large enough to contain
the entire listing. You will be asked

  OK for size to be 400 sectors (Y/N)?

In most cases you may accept the default by
typing Y <RETURN>. For disks with an extremely
large number of files you may want to increase
the size of the output file. For disks with very
little free space for new volumes you may have
to decrease the size of the output file. To do
so, respond N <RETURN>, and you will be asked to
enter the size of the file in sectors.

Note that if the entire listing does not fit in
the output file, it will be truncated.

After these questions, the output file will be
created and initialized. If the file already
exists, you will be asked for permission to
replace it.

You will now be asked what disk, or part of
disk, is to be listed:

    Pathname of tree to list?

You may respond with the pathname of any disk or
directory subtree. Example responses are:

```
/main
/1
/main/users/smith
```

You are then asked whether you wish to list only
the directories in the subtree, or whether all
files,   including non-directories, should be
listed:

List non-directory files (Y/N)?

NOTE: The term "non-directory files" refers to
virtual volumes that are not directories.

If you respond Y <RETURN>, then all files will
be listed. If you respond N <RETURN>, then only
directories will be listed. The directory-only
list is usually a much shorter summary of disk
utilization.

Finally, you are asked for a title which is to
be printed on the top of each page of the
listing:

Listing title:

Respond with any string, or just <RETURN> for no
title.

The   utility will now   begin examining the
directory tree and create the listing file. As
it executes, a dot is printed on the screen for
every line added to the output file.

4.7.1 The Output Format

The output of this utility is a virtual volume
that contains a spooled print request. The first
few lines contain instructions to the print
server, followed by the file listing. There is

one line for each file in the subtree, indented
under the name of the directory which contains
it. After all the files of a directory have been
listed, a line starting with "---" summarizes
the number of files and total space used by the
files in that directory.

The line which describes a file gives the file
name, the file type, and the size in sectors.
(The size does not include a sector for each
file which contains internal file server
information, but that sector is counted in the
space used by files in the directory.)

4.8 Examine Disk Contents

Use this option for a variety of disk
maintenance purposes. The following is an
overview of some features of this option which
may be useful.

Turn on the file server. Press any key if you
want to use the utility from tape or any disk
other than the default disk (#1). Whether you
use the default disk or not, press the console
space bar when the "10 seconds" prompt appears.

If the file server is currently running, type
[<ESC><password><Return>]QUIT<return> to reach
the utility menu (brackets indicate optional
password).

When the utility menu is displayed, type H.

Input is via a nested series of menus; at the
outer level you have the choice of:

F(ile) - File system submode allows you to issue
   a variety of file server-like and other
   commands to manipulate disk structures.

D(isk) - Disk submode is used in conjunction
   with M(emory submode. It allows sectors to be
   brought in from or written to disk.

M(emory) - Memory submode allows sectors brought
   into memory by the D(isk submode to be brought
   into memory and changed.

   NOTE: Do not use the M(emory) or D(isk)
   submodes without the assistance of your
   network representative. Using these utilities
   may damage the contents of your permanent disk
   storage.

I(nfo) - Information about buffers within this utility are displayed.

Q(uit) - Return to the utilities menu.

The F(ile) submode prompts with "Command?" and has a large number of commands available. The HELP command will list most of the available commands, but you are encouraged to restrict your use to the examples shown below unless you get further information from your network representative. Note that some of the commands (such as CREATE) differ from their file server equivalents in the way in which information is supplied.

This utility is privileged in that it can override normal password and access controls. You will not be refused access to any file on the source, or asked to supply any passwords in any pathname. (Since the utility can only be run on the file server, this does not represent a breach of security).

F(ile) mode examples

(1) Renaming a disk volume

        Command? RENAME /1
        NEW NAME FOR MAIN (CR TO EXIT): NEWDISK
        DO YOU MEAN TO RENAME THE DISK? Y
        OK
        UNIT 1: NEWDISK?
        Command?

(2) Changing the file (system volume)
    that is to be booted by the file server

        Command? SETBOOT /1/SYSTEM/FILE SERVER
        OK

(3) Displaying the pathname of the current boot volume.

    Command? SHOWBOOT <rootname>

Examples:

    SHOWBOOT   /1
    SHOWBOOT   /ALT
    SHOWBOOT   //

results in a display of current boot volume. Use this utility in conjunction with SET BOOT.

(4) Deleting a file

    Command? DELETE /MAIN/USERS/LJS/JUNK
    OK

(5) Creating a file

    Command? CREATE /MAIN/USERS/LJS/NEWJUNK
    SIZE IN SECTORS? 100
    TYPE (SINGLE LETTER)? B
    OK

(6) Listing a directory

    Command? LIST /MAIN/USERS/LJS
    /MAIN/USERS/LJS
      DOCUMENTS ,T=P,SZ=2401S
      MAIL,T=P,SZ=204S
         ...etc...

(7) Listing a directory (nested) gives a "nested" listing of the specified directory.

    Command? LISTN /MAIN/USERS/LJS

Causes a display of all of the branching
subdirectories and volumes. For example, if
LJS contains the subdirectory "memos", all
of the volumes in that directory will be
listed under "memos"; if any of the volumes
listed in memos are directories, their
branching volumes will also be listed.

(8) To quit, type QUIT<Return>.

4.9 Check Disk Consistency

This utility is used to verify the condition of network hard disks. Among its functions are:

- Reading all sectors on the disk, including control and directory sectors, user data, and freespace, to verify that all sectors are physically readable. Sectors which cannot be read may be optionally rewritten to attempt to repair their damage.
- Reading and validating all control sectors (headers and file descriptors).
- Reading and validating all directory sectors starting with the root directory.
- Reading and validating all freespace descriptors.
- Reporting any orphaned sectors and optionally adding them to the freespace. (Orphaned sectors are those which are neither part of allocated files nor on the freelist, and may result from a file server crash which occurred while directory information was being updated.)
- Recovering lost freespace.

Use this option when you suspect that a disk problem exists and as a normal part of disk maintenance (such as backup and restore operations).

This utility is privileged in that it can override normal password and access controls. You will not be refused access to any file on the source, or asked to supply any passwords in any pathname. (Since the utility can only be run on the file server, this does not represent a breach of security).

4.9.1 How to Use the Check Disk Consistency Utility

Turn on the file server. Press any key if you want to use the utility from tape or any disk other than the default disk (#1). Whether you use the default disk or not, press the console space bar when the "10 seconds" prompt appears.

If the file server is currently running, type [<ESC><password><Return>]QUIT<Return> to reach the utility menu (brackets indicate optional password).

In either case, select I from the menu that is displayed.

The utility will ask

    UNIT NUMBER?

to which you respond with 1, 2, 3, or 4. It then asks whether you want the data part of files and/or the unused parts of the disk to be read and physically checked.

    CHECK DATA BLOCKS (Y/N)?

    CHECK FREE BLOCKS (Y/N)?

Respond Y or N to each question. (The only reason to respond N is to save time in the execution of the utility. N will increase speed of operation significantly).

This utility will then begin its examination of the disk. As each file is processed, the full pathname will be printed. After all files and freespaces have been checked, summary information will be displayed. The time required by the program to complete its examination depends upon the total number of

files and the total number of free extents that
separate them. About 10 MB/minute will be
examined.

If any inconsistencies or structural errors are
found, the utility will describe the problem
and, in many cases, request permission to take
some corrective action. The general description
of the possible inconsistencies, the corrective
actions, and the consequences, are beyond the
scope of this document. However, in the case
when the only reported error is orphaned blocks
(also called "gaps"), then it is generally safe
to allow the utility to add any such blocks to
the freespace.

If errors persist or anything besides "gaps" are
reported, contact your network service
representative.

4.10   Repair Disk

This utility is used to search for and repair
bad sectors or tracks on hard disks. Among its
functions are:

 - Read all sectors of the disk in physical
   order and report which are not readable.

 - Rewrite the data part of sectors discovered
   to be unreadable, or of any specified
   sector.

 - Reformat any track of the disk, salvaging as
   much of the data as possible.

 - Assign an alternate track for any track,
   salvaging as much of the data as possible and
   transferring it to the new alternate track.

This utility is privileged in that it can
override normal password and access controls.
You will not be refused access to any file on
the source, or asked to supply any passwords in
any pathname. (Since the utility can only be run
on the file server, this does not represent a
breach of security).

4.10.1   Summary Of Disk Organization

Since this utility operates on the data as it is
physically located on the disk, some
understanding of the physical disk organization
is helpful. This information is of no concern
for most other uses of the file server.

The basic read/write unit of data is the SECTOR,
which contains 256 bytes. A set of sectors is
recorded on a single line of a single disk
surface; that sequence is called a TRACK.

Several tracks of the disk are accessible
without repositioning the access arm; those are
collectively called a CYLINDER. Each step of the
access arm moves to another cylinder, of which
there are typically several hundred).

Some part of the magnetic surface used for a
track may have a defect which prevents data from
being written or read. In that case, the track
may be marked as "defective", and another track
chosen as its alternate. A pointer to the
alternate track is written in some good part of
the track which contains the defect. Alternates
are assigned beginning with the last track of
the last cylinder. Alternates are initially
assigned by the VERIFY operation of the Format
Disk utility, and additional alternates may be
assigned by the Repair Disk utility.

Each sector as recorded on the disk consists of
two parts: ID and DATA. The ID is written once
when the track is formatted, and contains the
cylinder, track and sector address of the data.
The DATA part contains the actual 256 bytes of
sector data, and is rewritten in whole whenever
any part of the sector is to be changed.

Finally, the logical order in which sectors are
written on the track is not the physical order.
To speed up access to logically consecutive
sectors, they are written in staggered fashion
called "interleaving".

4.10.2   Running The Utility

Turn on the file server. Press any key if you
want to use the utility from tape or from any
disk other than the default disk (#1). Whether
you use the the default disk or not, press the
console space bar when the "10 seconds" prompt

appears.

If the file server's software is running, type [<ESC><password><Return>]QUIT<Return> to quit the program and reach the utility menu (brackets indicate optional password).

When the utilities menu appears on the screen, select option J.

The utility will ask

   Hard disk unit number (1,2,3,or 4):

Respond with the number of the hard disk, followed by RETURN. For this and all further prompts, responding with ESC RETURN will abort the operation: either exit the program, or return to the main menu if a disk operation is in progress.

You will then be presented with a menu of operations to choose from:

   E(rror scan of whole disk)
   S(ector rewrite)
   R(eformat track)
   A(ssign alternate track)
   Q(uit)

                    WHICH?

Enter the letter E, S, R, A, or Q to choose an operation, followed by RETURN. When that operation is complete, the menu will be redisplayed for another choice. The Q option will exit the utility.

The primary operation of this utility is the "Error scan of whole disk", which causes the entire disk to be read a track at a time (option

E). If any sector of any track cannot be read, it reports

   *** I/O error reading sector nnnnnn
      Code $xx Subcodes $yy $zz
      Error is sector #rrr on track ttt

Refer to the table of hard disk errors for detailed information about the disk error codes and subcodes.

You are now given a menu of corrective actions to choose from:

S(ector rewrite) R(eformat track) A(ssign alternate track) C(ontinue scan)

               WHICH?

If you choose "Sector rewrite", the data part of the sector will be rewritten with zeroes. This is likely to be a successful operation only if the error does not involve the ID field of the sector. If it is unsuccessful, you will be asked whether you wish to reformat the track.

The "Reformat track" option will read as many of the sectors on the track as it can and store them in memory. It then attempts to reformat the track in the same place (i.e. not at an alternate location), and then rewrite the data sectors. Any sectors which could not be read are written with zeroes. If the reformat and rewrite operations are successful, it verifies that the data can be read by reading all sectors 10 times.

Reformatting the track is likely to be a successful operation if the error was caused by an electrical or mechanical transient, and not by a defect in the magnetic surface. Note that

because of the sector interleaving, a single damaged area spanning more than one sector will not correspond to a logically contiguous set of sectors.

It is possible that a track can only sometimes be formatted correctly. There are gaps dispersed throughout the track in the spaces between the sequence of ID and DATA records, and a small defect in the magnetic surface may or may not be positioned in a gap. Therefore, reformat may sometimes work on a track which has failed formatting before. In general, though, it is probably best to assign an alternate for any track for which reformatting fails.

If some part of the "Reformat track" operation fails, you are presented with the following choices:

    R(eformat original track again)
    A(ssign an alternate track)
    S(top repair of this track)

                                        WHICH?

The "Assign alternate track" operation also attempts to read as many of the data sectors as possible, but then marks the track as defective, formats a new alternate track from the end of the disk, and then writes the sectors on the alternate track.

If you already know that a particular sector or track on the disk is defective, and particularly if the sector or track is marginal and may not be caught by the "Error scan of whole disk", you may choose the "Sector rewrite", "Reformat track", or "Assign alternate track" options directly from the main menu. You will be asked for the sector number in question, or any sector

of the track in question, and should respond
with a decimal number or a hexadecimal number
preceded by $. (The sector number may have been
supplied by some other utility program which
discovered the bad sector). You will then be
presented with the same sequence of operations
and questions described above.

Warning: There is a limit on the total number of
alternate sectors that should be assigned by
either the Format Disk or Repair Disk options.
For both disk sizes, the limit is 326.

4.11 Format Disk

Hard disks are shipped already formatted. Under
normal circumstances there should be no need to
reformat a hard disk. Do not reformat a hard
disk without first contacting your network
representative.

The date of formatting is written in the device
header.

In order to prevent accidental erasure of
valuable data from the hard disk, execution of
this utility is password protected. To obtain
the password and for advice and assistance on
the the use of this utility, contact your dealer
or network service representative.

THIS UTILITY WILL DESTROY ALL DATA ALREADY ON
THE DISK AND GIVE YOU A FRESH EMPTY DISK. BE
SURE   THIS IS WHAT YOU WISH TO DO BEFORE
FORMATTING A DISK. HARD DISKS ARE FORMATTED AT
THE   FACTORY   AND   SHOULD   NOT   NORMALLY BE
REFORMATTED.

1. Turn on the file server. Press any key if you
   want to use the utility from tape or from any
   disk other than the default disk (#1).
   Whether you use the default disk or not,
   press the console space bar when the "10
   seconds" prompt appears.

   If the file server is in operation, type

      [<ESC><password><Return>] QUIT <Return>

   (brackets indicate optional password).   In
   either case, when the menu comes up, type K.

2. The next prompt will be:

      ENTER DRIVE NUMBER (1,2,3,4):

You must enter one of these numbers, (the hard disks 1,2,3,4) followed by <return>. Normally you would not reformat the hard disk units. This has been done by Nestar prior to shipping the hard disk units to you.

3. You are now prompted with the message:

ENTER Y TO PHYSICALLY
FORMAT THE DISK (Y/N)?

You must reply with 'Y' to cause the physical formatting information to be written correctly. This will destroy any data previous recorded on this disk.

If FORMAT recognizes the disk you are about to format as a previously formatted Nestar volume, it will ask

OK TO DESTROY "name" (Y/N)?

where "name" is the existing name of the volume. Respond Y if you wish to proceed, and all contents of the disk will be erased. Enter N to abort the operation.

Any errors will be shown on the console. Should you get a flurry of errors, you can press the <esc> key to abort the entire operation at this time. Contact your Nestar service representative when a suspect disk is encountered.

Entering 'N' in response to the PHYSICALLY FORMAT prompt proceeds to the next step.

4. You are now prompted with the message:

ENTER Y TO VERIFY ALL DATA

ON THE DISK (Y/N)?

You should verify the correctness of the formatted area of the disk, by replying ´Y´.

It is possible that some errors may occur, due to problems in writing the actual physical format information during step 6. If one or two errors occur during this phase, go back and reformat the entire disk again, including step 6. This may cure the problem. In no case use a disk which has permanent errors reported during the VERIFY phase of this program.

You can also press <esc> while the dots are being typed for each track during verification if you need to abort and start over.

5. You are now prompted with the message:

ENTER Y TO INITIALIZE THE DISK
ROOT DIRECTORY (Y/N)?

Type ´Y´, and the utility will prompt you with

ENTER DISK ID:

You should now type in a volume name, which will be used to identify this disk to the file server, and which can be specified by users in their disk requests. This name can be up to 15 characters long (however, do not use "/").

As in 5 above, if the utility recognizes the disk as a Nestar-formatted volume, it will ask

OK TO DESTROY "name" (Y/N)?

The utility will record the ID name you supply, and will perform other important system initialization tasks in the root directory for this disk. During this time the screen will display a series of dots again, following by the message:

DIRECTORY STRUCTURE INITIALIZED.

Type ´N´ to the message ENTER Y TO INITIALIZE... if you realize that you have made a mistake and wish to skip to the end of the program in order to begin again. A disk that does not have correct directory information will not be usable in the Nestar File System.

Any messages other than those described above should be recorded, and if the problem persists, reported to your Nestar service representative.

6. You will now be prompted with the message:

DO YOU WANT TO FORMAT
ANOTHER DISK (Y/N)?

Answering with ´Y´ will allow you to format additional disks. A reply of ´N´ returns you to the file server.

Whenever the utility program requests a reply from you, you may elect to abort the current stage of formatting, and start from the beginning of the program. This is done by pressing the <esc> and then <return> keys in succession.

4.12 Modem On/Off

This utility allows you to use a remote terminal
via modem with the file server. (See Section 2.2
for setting up a console or terminal).

The file server MODEM ON/OFF command (Chapter 3)
serves the same function.

To use this utility, turn on the file server.
Press any key if you want to use the utility
from tape or from any disk other than the
default disk (#1). Whether you use the default
disk or not, press the console space bar when
the "10 seconds" prompt appears. The utility
menu will appear.

If the file server is running use the MODEM
ON/OFF command to enable or disable the modem.

Select menu option M from the utility menu.

The utility will display a message such as

   Modem is disabled. Enable it (Y/N)?

Type Y <Return> to enable the modem, and file
server input will be directed simultaneously to
the local console and to a remote terminal via
modem, and accepted from either.

To disable the modem, select m from the menu and
the utility will display

   Modem is enabled.
   Disable it (Y/N)?.

Type Y <Return> to disable the modem.

4.13   Edit File Server Startup File

This utility allows you to edit the file of file
server startup commands (named FSCMD).

To use the utility, turn on the the file server.
Press any key if you   want to   use the   utility
from   tape   or   from   any   disk   other   than the
default disk (#1). Whether   you use the   default
disk   or not,   press the console   space bar when
the   "10   seconds"   prompt   appears.   When   the
utility menu appears, type N.

If   the   file   server   is   in   operation,   type
[<ESC><password><Return>]QUIT<Return>. When   the
menu comes up, type N.

This   utility manipulates the contents of a text
file located on the   file server´s boot   volume.
When   you select this option for the first time,
it will   simply query   you   for commands   to   be
stored   in this file and used by the file server
at startup.   In   response   to   each   prompt   for
"Command",   type in the desired command followed
by <Return>. Once you have entered all commands,
respond <Return> to the next prompt to terminate
the querying. The commands   will then be   stored
on disk.

The   next   time   you   select   this   option,   the
program will display the contents of the file on
the screen. (Use <CTRL-S> to stop scrolling   and
<CTRL-Q>   to   restart   it).   After   all existing
commands have been   displayed, the program   will
present   each command and   allow you to "retain"
it (by typing   <Return>), delete   it (by   typing
<space><Return>,   or replace it, by typing a new
command).

After all existing commands have been   processed
in   this   manner,   you   will   be   asked   whether

additional commands should be added to the file. If the response is no, the file is saved on disk. If the response is yes, you can add more commands in the same way. All commands then will be stored on disk.

Appendix A

Error Codes

A.1 Introduction

Errors in this Appendix are listed in the following order:

A.2 Hard Disk and Tape Errors

Disk error codes are reported in hexidecimal by the file server (the file server program and the various offline utilities). They consist of two parts:

a. a Disk error code, described in the Disk Error Code table in A.2.1.

b. a device subcode, which is device dependent and describes the details of the error.

You should contact your service representative immediately upon discovery of a hard disk error. Record both the error code and the subcode for your service representative.

A.2.1 Hard Disk and Tape Error Codes

HARD DISK ERROR CODES

```
------------------------------------------------------
CODE
(HEX)   DEFINITION STATUS REQ. 1
------------------------------------------------------
00      GOOD EXECUTION
01      GOOD EXECUTION;
        SEEK RETRY AFTER SEEK FAULT ERROR
02      GOOD EXECUTION;
        SEEK RETRY AFTER CYL MISMATCH ERROR
04      GOOD EXECUTION;
        DATA RETRY AFTER ID CHECK SUM ERROR
05      GOOD EXECUTION;
        DATA RETRY AFTER CRC ERROR
08      TAPE READ OPERATION COMPLETE,
        TERMINATED BY FILE MARK
13      DRIVE SEEKING
18      REWIND;POSITION COMMAND IN PROGRESS
19      ERASE TAPE;POSITION COMMAND IN PROGRESS
1A      RETENSION;POSITION COMMAND IN PROGRESS
1B      ADVANCE FILE MARK;
        POSITION COMMAND IN PROGRESS
1C      XPARENT BACKUP IN PROGRESS
1D      XPARENT RESTORE IN PROGRESS
20      DISK DRIVE NOT PRESENT
```

21	SEEK FAULT
22	CYLINDER MISMATCH ERROR
23	SECTOR NOT FOUND
24	ID CHECKSUM ERROR
25	DATA CRC ERROR
28	HEAD WRITE PROTECTED
30	INVALID CONTROLLER COMMAND
31	INVALID DISK DRIVE
32	INVALID HEAD
33	INVALID CYLINDER
34	INVALID SECTOR
36	INVALID DRIVE ID
37	INVALID SECTOR SIZE
	(OTHER THAN 128,256, OR 512)
38	DISK OVERRUN (MAX CYLINDER)
40	BAD SECTOR DETECTED BY
	CRC VERIFY ROUTINE
60	TAPE DRIVE NOT PRESENT
61	TAPE CARTRIDGE WRITE PROTECTED
62	FILE MARK DETECTED
63	BLOCK IN ERROR NOT FOUND
65	HARD DATA ERROR
68	CARTRIDGE NOT IN PLACE
69	END OF TAPE
6A	TAPE NOT ONLINE
6C	BOTTOM OF TAPE
6D	NO DATA DETECTED
6E	ILLEGAL COMMAND
	(TO TAPE DRIVE FROM FORMATTER)
70	INVALID COMMAND WITH
	TAPE WRITE MODE SET
71	INVALID COMMAND WITH
	TAPE READ MODE SET
73	TAPE NOT AVAILABLE
	(CURRENTLY BEING USED IN XPARENTCOM)
80	CONTROLLER RESET HAS OCCURRED
F0	NO COMMAND; AWAITING ACKNOWLEDGEMENT
F4	XPARENT COMMAND NOT COMPLETE
F8	NO XPARENT COMMAND IN PROGRESS

A.2.2   Device Error Subcodes

When a device dependent error occurs, a subcode
is displayed whose interpretation depends on the
device type. This code is displayed in
hexadecimal.

Each subcode is a single byte whose bits
represent various conditions, and several bits
may be on simultaneously, so that their sum
represents the total subcode. Not all bits
indicate errors; some are simply status
information. A device error subcode of 0
indicates no subcode is given for the device
causing the error.

A.2.2.1   Hard Disk Device Subcodes

BIT	NAME	DESCRIPTION
0	Ready	The drive is up to speed, servo system is locked onto a servo track, and the unit is in a state to read, write or seek.
1	Seek Complete	The bit is set when seek operation is completed.
2	Seek Fault	This bit indicates that a fault was detected during a seek operation.
3	Cylinder Zero	The access arm is positioned over cylinder 0.
4	Busy	The drive is in the process of executing a command.
5	Drive Fault	A fault was detected by the drive error monitoring circuitry.

6   Write   The head selected is write protected.
     Protect   Write protection is set by
                switches in the drive or when the
                drive is not sequenced up.

7   Command   A control or Register Load Command
     Reject   was received while the drive was
                not ready, or an undefined command
                was received.

A.3 Errors While Booting the File Server

A.3.1 Errors While Booting From Hard Disk

If a hardware error occurs during boot, an attempt is made to diagnose the problem and report it. The following table is a list of the messages and their meaning.

Disk drive not attached to PIC.

Indicates the Peripheral Interface Card (usually in slot 3 of the card cage) is not communicating with the controller. Possible causes are a damaged PIC, cable or disk controller.

Drive Error when identifying drive. Code is xx.

A hard disk error occurred while accessing the boot drive. See Section A.2.1 for list of the error codes and their meanings.

<u>Drive</u> <u>Error</u> <u>while</u> <u>reading</u> <u>boot</u> <u>volume.</u> <u>Code</u> <u>is</u> <u>xx.</u>

A hard disk error (error code xx) occurred while reading the boot volume //SYSTEM/FILESERVER. See Section A.2.1 for a list of the error codes and their meanings.

<u>PIC</u> <u>missing</u> <u>or</u> <u>not</u> <u>working.</u>

Indicates the file server could not access the PIC (usually in slot 3 of the card cage). The PIC is not present in the machine or is not working.

<u>Disk</u> <u>sector</u> <u>0</u> <u>is</u> <u>not</u> <u>initialized.</u>

The disk does not have a directory structure placed upon it. Indicates corruption of the disk structure.

<u>Disk</u> <u>is</u> <u>not</u> <u>initialized.</u>

Indicates there is no boot volume set for this drive.

All errors that occur while booting from the hard disk are serious and should be reported to your service representative immediately.

A.3.2 Errors While Booting From Server Boot Tape

If a hardware error occurs during the boot process, an attempt is made to diagnose the problem and to report it. The following is a list of the messages and their meanings.

Tape is not a Server Boot tape.

Indicates a tape of the wrong type was inserted
in the drive.   Only diagnostic boot tapes,   not
backup tapes, can be used to boot the server.

Version of the Boot tape must be Version 2.0 or
later.

Indicates an attempt was made to boot from a
tape older than the boot ROM.

Checksum error on Boot tape.

Indicates an error while reading tape. Possible
causes are a damaged tape or a defective drive
or controller.

Error during tape read. Result is xx.

Indicates an error occurred while reading the
boot tape. See Section A.2.1 for a list of the
error codes.

A.4 System Errors

If the file server detects a run-time error,

```
     ***** SYSTEM ERROR *****
     error type _____
     System stack is: nnnn
     Hit return to reboot server...
```

will be displayed, where error type is a message
describing the error.

If this should happen, you should contact your network service representative immediately. You should also record the full contents of the file server's console (for your service representative's use). Then reboot the file server and check the consistency of the disk (see the File Server Installation and Operation Manual, Section 4.9) before allowing the file server software to execute.

A.5 File Server Error and Information Messages

When the file server receives a file server command from a user station, it executes the command, if possible, and returns two variables:

- return code - an integer between 0 and 300

- return message, such as OK, ILLEGAL COMMAND, or TYPE=PASCAL

Messages are of several types:

- information, such as OK, IN USE, TYPE=BINARY

- user errors such as syntax errors or attempting to access a Network file without the necessary access rights

- system errors such as memory full or disk full; these should be reported to the system manager.

In this list, messages are classified as:

    general syntax

    pertaining to a specific command

    system errors

    file system errors.

General Syntax (0-19)

0,OK

(Not an error.)   The command was syntactically
correct and was executed without error.

1,ILLEGAL COMMAND

The command verb cannot be recognized, or cannot
be executed from this user station operating
system environment.   The command verb is the
first word of the command, and must be separated
from the rest of the command with one or more
blanks.

2,NAME PARAMETER REQUIRED

The first parameter of the command must be a
non-null pathname.

3,UNRECOGNIZED PARAMETER

A keyword parameter was not recognized.   Check
the spelling carefully, and make sure that it is
properly separated from the   previous   and
following items with commas.

4,ILLEGAL DRIVE NUMBER

A drive number must be specified with "D"
followed by an integer in the range supported
for your environment. Example: "D4".

5,ILLEGAL STATION NUMBER

A   station number must   be specified as a
two-digit hexadecimal number preceeded with $,
in the range $1 to $FE. Example: "$2D".

7,PARAMETER APPEARS TWICE

A keyword parameter appears more than once in a
single command. There can only be one occurence
of a keyword parameter, even if multiple
occurences have the same value.

8,ILLEGAL TYPE PARAMETER

The "T=" value is not one of the legal volume
types. It must be one of the following:

    P (Apple // Pascal)   B (binary)
    D (Apple // DOS),   S (system)
    C (Apple // CP/M)   Y (directory)
    3 (Apple /// SOS)   T (text)
    U (IBM PC p-SYSTEM PASCAL)   I (IBM PC DOS)

Example: T=P

9,COMMAND TOO LONG

A file server command must be no longer than 80
characters. In unusual cases where this is a
problem, long commands can often be shortened by
using a default directory, or by assigning
access rights in a subsequent PROTECT command.

10,PARAMETER TOO LONG

The new name given as the second parameter of
the RENAME command must be no more than 15
characters long. Remember that RENAME changes
only the last name in the sequence of names
which constitute a pathname. If you wish to
change the name of a directory, give the
pathname of the directory itself as the first
parameter of RENAME.

11,ILLEGAL PROTECTION PARAMETER

The value of the PUBACC, GRPACC, or PRVACC
protection item is incorrect. The value must be
some combination of the letters RWECD (read,
write, erase, create, and delete), or may be
null. For example, "GRPACC=RW" or "PUBACC=".

12,NO STATION CMD; USE $NN PREFIX

The "station" command has been removed. Use
"$nn <command>" where nn is the station number
on whose behalf you wish to issue the command.
(file server console only.)

13,ILLEGAL NUMBER (NEGATIVE OR TOO BIG)

The number was less than 0 or bigger than
32767. Number may be specified in decimal, or
in hexadecimal preceeded by $. Examples: "42",
"$1A3".

19,HELP FILE NOT FOUND

There is no HELP file for the word used as an
operand of the HELP command. Use the HELP
command with any parameters to see what the
possible HELP parameters are. (The system
manager has the option of removing all HELP
files to save space.)

Create (20-25)

20,TYPE PARAMETER REQUIRED (T=?)

The type parameter was missing. Example:"T=D".

21,SIZE OUT OF RANGE (<0B OR >32752B)

The value of the SIZE parameter was negative or greater than 32752 blocks. Each block is 512 bytes. Other units that can be specified are C (characters), and K (1024 bytes). If the units are omitted, B (512-byte blocks) is assumed. Examples: "SIZE=280", "SIZE=2000S".

23,SIZE PARAMETER REQUIRED WITH T=B, =T

The SIZE parameter must be specified to create a binary volume. The size may be an overestimate of the size of the data to be BSAVEd into the volume, but it must not be less.

24,SIZE OUT OF RANGE (<1C OR >48K)

The limits on the size of a binary (T=B) file are between 1C (one byte) and 48K (49152 bytes) regardless of the units used in the specification.

Delete (25-29)

29,CURRENTLY MOUNTED OR DEFAULT DIR

You cannot delete a volume which is currently mounted by any station, or which is the default directory (see the SET DIR command) of any station.

Mount (30-34)

30,DRIVE REQUIRED

You must specify what drive the volume is to be mounted on. Example: "D4".

31,IN USE

The volume you asked to mount is in use by another station. You are therefore denied exclusive use of that volume.

32,IN EXC USE

The volume you asked to mount is in exclusive use by another station. You are therefore denied any use of the volume.

34,RW NOT ALLOWED ON DIRECTORIES

You are not allowed to mount a directory (T=Y) volume for write access.

Unmount (35-39)

35,DRIVE OR "ALL" REQUIRED

You must specify a drive number or "ALL" on the UNMOUNT command. Examples: "UNMOUNT D1", "UNMOUNT ALL".

36,NOT CURRENTLY MOUNTED

The drive number specified in the UNMOUNT command does not have any virtual volume mounted on it by the file server.

Lock (40-44)

40,ILLEGAL LOCK NAME

A lock name must be 1 to 15 characters long.

ERRORS

41,IN USE

The lock name specified is in use by another
station. You are therefore denied exclusive use
of the lock.

42,IN EXC USE

The lock name specified is in exclusive use by
another station. You are therefore denied any
use of the lock.

Unlock (45-49)

45,NOT HELD

The lock name specified is not currently held by
your station.

BSAVE, BRUN, BLOAD (50-55)

50,CMD NOT ALLOWED FROM THIS STATION

The BSAVE/BLOAD/BRUN/OFF commands may only be
executed from an Apple // user station.

51,NOT BINARY

The pathname indentifies a volume which is not
binary (T=B). Only binary volumes can be used
for BSAVE, BLOAD, or BRUN commands.

52,NOT PREVIOUSLY SAVED

The binary volume was created but has never had
any data written into it using the BSAVE
command. It can not not be used with BLOAD or
BRUN until it has been BSAVEd into.

53,FROM PARAMETER REQUIRED

For BSAVE, the FROM parameter, which specifies
the memory area from which data is to be taken,
must be provided. Example: "FROM=$1000".

54,SIZE PARAMETER REQUIRED

For BSAVE, you must provide the SIZE parameter
on the BSAVE command to indicate how much data
is to be saved. This value must be less than or
equal to the size of the volume specified on the
original CREATE command. Example:
"SIZE=256.C".

55,FILE WAS THERE; REP NOT SPECIFIED

Data has already been saved in the binary
volume. To replace that data, you must specify
"REPLACE" as a parameter in the BSAVE command.

Set/List (57-58)

57,FILE IS NOT A DIRECTORY

The pathname given in a SET DIR command
identifies a volume which is not a directory
(T=Y).

58,USE: SET TIME [YYMMDD] [,HH[MM]]

If the date parameter was supplied, it was
incomplete or contained invalid fields. If the
time of day parameter was supplied, it contained
invalid fields.

4/1/83   A-15

ERRORS

Show (59-69)

59,TYPE=SYSTEM

(Not an error.) The volume mounted on the drive
for which you did a "SHOW TYPE" is a system
volume (T=S).

60,SHOW OPTION NOT RECOGNIZED

The   operand of a   "SHOW" command was not
recognized. Check the spelling and make sure
there are no extraneous items in the command.

61,DRIVE REQUIRED

For the "SHOW TYPE" command you must specify the
drive number on which the volume is mounted.
Example: "SHOW TYPE D12".

62,NOT CURRENTLY MOUNTED

The drive number specified has no volume mounted
on it by the file server.

63,TYPE=APPLE // CP/M

(Not an error.) The volume mounted on the drive
for which you did a "SHOW TYPE" is an Apple //
CP/M volume. (T=C).

64,NO DEFAULT DIRECTORY SET

(Not necessarily an error.) This response to the
"SHOW DIR" command indicates that there is no
default directory established for this station
by the file server.

65,TYPE=APPLE // PASCAL

(Not an error.) The volume mounted on the drive
for which you did a "SHOW TYPE" is an Apple //
Pascal volume (T=P).

66,TYPE=APPLE // DOS

(Not an error.) The volume mounted on the drive
for which you did a "SHOW TYPE" is an Apple //
DOS volume (T=D).

67,TYPE=BINARY

(Not an error.) The volume mounted on the drive
for which you did a "SHOW TYPE" is a binary
volume (T=B).

68,TYPE=DIRECTORY

(Not an error.) The volume mounted on the drive
for which you did a "SHOW TYPE" is a directory
(T=Y).

69,UNKNOWN TYPE

The volume mounted on the drive for which you
did a "SHOW TYPE" is not a standard volume
type.

70,yymmddhhmmssw

(Not an error.) Returns date and time
information in encoded form. For example, the
FS command TIMESTAMP returns the current year,
month, day, hour, minute, second, and day of the
week in the form 70,8104301859381 (that is, 6:59
P.M., Sunday, April 30, 1981).

71,--t--tt--t-t----

(Not an error.) Returns types of virtual disks
currently mounted on drives 1-16. (Each t is one
of Y,P,D,B,S,C,3,I,U,T). The system responds to
the FS command SHOW TYPES using this format.

72,TODAY IS DD-MON-YYYY HH:MM:SS

(Not an error.) This is the response to the SHOW
TIME command.

73,TYPE=TEXT

(Not an error.) The volume mounted on the drive
for which you did the SHOW TYPE is a text volume
(T=T).

74,TYPE=APPLE /// SOS

(Not an error.) The volume mounted on the drive
for which you did the SHOW TYPE is an Apple ///
SOS volume (T=3).

75,TYPE=IBM PC DOS

(Not an error.) The volume mounted on the drive
for which you did the SHOW TYPE is an IBM PC DOS
volume (T=I).

76,TYPE=IBM PC P-SYSTEM PASCAL

(Not an error.) The volume mounted on the drive
for which you did a "SHOW TYPE" is an IBM PC
p-System Pascal volume (T=U).

Local Commands   (90-92)

Vary   according   to   user   environment.   See the
appropriate User Guide.

System Errors   (94-99)

94,NOT CONNECTED

This is a network error that indicates that   the
connection   to   another   station   has   been
terminated prematurely.

95,UNRECOGNIZABLE NETWORK RESPONSE

The last response message   from file server   did
not   contain a numeric   error code, as expected.
This may indicate incorrect logic in the use   of
NETUNIT procedures from within Pascal programs.

96,NO NETWORK CARD IN SLOT

The slot number specified does not have a Nestar
network interface card installed, or the card is
defective.

97,FILE SERVER MEMORY FULL

The   file server   has no   space left   for tables
needed to complete your   request. This does   NOT
refer to memory space in the user station.

98,NETWORK ERROR

The network routines were unable to complete the
transaction. The error may be transient; see the
description of NETUNIT for more information.
This error does not occur from most user level
programs, such as NET.

99,USER ABORT

The network abort key was pressed while a
network transaction was queued up or in
progress. The transaction was aborted.

File System Errors (100-140)

101,END OF FILE OR RECORD OUT OF RANGE

An attempt was made to read a block or sector of
a volume which is outside the legal range for
that volume.

102,FILE NOT FOUND

The volume specified by the pathname was not
found, or one of the directories in the pathname
was not found. Check the spelling of each
filename in the pathname. If the name does not
begin with a slash, check that the current
default directory is the correct one.

103,BAD DELIMITER IN PATHNAME

A delimiter other than "/" or ":" was found in a
pathname. Make sure that you have not omitted a
comma separating the pathname from other
operands in the command.

104,FILE NAME OR PASSWORD TOO BIG

A single filename (the part between slashes in a
pathname), or password (the part after a colon
in a pathname) is longer than the maximum of 15
characters.

105,NO ACCESS FOR READ TO DIRECTORY

You have been denied read access to a directory
which is part of the specified pathname.

106,NON DIRECTORY FOUND IN PATHNAME

One of the names in the pathname (other than the
last name) identifies a volume which is not a
directory (T=Y). Only the last thing in a
pathname can be other than a directory.

107,END OF PATHNAME IS A DIRECTORY

The pathname specifies a directory (T=Y) in a
context where a non-directory volume is
required.

109,ROOT DIR NOT SPECIFIED NO DEFAULT

The specified pathname does not begin with a
slash, and there is no default directory
recorded for this station by the file server.
If you wish to completely specify the pathname,
begin with a slash and the name or number of the
disk unit. If you wish to use the current
default directory, do not begin the pathname
with a slash. You may use the "SHOW DIR"
command to find out the current default
directory, and the "SET DIR" command to
establish one.

110,NO ACCESS FOR READ

You have been denied read access to the volume specified by the pathname, or to a directory along the path.

111,NO ACCESS FOR WRITE

You have been denied write access to the volume specified by the pathname.

112,NO ACCESS FOR APPEND (not yet implemented)

You have been denied append access to the volume specified by the pathname.

113,NO ACCESS FOR ERASE

You have been denied erase access to the volume specified by the pathname. Erase access is necessary to delete the file.

114,NO ACCESS FOR CREATE

You have been denied access to create or rename an entry in one of the directories specified in the pathname.

115,NO ACCESS FOR DELETE

You have been denied access to delete or rename an entry in one of the directories specified in the pathname.

116,CANT DELETE NON-EMPTY DIRECTORY

The pathname specified in a DELETE command identifies a directory, and that directory is not empty, that is, it still points to other volumes. Only empty directories can be deleted by a single file server DELETE command. To delete non-empty directories (i.e. subtrees) see the description of the TREEWALK utility in the User's Manual for supported environments.

117,FILE SERVER MEMORY FULL

The file server has no space left for tables needed to complete your request. This does NOT refer to memory space in the user station.

118,DISK FULL

There is not enough contiguous space left on the disk unit to create the volume. The LIST command when used to display the root directory will give information about the space available on a disk unit. Example: "LIST /MAIN".

119,DIRECTORY FULL

There is not enough space left to create more entries in the directory, and the directory cannot be expanded. Directories are automatically expanded as necesary to accomodate new entries.

120,INTERNAL ERROR

An internal error has been detected by the file server. Additional information is written on the console of the file server. That information and the circumstances surrounding the error should be transmitted to your support organization for diagnosis. The file server should be restarted as soon as practical.

121,UNINITIALIZED DISK

The disk unit has not been initialized. All
disks must be formatted and initialized using
the file server FORMAT DISK utility; see the
File Server Installation and Operation Manual.

122,WRONG SOFTWARE VERSION

The disk format is not compatible with version
of the file server currently running. (This
error cannot occur with any file servers so far
released.)

123,FILE ALREADY EXISTS

The file you have asked to create, or the new
name used in a RENAME command, already exists in
the directory.

124,DISK I/O ERROR, SUBCODES x,y

A hardware I/O error was detected. The details
of the error are described in the subcodes; for
more information, see the table of I/O errors at
the beginning of this appendix.

125,VERIFY FAILED (BAD MEMORY)

All disk write operations are verified by
reading back the recorded data and comparing it
to the data stored in memory. This error
indicates that the disk data did not compare
correctly. It sometimes indicates a memory error
in the file server, and not a disk error.

128,BAD UNIT NUMBER IN PATHNAME

The first item after the initial slash in a
pathname is a number, but it is not in the legal
range for unit numbers (1 to 4).

130,NEED PRIVATE PASSWORD FOR PROTECT

In order to execute the PROTECT command for any
volume, the private password must be specified
in the pathname or as a default private
password. The password must be specified
whenvever the volume has a non-null private
password, regardless of the access rights
currently assigned to the volume.

131,UNIT NAME NOT FOUND

The name after the initial slash of a pathname
is not the name of a disk unit currently
recognized by the file server. You can also use
the unit number in place of a name, if you
wish.

133,DISK NOT READY

The disk unit specified is not ready. The one
minute warmup period after initial power up may
not have elapsed. It may also indicate a
controller or disk drive failure.

Appendix B

The Apple // DOS User Environment

B.1 Transferring Additional Necessary Files To
/MAIN/LIB/APPLE2/DOS

To make commonly used programs, such as FID or
MUFFIN, available to all network DOS users on a
shared library volume, obtain an Apple DOS
diskette containing, in this example, FID and
MUFFIN. With a local floppy connected via slot
4, power on an Apple // workstation that has
been attached to the network. In response to the
"Volume to Boot" prompt, type

/MAIN/LIB/APPLE2/DOS

Type PR#N (where N is the slot containing the
Network Interface Card.)

Insert the Apple diskette and type:

LOAD FID, S4, D1

SAVE FID, SN, D1
(N = Network Interface Card slot)

LOAD MUFFIN, S4, D1

SAVE MUFFIN, SN, D1

B.2 Setting Up Disks For The DOS Environment

From a user station, boot /MAIN/LIB/APPLE2/DOS.
After the prompt has been displayed, type "RUN
CREATE". Respond to the program's prompts. The
CREATE program is documented in the Apple // DOS
User's Guide.

Appendix C

The Apple // Pascal User Environment

C.1 Transferring Additional Necessary Files To
     /MAIN/LIB/APPLE2/UCSD/PASCAL

/MAIN/LIB/APPLE2/UCSD/PASCAL is the virtual
volume that the BOOT program MOUNTs on drive #5
as a library for Pascal users.   (This may be
changed by changing the contents of the profile
record for a particular user station address.)

As shipped, /MAIN/LIB/APPLE2/USCD/PASCAL does
not   contain   SYSTEM.COMPILER,   SYSTEM.EDITOR,
etc., which may be needed.

To   copy   the   Pascal   system   files   to
/MAIN/LIB/APPLE2/UCSD/PASCAL   follow   the
procedure listed here. Those familiar with the
Pascal   and   Nestar   systems   may   skim the
directions for the underlined phrases.

NOTE: /MAIN/LIB/APPLE2/UCSD/PASCAL is protected
from write operations with the password NESTAR.
The password or protection may be changed using
the PROTECT command from the system console or
from the NET program at a user station.   The
current password must be given in the PROTECT
command.

1. Start the Network File Server (flip on power
   switch).

2. Configure a 64K user station with a network
   interface card in slot 6, and a 16-sector
   Apple floppy drive in slot 5, drive 1.
   Ensure that all minidisks are for use with
   Apple Pascal Release 1.1.

3. Boot /MAIN/LIB/APPLE2/UCSD/PASCAL at the user
   station by turning on the power and answering
   the prompt:

        VOLUME TO BOOT:

   with /MAIN/LIB/APPLE2/UCSD/PASCAL:NESTAR

4. Insert Apple1: the Pascal Release 1.1 system
   floppy diskette provided by Apple into local
   mini disk drive.

5. Enter the Pascal Filer (on Apple1:) by typing
   ´F´.

6. The BOOT program will mount

        /MAIN/LIB/APPLE2/UCSD/PASCAL

   on both #4: and #5:. In the Filer this will
   cause a "WARNING UNITS 4 & 5   HAVE THE SAME
   NAME". Disregard this warning and execute the
   following steps exactly.

7. Transfer the Apple Pascal files from APPLE1:
   and APPLE2: to #4:

      from APPLE1:

           SYSTEM.EDITOR
           SYSTEM.LIBRARY
           SYSTEM.CHARSET
           SYSTEM.SYNTAX

      and from APPLE2:

           SYSTEM.COMPILER
           SYSTEM.LINKER
           SYSTEM.ASSMBLER
           6500.OPCODES
           6500.ERRORS

APPLE1: and APPLE2: are diskettes distributed
by Apple with the Pascal system. Be sure to use
Release 1.1 of Apple Pascal. If you have an
older release of Apple Pascal, see your Apple
dealer for an updated release.

NOTE: Only transfer the files listed above.
DO NOT TRANSFER SYSTEM.APPLE OR SYSTEM.PASCAL.

File transfer is done as follows:

1. The file to be transferred is on a 5 1/4"
   floppy diskette. Insert it in drive 1 of the
   controller in slot 5.

2. Type ´T´ for transfer.

3. The filer will respond with:

        TRANSFER WHAT FILE ?

   Type in the volume name followed by the file
   name (e.g. APPLE1:SYSTEM.EDITOR). Then type
   <return>.

4. The filer will ask:

        TO WHERE ?

   Type ´#4:$´.

   Do this for each file to be transferred.

C.2 Setting Up User Virtual Volumes For The
     Pascal Environment

Using the steps listed below you may create
Pascal volumes for users.

1. Boot /MAIN/LIB/APPLE2/UCSD/PASCAL at a user station by turning on the power and answering the prompt:

    VOLUME TO BOOT:

   with

    /MAIN/LIB/APPLE2/UCSD/PASCAL:NESTAR

2. From the command level of Pascal X(ecute N by typing ´X´. The system will respond by saying:

    EXECUTE WHAT FILE?

   Type ´NET´ and press <return>.

3. NET will display its copyright notice followed by its prompt ":". Create the user´s bootable Pascal volume (for instance, /MAIN/USERS/NAME/1) and mount it on drive 9 by typing:

    CREATE /MAIN/USERS/NAME/1,T=P,D9,RW

   If there is a minidisk controller in slot 4, set drive 9 virtual by typing

    SET DRIVE 9 VIRTUAL

4. Type Q<return> to exit (quit) NET.

5. Go into the Pascal Filer by typing ´F´.

6. Zero /MAIN/USERS/NAME/1´s directory by typing ´Z´. The filer will respond with:

    ZERO DIR OF WHAT VOL ?

Respond with ´#9:´. The filer will ask:

    DUPLICATE DIR ?

Since Apple Pascal does not support this
feature, type ´N´. Next, it will ask:

    # OF BLOCKS ON THE DISK ?

Enter whatever number you used for SIZE=x
when   you created MAIN/USERS/NAME/1. (280
blocks in this example, since SIZE= was not
specified in the CREATE command.) Then it
will ask:

    NEW VOL NAME ?

We suggest you name the volume ´NAME:´.   So
type ´NAME´ and <return>. It will ask if this
is correct by:

    NAME: CORRECT ?

Type ´Y´. The zero command terminates with
the message

    NAME: ZEROED.

The user can now boot a user station in Pascal
by responding to the BOOT program with:

    /MAIN/USERS/NAME/1

Note that the instructions for what pathnames to
use (/MAIN/USERS/NAME/1) and what Pascal volume
names to use (NAME) are only suggestions, and
other naming conventions may be preferred in
some environments.

Appendix D

The Apple // CP/M User Environment

D.1 Transferring Additional Necessary Files To /MAIN/LIB/APPLE2/CPM

A number of files necessary or useful in the CP/M environment with the file server software, on the shared library volume

/MAIN/LIB/APPLE2/CPM

can be found:

CREATE.COM	SUBMIT.COM
CMD.COM	INSTALL.SUB
COPYSYS.COM	NWLIB.ERL
NCONFIG.BAS	NWRTNS.REL
SETREAL.COM	STARTCMD.SUB
SETVIRT.COM	NETUNIT.TYP
REALFMT.COM	NETUNIT.FNS
TURNKEY.COM	CMDUNIT.FNS
OFF.COM	CMDUNIT.TYP

Users will want additional files on the library volume (such as PIP, STAT, and the other programs found on the Microsoft distributed diskette).

Before adding such program files, note that 2 cards are needed in the 64K user Apple:

a Z-80 card in any available slot
a minifloppy controller in slot 4, drive 1

With these cards installed, power on a user station and respond to the "Volume to Boot" prompt with

/MAIN/LIB/APPLE2/CPM

When the A> prompt appears, insert the Microsoft
16 sector CP/M diskette in the floppy drive,
then type

SUBMIT INSTALL

This program will automatically PIP files from
the Microsoft diskette to your library volume.
Not all the files on the Microsoft diskette are
transferred. DO NOT transfer any others.

D.2 Setting Up User Virtual Volumes for the
     CP/M Environment

To set up bootable virtual volumes for CP/M
users, power on a user station and respond to
the "Volume to Boot" prompt with

/MAIN/LIB/APPLE2/CPM

Follow the CREATE.COM instructions in the User
Guide for this environment.   CREATE.COM mounts
the new volume on G:. PIP such necessary files
as NET.COM from A: to G:.

Appendix E

The Apple /// SOS User Environment

E.1 Transferring Additional Necessary Files To
     /MAIN/LIB/APPLE3/SOS

Nestar distributes the following Apple /// SOS
environment files on the shared library volume
/MAIN/LIB/APPLE3/SOS:

        NET.CODE (Pascal)
        TREEWALK.CODE
        CAPTURE (Business Basic)
        UTILS (APPLE /// UTILITY FILER)
        NETWORK.LIBRARY
        NET (Business Basic)

To install additional necessary or useful files
such as:

    SYSTEM.EDITOR
    SYSTEM.FILER

1. Boot the Nestar supplied Apple /// Pascal
   boot diskette

2. X(ecute) NET

3. Mount /MAIN/LIB/APPLE3/SOS,D1,RW

4. Q(uit) the NET program

5. Insert the Apple /// PASCAL1 diskette in the
   Apple´s built-in floppy.

6. Type F, to use the filer

7. Transfer the real diskette files to the
   shared library volume by typing T   and

4/1/83   E-1

answering   the   prompt   "Transfer   what   file?"
with

     .D1/XX,.N1/$

XX being the file name.

8. Repeat this   procedure   using the   Apple   ///
   PASCAL2 and PASCAL3 diskettes, as well as any
   other SOS diskettes containing useful Pascal
   or Business Basic programs.

E.2   Setting Up User Virtual Volumes For The
      Apple /// Environment

Before continuing, read Section 2.3 of the File
Server Apple /// SOS User's Guide.

To create nonbootable virtual volumes for system
users:

1. Boot a user station with an Apple /// Pascal
   diskette configured for network use.

2. Mount /MAIN/LIB/APPLE3/SOS, if it has not
   been mounted automatically.

   NOTE: If the boot diskette being used is a
   copy of the master Apple /// Pascal network
   · boot diskette shipped with your network, the
   shared library volume is mounted during the
   boot process.

3. X(ecute) /LIB/NET

4. Create /MAIN/USERS/NAME/SOS1,T=3,D2,RW

5. Quit the NET program.

6. Use the /LIB/UTILS program to format the new

volume, now mounted on .N2 for READ/WRITE usage. This volume has a size of 280 blocks, the default value, since the size parameter was not specified in the create command.

E.3 Creating Boot Diskettes

The system is shipped with two Apple /// boot diskettes that have been configured for network use. (SOS.DRIVER files contain the necessary network driver code to handle several character devices (.NCMD, .NMSG and .PRINTER) and 11 block structured devices (.N1 - .N11).

One diskette contains a Business Basic interpreter (Master Basic network boot diskette); the other contains a Pascal interpreter (Master Pascal network boot diskette).

The system manager should make a working copy of each diskette and then place the original master diskette in a secure place. (Use the Utility Filer that is shipped as SYSTEM.STARTUP on the SYSTEMS UTILITY diskette from Apple to duplicate the diskette.)

In addition to backing up the master diskettes, the system manager needs to make a copy for each user. (Some users may not need both Pascal and Business Basic network boot diskettes.)

Appendix F

The IBM PC UCSD p-System User Environment

F.1 Transferring Additional Necessary Files To
     /MAIN/LIB/IBMPC/UCSD/PASCAL

/MAIN/LIB/IBMPC/UCSD/PASCAL   is   the   virtual
volume   that the profile MOUNTs on drive #4 as a
library for Pascal users. (This may be changed
by   changing   the   contents   of   the profile
record for a particular user station address.)

As shipped, /MAIN/LIB/IBMPC/USCD/PASCAL does not
contain   SYSTEM.COMPILER,   SYSTEM.FILER,
SYSTEM.EDITOR,   SYSTEM.PASCAL,   SYSTEM.INTERP,
etc., which will be needed to use the Pascal
environment.

To   copy   the   Pascal   system   files   to
/MAIN/LIB/IBMPC/UCSD/PASCAL follow the procedure   .
listed here. Those familiar with the Pascal and
Nestar systems may skim the directions for the
underlined phrases.

NOTE: /MAIN/LIB/IBMPC/UCSD/PASCAL is protected
from write operations with the password NESTAR.
The password or protection may be changed using
the PROTECT command from the system console or
from the NET program at a user station. The
current password must be given in the PROTECT
command.

1. Boot a network boot diskette (see Section F.3
   for instructions on creating network boot
   diskettes.)

2. X(ecute NET and enter

        MOUNT /MAIN/LIB/IBMPC/UCSD/PASCAL,d9,RW

and

    Q

to quit NET.

3. Use the Filer to transfer all system files
   from the Boot Disk (not from the IBM
   distributed disks) from #4 to #9.

F.2 Setting Up User Virtual Volumes For The Pascal Environment

Using the steps listed below you may create
Pascal volumes for users.

1. Boot a network boot diskette (see Section F.3
   for instructions on creating network boot
   diskettes.

2. From the command level of Pascal X(ecute NET
   by typing ´X´. The system will respond by
   saying:

        EXECUTE WHAT FILE?

   Type ´NET´ and press <return>.

3. NET will display its copyright notice
   followed by its prompt ":". Create the
   user´s bootable Pascal volume (for instance,
   /MAIN/USERS/NAME/1) and mount it on drive 9
   by typing:

        CREATE /MAIN/USERS/NAME/1,T=U,D9,RW

4. Type Q<return> to exit (quit) NET.

5. Go into the Pascal Filer by typing ´F´.

6.   Zero /MAIN/USERS/NAME/1´s   directory   by
      typing ´Z´. The filer will respond with:

          ZERO DIR OF WHAT VOL ?

      Respond with ´#9:´. The filer will ask:

          DUPLICATE DIR ?

      Since Apple Pascal does not support this
      feature type ´N´. Next, it will ask:

          # OF BLOCKS ON THE DISK ?

      Enter whatever number you used for SIZE=x
      when you created MAIN/USERS/NAME/1.   (640
      blocks in this example, since SIZE= was not
      specified in the CREATE command.) Then it
      will ask:

          NEW VOL NAME ?

      We suggest you name the volume ´NAME:´. So
      type ´NAME´ and <return>.   It will ask if
      this is correct by:

          NAME: CORRECT ?

      Type ´Y´. The zero command terminates with
      the message

          NAME: ZEROED.

The user can now boot a user station in Pascal
by responding to the BOOT program with:

      /MAIN/USERS/NAME/1

Note that the instructions for what pathnames to
use (/MAIN/USERS/NAME/1) and what Pascal volume
names to use (NAME) are only suggestions, and

other naming conventions may be preferred in some environments.

F.3 Creating Boot Diskettes

Requirements

You will need an IBM PC with 128K bytes of memory and two or more double sided diskette drives.

You should have available the SYSTEM2 and UTILITY diskettes provided by IBM and the UPSMAKER diskette provided by NESTAR. You will also need one spare double sided diskette in addition to the double sided diskette on which the network boot is being constructed.

Making The Diskette

1. Insert the SYSTEM2 diskette into the first drive and boot up. If not already done, format the diskette to be used for booting using the DISKFORMAT program on the UTILITY diskette.

2. Using the Filer, ZERO the directory on the new diskette and name it. In this document, the new diskette will be called BOOT. Wherever you see "BOOT", you should substitute the name chosen for your own boot diskette.

3. Still in the Filer, TRANSFER all files from SYSTEM2: to BOOT:. This is easily done by typing

        T   [for TRANSFER]
        SYSTEM2:=,BOOT:$ [enter]

This process will transfer all files on the
SYSTEM2: diskette volume to the BOOT diskette
volume, including two files that are not
needed on the BOOT diskette: SYSTEM.STARTUP
and SYSTEM.LOGO. Once the transfer process is
complete, it is recommended that you use the
Filer to remove these files.   The file
SYSTEM.SYNTAX is not strictly necessary on a
boot diskette, and its file space will be
·required later. It should be removed also.

4. Remain in the Filer. Type ´T´ to prepare to
transfer more files. When you get the prompt
´Transfer which file?´, remove SYSTEM2: and
insert UPSMAKE: in its place. Now transfer
all files from UPSMAKE: to BOOT: by:

        UPSMAKE:=,BOOT:$ [enter]

5. Still in the Filer, you must now transfer the
first block from UPSMAKE: to BOOT:. This is
done by a volume-volume transfer, specifying
only 1 block as follows:

        T [for TRANSFER]
        UPSMAKE:,BOOT: [enter]

which will cause the prompt

        ´Transfer 640 blocks´? Answer ´N´

which will generate a further prompt

        ´Number of blocks to transfer?´

to which you should respond

        1 [enter]

and one block will be copied from UPSMAKE: to

BOOT:, after which the Filer will report that the volumes have been copied as requested.

Now reboot using the BOOT: diskette. Then insert the UTILITIES diskette in the second drive. Execute #5:SETUP. Change the two fields (to make a 128K byte system) as described on page 4-6 of the Operations User Guide Book 1 and page 7-5 of the Operations User Guide Book 2. Set field "code pool base (first word)" to 1. Set field "has extended memory" to TRUE. Remember after saving to disk that SYSTEM.MISCINFO must be removed, and then NEW.MISCINFO must be renamed SYSTEM.MISCINFO.

You can now set the diskettes SYSTEM2: and UPSMAKE: aside. They should not be required again.

6. If not already done, turn your IBM PC off, disconnect from the main power supply, remove the main unit cover and insert a NIC into a free slot in the computer. Now insert BOOT: into the first drive (do not put a write-protect label on BOOT:) replace the cover and turn the computer on. The system should now perform a bootstrap in accordance with the User's Guide. However, you have not finished, since the system as it now exists on Boot: will only support up to four disk drives (real or virtual). The remainder of the procedure is concerned with modifying the standard system to enable you to utilize up to six drives (though you can only use at most four real drives). If you will need to use only four drives, BOOT: will suffice as it now exists. However, we recommend that you complete the procedure regardless of your immediate requirements.

7. X(execute UPSPATCH. You should see a series of lines on the screen reporting that patches are being made. You do not need to examine these lines. The program should terminate after reporting "SYSTEM.INTERP patched".

8. Load the UTILITY: diskette into the second drive and X(execute #5:LIBRARY twice. On the first run, specify INITIALI.CODE as the output file, and SYSTEM.PASCAL as the input file. Copy slot number 1 (INITIALI) to slot 1 in the output file and then Q(uit. (Respond to "Notice?" with <enter>.) On the second run, specify GETCMD.CODE as the output file and SYSTEM.PASCAL as the input file. This time, copy slot 2 (GETCMD) to slot 2 in the output file and Q(uit. You should now have two further files on BOOT:, viz. INITIALI.CODE and GETCMD.CODE.

9. Still with UTILITY: in the second drive, X(execute UTILITY:PATCH. Instructions for running PATCH are available in the UCSD User's Guide. Your first action should be to G(et INITIALI.CODE. You should then R(ead block 4, and, with display in character form (use the M(ix option), V(iew the block read. You should be able to see a character string "*SYSTEM.STARTUP" preceded by two characters "OF". Select the T(ype option and move the cursor to the zero of the "OF". Use the H(ex option to replace the "OF" by "OE", then type <Ctrl>-C. Now use the C(har option to replace the following string ´*SYSTEM.STARTUP" by ´*NETWORK.START ´ then type <Ctrl>-C. Now Q(uit the type option, and S(ave the edited block back to the file.

10. Still using PATCH, G(et GETCMD.CODE and R(ead block 14. You should be able to see the same string "*SYSTEM.STARTUP" preceded

by the "ØF". Perform the same edits as for INITIALI.CODE, remembering to S(ave the block back to the file. Finally, Q(uit the PATCH program.

11. Format a spare diskette and load it into the second drive. A pre-formatted diskette will also suffice. Use the Filer to zero it and name it, for example, TEMP:. REMOVE TEMP: and replace it with the UTILITY: diskette, X(execute UTILITY:LIBRARY. When the program prompts you for the name of the output file, remove UTILITY: from the second drive and replace it with TEMP:. Specify TEMP:SYSTEM.PASCAL as the output file and BOOT:SYSTEM.PASCAL as the input file. Using the S(elect option, copy all segments to the output file EXCEPT segments 1 and 2 (INITIALI and GETCMD). When this is complete, select a N(ew input file (INITIALI.CODE). Copy slot 1 from INITIALI.CODE into slot 1 of the output file. Now select a further N(ew input file with GETCMD.CODE as the input file. Now copy slot 2 of GETCMD.CODE into slot 2 in the output file. Finally, Q(uit the program, and when asked for a "Notice?", type [enter] to complete the run.

12. The last stage of the process involves copying TEMP:SYSTEM.PASCAL to BOOT:SYSTEM.PASCAL. When this is done, you should re-boot using BOOT:. You should find it possible to utilize up to six drives. The process is complete. The only remaining (non-compulsory) task is to use the F(iler to R(emove unwanted files from BOOT:, viz. "UPSPATCH.CODE", "SYSTEM.PATCHES", "INITIALI.CODE" and "GETCMD.CODE".

13. Further boot diskettes can be produced by

simply copying the entire volume BOOT:,
including the Boot block (block 1), onto a
formatted diskette using the Filer T(ransfer
command and responding to "Transfer what
file?" with "Boot:,NEWVOLUME:". Use the
Filer C(hange command to change the name of
the new boot diskette.

Appendix G

The IBM PC DOS User Environment

G.1 Transferring Additional Necessary Files To /MAIN/LIB/IBMPC/DOS

A number of files necessary or useful in the DOS environment with the file server software are included on the shared library volume /MAIN/LIB/IBMPC/DOS:

    NET.EXE
    STARTUP.EXE
    SETPROF.EXE
    NET.UNIT.ITF
    NETUNIT.OBJ
    CMDUNIT.ITF
    CMDUNIT.OBJ

Users may want additional files on the library volume (such as FORMAT and the other programs found on the Microsoft distributed diskette).

This can be done by using the NET program to mount the library volume RW and then using the DOS COPY command to copy any desired files to the library volume.

G.2 Setting Up User Virtual Volumes for the DOS Environment

To set up virtual volumes for DOS users, boot a network boot diskette (see Secion G.3 for instructions on creating a network boot diskette).

Follow the instructions for the INIT command of the NET program in the User Guide for this environment.

G.3 Creating Boot Diskettes Boot Diskette

Requirements

You will need the standard DOS 1.1 boot diskette
issued by IBM, the DOSMAKER and UTILITIES
diskettes issued by your network manufacturer, a
spare diskette to become the network boot
diskette, and an IBM PC with 128K bytes.

Making the Boot Diskette

1. Insert the DOS 1.1 boot diskette into the
   first drive and load DOS normally.

2. Insert the blank diskette into B: and run
   FORMAT to format the diskette and copy the
   system files. The command line should be:

        format b:/s

3. Put the new network boot disk, that you have
   just formatted, in drive A: and the Nestar
   DOSMAKER diskette in drive B: (if you have a
   two-drive IBM PC). Reboot the system.

4. At the A> prompt, key in

        B:P4000

   This will execute the batch file P4000.BAT on
   drive B:, which copies the network files from
   the DOSMAKER disk to the new network boot
   disk and patches the operating system (via
   IBMBIO.com) to use the network.

   You can execute this process on a
   single-drive IBM PC. DOS will prompt you to
   put in disk A:, disk B: or the batch file's

disk.   These disks are:

  ´A:´ - the new network boot disk
  ´B:´ - the DOSMAKER disk
  ´the batch file´s disk´ - the DOSMAKER disk.

5. Optionally,   copy   any   other   files required
   from the second distribution disk (UTILITIES)
   to A:. In particular copy SETPROF.EXE. You
   may   wish   to   copy the   NETUNIT   and CMDUNIT
   files if you are going to write programs that
   use the network.

6. Optionally, replace the DOS 1.1 diskette in
   B: and copy any utilities you may need on the
   boot   diskette.   In   particular,   copy
   FORMAT.COM, as this will permit new network
   boot   diskettes   to   be   produced   much   more
   quickly, as in (7) below. The process is now
   complete. The diskette in A: can be used as a
   network boot.

7. If ·you   copied   FORMAT.COM onto   the   network
   boot   diskette, further boot diskettes may be
   made by inserting the network boot diskette
   into   A:, inserting a blank diskette into B:
   and then   formatting the   blank diskette   and
   copying all files from A: to B:, as follows:

        format b:/s
        copy *.* b:

   The   diskette in B: will   be a   network boot
   diskette with   all utilities   available   that
   were available on the ´old´ boot diskette.

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PLAN 4000 Physical Planning and Installation Manual	GA40-0101
File Server User's Manual	SC40-0200
File Server Apple // Pascal User's Guide	SC40-0501
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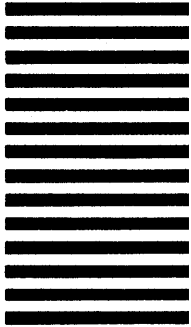Attn: PUBLICATIONS DEPT.

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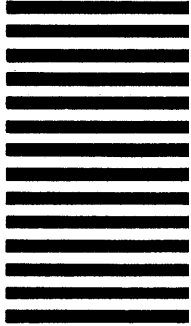First Class   Permit No. 239   Palo Alto, CA

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