

~~BSYS.DOC~~
B.SYS.DOC
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Program Name: BSYS TOPS20 Backup System
Date: 15-MAY-77
Author: Donald C.(Smokey) Wallace
Contributions: The immediate world
This is a working version of the BSYS documentation
and as such is subject to correction and change. Please
address any correspondence to:

C. A. Untulis - UNTULIS@SRI
Stanford Research Institute
333 Ravenswood Drive
Menlo Park Calif.
(415)326-6200 x4470

Abstract:

BSYS is a subsystem for the TOPS20 and TENEX timesharing systems. It provides facilities for dumping, restoring and archiving user files. It is also a file system utility allowing a wide variety of functions for verifying, examining and fixing file system problems. In philosophy it is intended as an extension of the TOPS20 file system to magnetic tape storage, allowing file name recognition, directories etc. The descriptions will be relative to a TOPS-20 system.

INTRODUCTION

The backup system (BSYS) has three main purposes:

Protection for both the user and the system against catastrophic loss of data (files).

Automatic (or manual if desired) file saving and deletion of inactive (not referenced) files. In this manner, it also provides for another level of file storage.

A general file system utility for verifying user directories, deleting extra versions, and a wide variety of useful operations on the file system.

CONVENTIONS

In writing this document, the following conventions are used:

- 1) Instructions about things to do are enclosed in parentheses.
Ex: (mount decatpe on unit 0)
- 2) When describing interactions with the system, characters typed by the user are capitalized, and characters typed by the system are lowercase.
- 3) Special control characters will be described with the following notations:
 - a) <ALT> is an Altmode or Escape
 - b) <CR> is a Carriage Return
 - c) <SP> is a Space
 - d) <^D> is a Control D
 - e) <^C> is a Control C, etc.
- 4) In How-to-do-it scenarios semicolon is used to delineate comments as in the EXEC comment convention and PDP10 Macro
- 5) # - is used to signify the operator is to enter a number
- 6) NUL: - is used on TOPS-20 System
- 7) NIL: - is used on TENEX System
- 8) . - is used before the generation number on TOPS-20 System
- 9) ; - is used before the version number on TENEX System
- 10) A carriage return <CR> in response to a "listing to" question defaults to TTY:

DUMPS

General Description

BSYS dumps provide an additional level of file storage to the TOPS20 timesharing system. They fundamentally do a "page" copy of a file group to magnetic tape storage. BSYS dumps differ from Dumper in that the tapes produced by BSYS have directories and as such "know" where a file is on the tape and can position directly to the desired file (forward or backward). The directory also allows the listing of a specific tapes contents.

Information about the last dump tape number plus the time and date of the last dump is maintained in the FDB of each file in the file system. This data is only updated for Full and Full Incremental dumps. This allows you to do as many directory dumps as you like without affecting any systematic dumping/retrieving process being done by you local operations staff. This information should aid in recovering smashed or otherwise destroyed files from dump tapes.

** SPECIAL NOTE **

You must let BSYS unload a tape or return to prompt the operator with "*" or a question before you can deselect that unit. If you do not the tape will be no good!! BSYS "rewrites" the directory on the front of each tape. The common Mini-dumper practice of deselecting the tape unit at rewind time is disastrous when using BSYS. Due to a completion marking mechanism the files would be redumped on a subsequent dump (incremental) but the dumped data and time used is lost.

Dumping the entire file system

What a Full Dump does

The Full Dump function of BSYS copies the entire file system onto magnetic tapes. This process takes about 1/2 hour per tape. An 800 BPI tape contains approximately 5000 pages and a 1600 BPI doubles that amount.

How to do a Full Dump

1. Mount blank tapes on tape units and be sure they have write rings in them!!!
2. Login as a user with OPERATOR(WHEEL) capabilities.

@Enable

```
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*F<ALT>ull dump (entire file system)<CR>
enter tape unit mta #
; # - type proper unit number
Listing to file <cr> for tty: (site's choice)<CR>
; ie: LPT:, TTY: ..
tape number #<CR>
; # - type tape number on tape reel
; The dump should now be running....
; When BSYS has filled up the first tape, it rewinds
; that tape, writes the tape directory at the front of
; the tape and instructs
; the operator to:

enter tape unit mta #
; # - next unit number
tape number #<CR>
; # - the tape number of next tape
; When the dump is completed (last tape rewinds),
; You must wait for the "*".
```

Dumping a User Directory(s)

What Dump Directory does

The Directory Dump function of BSYS copies an entire user directory onto magnetic tapes. The length of time required to do this operation is a function of the system load and the total number of pages in the specific user directory. At the end of dumping each directory the operator is given the opportunity to specify another directory.

How to do a Dump Directory

1. Mount blank tapes on tape units and be sure they have write rings in them!!!
2. Login as a user with OPERATOR(WHEEL) capabilities.
@Enable
!BSYS<CR>
(site name)-(system)-bsys version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*DU<ALT>mp directory<CR>

```
Privileged user? Yes<CR>
      ;a non privileged user can only dump
      ;his own directory.
Directory: FOOBAR<CR>
List of files? No<CR>
      ;YES permits a list of files to be selected
      ;terminated by a blank line.
enter tape unit mta #
      ; # - type proper unit number
Listing to file <cr> for tty: <CR>
      ; ie: LPT:, TTY: ..
tape number #<CR>
      ; # - type tape number on tape reel
enter tape id: TEXT...<CR>
      ; like "Dump Of <FOOBAR>"
      ; The dump should now be running...
      ; When BSYS has filled up the first tape, it rewinds
      ; that tape, writes the tape directory at the front of
      ; the tape, and if it needs another tape instructs the
      ; operator to:

enter tape unit mta #
      ;# - the proper unit number
tape number #<CR>
      ;# - the tape number of next tape

      ; When the dump is completed (last tape rewinds),
      ; You must wait for the "*".
```

Incremental Dumps

What an Incremental Dump does

The Incremental Dump function of BSYS copies all files that have been written since either the last dump or since a specified date and time onto magnetic tapes.

How to do an Incremental Dump of the entire file system

1. Mount blank tapes on tape units and be sure they have write rings in them!!!
2. Login as a user with OPERATOR(WHEEL) capabilities.

@Enable

```
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*INC<ALT>remental dump (changed files)<CR>
```

```
dump since date and time(y or n)? Yes<CR>
enter date and time: MO/DA/YR HH:MM<CR>
; or any valid IDTIM format
; If NO is specified then BSYS dumps all
; files changed since the last dump.
```

```
entire file system? Yes<CR>
enter tape unit mta #
; # - type proper unit number
Listing to file <cr> for tty: (site's choice)<CR>
; ie: LPT:, TTY: ..
tape number #<CR>
; # - type tape number on tape reel
; The dump should now be running...
; When BSYS has filled up the first tape, it rewinds
; that tape, writes the tape directory at the front of
; the tape, and if it needs another tape instructs the
; operator to:
```

```
enter tape unit mta #
; # - next unit number
tape number #<CR>
; # - the tape number of next tape
; When the dump is completed (last tape rewinds),
; You must wait for the "*".
```

How to do an Incremental Dump of a specific directory(s)

1. Mount blank tapes on tape units and be sure they have write rings in them!!!
2. Login as a user with OPERATOR(WHEEL) capabilities.
@Enable

```
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*INC<ALT>remental dump (changed files)<CR>

dump since date and time(y or n)? Yes<CR>
enter date and time: MO/DA/YR HH:MM<CR>
      ; or any valid IDTIM format
      ; If NO is specified then BSYS dumps all
      ; files changed since the last dump.

entire file system? No<CR>
Privileged user? Yes<CR>
directory; FOOBAR<CR>
List of files? Yes<CR>
type file list, terminated with null line:
enter tape unit mta #
      ; # - type proper unit number
Listing to file <cr> for tty: <CR>
      ; ie: LPT:, TTY: ..
new tape? Yes [confirm]<CR>
      ; answering the preceding question NO allows you to
      ; "append" files to the end of an existing BSYS tape
      ; the following question will not be
      ; asked in the NO case.
tape number #<CR>
      ; # - type tape number on tape reel
      ; The dump should now be running...
      ; When BSYS has filled up the first tape, it rewinds
      ; that tape, writes the tape directory at the front of
      ; the tape, and if it needs another tape instructs the
      ; operator to:

enter tape unit mta #
      ; # - next unit number
tape number #<CR>
      ; # - the tape number of next tape
      ; When the files for the given directory have been
      ; dumped, you may select others..
more users? No<CR>
      ; When the dump is completed (last tape rewinds),
      ; You must wait for the "*".
```

Continuing Dumps

What Continue Dump does

The continue dump function will restart full and incremental dumps (entire file system) that were interrupted. BSYS keeps track of the last completed dump tape #, present directory number, the original connected directory number and dump id-text, allowing the operator to get the dump going again by supplying a minimum of data.

BSYS deletes the continue data upon successful completion of a dump. If you attempt to continue a dump that was not interrupted abnormally, BSYS will place you in "manual" mode. This means that

BSYS will ask you for all the data it requires to restart a dump at a given user.

How to Continue a Dump

1. Mount blank tapes on tape units and be sure they have write rings in them!!! Be careful not to use any previously completed dump tapes.
2. Login as a user with OPERATOR(WHEEL) capabilities.

```
@Enable
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*CONT<ALT>inue dump<CR>
; at this point you may get the message
; "No continue record?? entering manual mode"
; if this happens go to "manual mode" below
enter tape unit mta #
; # - type proper unit number
Listing to file <cr> for tty: (site's choice)<CR>
; ie: LPT:, TTY: ..
tape number #<CR>
; # - type tape number on tape reel
dump restarted at user name

; The dump should now be running...
; When BSYS has filled up the first tape, it rewinds
; that tape and writes the tape directory at the front of
; the tape, and if it needs another tape instructs the
; operator to:

enter tape unit mta #
; # - next unit number
tape number #<CR>
; # - the tape number of next tape
; When the dump is completed (last tape rewinds),
; You must wait for the "*".
```

4. Manual mode

; this is caused by one of two things

; 1) you are not really continuing a dump

; 2) BSYS screwed up in writing the continue data and you must now supply it. This is analogous to a normal dump (full or incremental) except you have the option of which directory to start dumping.

LOAD/RESTORE

General description

LOAD AND RESTORE are the commands used to copy files from magnetic tape storage to the active file system. LOAD is used if the desired resultant file is to be a new file. That is it should retain none of its original attributes except the data. (ie: creation date, archive status, etc..) RESTORE is used if the file is to reappear in the file system exactly as it was when it was dumped or archived.

Load files (from magtape)

What load does

The load command allows copying a file group from magnetic tape to the active file system.

```
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p to abort run
*LOAD files (from magtape)
enter tape mta #
Listing to file <cr> for tty: <CR>
mounting tape directory
copy mta1: <TAPE-DIR>*.SAV;* <ALT> to <DSK-DIR> <ALT>
;This will cause the save files to be loaded into the
;directory on disk.
more files (this tape)? No<CR>
move tapes? No<CR>
*
```

Loading a single file

```
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*L<ALT>ad files (from magtape)<CR>

enter tape unit mta #
; "#" is the number of the tape unit
Listing to file <cr> for tty: <CR>
; ie: LPT:, TTY: ..
mounting tape directory
copy mta#: <DIRECTORY>FILENAME.EXT;VER<CR>
; Altmode and ctrl-f can be used to recognize both
; the tape file's directory name and file name.
(to) <DIRECTORY>FILENAME.EXT;VER<CR>
copy mtan: <^D>
*E<ALT>xit<CR>
```

Restore files (from magtape)

What restore does

Restore brings back one file(group) from a BSYS-dumped tape, and writes it on the disk with the exact characteristics of that file when it was originally on-line. i.e., the directory, name, extension, version number, dates, and archive parameters are exactly the same.

How-to procedures

1) Restoring a single file

```
@Enable
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*RES<ALT>restore files (from tape)<CR>

enter tape unit mta #
; "#" is the number of the tape unit
Listing to file <cr> for tty: <CR>
; ie: LPT:, TTY: ..
mounting tape directory
restore mta#: <DIRECTORY>FILE.EXT;VER<CR>
; Altmode and ctrl-f can be used to recognize both
; the tape file's directory name and file name but not
; the extension.
restore mta#: <^D>
*E<ALT>xit<CR>
```

2) Restoring a single directory

```
@Enable
!BSYS<ALT><CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*RES<ALT>restore files (from tape)<CR>

enter tape unit mta #
; "#" is the number of the tape unit
Listing to file <cr> for tty: <CR>
; ie: LPT:, TTY: ..
mounting tape directory
restore mta#: <DIRECTORY>*.*;*<CR>
restore mta#: <^D>
; <^D> - aborts further restore and gets back to BSYS
; command level
*E<ALT>xit<CR>
```

Restoring the entire file system

Description

The RESTORE command provides for restoring the entire file system. The file system may be restored either from a full dump set of tapes or from a combination of incremental tapes and a full dump set. In the later case the facility to prevent ghosts (files deleted) is provided. The only requirement is that the first tape of the the most recent dump (either full or incremental) be loaded first. This allows BSYS to obtain the most recent copy of the file <SYSTEM>DIRECTORY;1 (for a TENEX system) to check files prior to restoration as to whether they were in the "last" state of the file system. For TOPS-20 systems, BSYS determines "last" state from the directory files in <ROOT-DIRECTORY>.

How-to scenario

@Enable

!BSYS<ALT><CR>

(site name)-(system)-bsys version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*RES<ALT>tore files (from tape)<CR>

enter tape unit mta #
; "#" is the number of the tape unit
listing to file <cr> for tty: NIL:<CR>
; ie: LPT:, TTY: ..
mounting tape directory
restore mta#: <*>*. *;<CR>
create users? Yes [confirm]<CR>
; Users may be created from the first tape of an
; incremental or full dump.
; If No is specified BSYS assumes that users already
; exists and bypasses creating them
do you wish to bypass restore checks ? No<CR>
; The file <system>directory.;1 is taken from the tape and used
; to check the files as they are restored.
more tapes ? Yes<CR>
; The tapes of the next older set of dumps should be
; processed back to the last full dump.

Retrieving a File

Description

The retrieve function allows automatic restoring of files from tapes. When the user makes a retrieval request, it is entered into <SYSTEM>RETRIEVE-REQUESTS.BINARY. The retrieve function periodically examines the contents of this file to see if there are any requests to process. If so it asks the operator to mount the primary tape and the file is automatically restored. If primary is not available or the file not found (should never happen) BSYS will inform requestor (file not on first tape--will try second). The next retrieve scans the request list it will ask for secondary tape and the file is automatically restored. The user is then sent a message describing the status of the request.

How-to scenario

@Enable

!BSYS<ALT><CR>

(site name)-(system)-bsys version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*RET<ALT>rieve (archived files)

Listing to file <cr> for tty: <CR>
; ie: LPT:, TTY: ..
Continuous for all users ? No<CR>
; if yes, the next 3 questions are not asked
Modify request list before processing? No <CR>
; if yes, the requests are listed and the subcommands
; of delete, continue, mark as done, error,
; list, and reset are available.
Continuous Check for Retrieval Requests? Yes <CR>
Process Retrieval Requests for all Users? Yes<CR>
; if no,
user: USER-DIR<CR>
Process Retrieval Requests for local users only? Yes<CR>
; either the list of tapes will be listed or the program
; will give the message "No retrieval requests to process"
get tapes: #, #, #, ...
please mount (site) primary tape # ok? Yes [confirm]<CR>
enter tape unit mta #
mounting tape directory
; the date and header info of the tape is listed
; then the file and who requested it are listed
[isia] <msg-group> msgfix.sav;1 by user usr-name
; a message is sent to the user that the file has been retrieved
; unless the user is exempt from the message.
;to exit from Retrieving you must type CNTRL-C
;if it was in continuous mode.

TAPE COPY

Description

Tape copy allows the operator to copy a BSYS tape and rebuild the directory on the front of the

How-to procedures

1. Mount the tape to be copied and a blank tape on tape units and be sure there is a write ring in the tape to be copied to!!! Be careful not to use a tape with files recorded on it.
2. Tape copy of a tape which has a bad beginning of tape.

@Enable

!BSYS<CR>

(site name)-(system)-bsys version date

type cntrl-d to abort type in, cntrl-p cntrl-c to abort run

*TA<ALT>pe copy <CR>

Listing to file <cr> for tty: <CR>

enter "from" tape mta #

enter "to" tape mta #

do you want to rewind "from" tape ? No<CR>

Read header from "from" tape ? No<CR>

Reconstruct tape header ? Yes<CR>

(site name) tape number #<CR>

; # - number to be put on tape

Enter tape id: TEXT...<CR>

; Otherwise the header id is copied from the "from" tape.

Copying:

; the header is listed with the tape number

; When the copy is completed both tapes are unloaded

; you must wait for the "*".

3. Copy of tape that has a good tape header

@Enable

!BSYS<CR>

(site name)-(system)-bsys version date

type cntrl-d to abort type in, cntrl-p cntrl-c to abort run

*TA<ALT>pe copy <CR>

Listing to file <cr> for tty: <CR>

enter "from" tape mta #

enter "to" tape mta #

do you want to rewind "from" tape ? No<CR>

Read header from "from" tape ? Yes<CR>

Reconstruct tape header ? No<CR>

Copying:

; you must wait for the "*".

Loading a Single file

What single does

Single also allows you to retrieve a file from a BSYS-dumped tape. however, it differs from restore, in that you can specify new file descriptors, rather than simply accept the old ones.

How-to load a single file

@Enable

!BSYS<CR>

(site name)-(system)-bsys version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*SI<ALT>ngle files<CR>

enter tape unit mta #
; # - tape unit number
mounting tape directory
copy mta#:<DIRECTORY>FILENAME.EXT;VER<CR>
(to) <DIRECTORY>FILENAME.EXT;VER<CR>
copy mta#: (^D)
; (^d) is the BSYS abort character
*E<ALT>xit<CR>
!reset<CR>

"tape-file-name" must include the directory name, as well as the other file descriptors. Altmode can be used to recognize both the tape file's directory name and file however, if you use an altmode for recognition of the file name, you do not need to type the confirming cr. also, if you use an altmode for the disk-file-name, you only need 1 (one) confirming cr.)

ARCHIVE SYSTEM

General Description:

The archive system uses a special form of the BSYS dump facility to process the file system and dump user files to magnetic tape. Facilities are provided for:

Specific Archive Requests

- Automatic File Deletion (after archival)
- Automatic Archival of Files not referenced in "n" days
- Automatic Notification of an operator for manual retrieval
- Inquiry for specific file archive information
- Exempt the directory from archive
- Archive all but the highest version of files

How-to scenarios

1) Generating a List of archivable files:

```
@Enable
!BSYS<CR>
  (site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*ARCH<ALT>ive (user files)<CR>

  archival period (days) = #<CR>
Listing only? Yes [Confirm]<CR>
  Listing to file <cr> for tty: <CR>
  pass-2 ? (y/n)No<CR>
entire file system? Yes [confirm]<CR>
List for users? No [confirm]<CR>
```

2) Delivering a List of files to be archived to users:

*** Not sure of this ***

```
note: setup files <ARCHIVE>ARCHIVE-MESSAGE.TXT and
<ARCHIVE>ARCHIVE-FILES-ONLY.TXT
@Enable
!BSYS<CR>
  (site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*ARCH<ALT>ive (user files)<CR>

archival period (days) = # [Confirm]<CR>
Listing only? Yes [confirm]<CR>
entire file system? Yes [confirm]<CR>
List for users? Yes [confirm]<CR>
```

3) Archiving user files:

```
@Enable
!BSYS<CR>
  (site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*ARCH<ALT>ive (user files)<CR>

  archival period (days) = #<CR>
Listing only? No [confirm]<CR>
Listing to file <cr> for tty: LPT:
  ; ie: LPT:, TTY: ..
pass-2 ? (y/n)No<CR>
  ; To insure that there is no mix of pass-1 and pass-2
  ; files on the same tape.
entire file system? Yes [confirm]<CR>
List for users ? No-[confirm]<CR>
enter tape unit mta #   new tape ? Yes [confirm]<CR>
really? Yes<CR>
(site) tape # number #<CR>
  (if new tape = no then BSYS says)
mounting tape directory
  BSYS now types a list of users and data about file archival
```

4) Interrogating the magtape archive:

```
The EXEC and BSYS command INTERROGATE calls the <system>archive-looku
program to search the archive-directory file.
@INT<ALT>errogate <DIRNAME>FILE.EXT;VER#<CR>
  ALL TOPS20 filename conventions apply
  ("*S,^F,ALTMODE..ETC.). If any groups are specified (*)
  then you will get a list of archived file belonging to that
  group. Only single file retrieval requests are permitted!
  If the file is found in the archive then the user is asked.
file is archived on tapes xxx and yyy
do you want it retrieved (y or n) ? Yes[confirm] <CR>
*** filename recognition ***

  ;your request has been noted you will be notified when
  ;completed
```

file system UTILITIES

General Description

BSYS's ability to "run" the file system structure (tape directory too!) allows the implementation of virtually any utility function desired.

ARCMES (CLEAR TAPE NUMBER FROM BACKUP WORDS)

What arcmes does

ARCMES looks at every fdb in the file system to see if the specified tape number is in either the left or right half of the archive tape backup word. If it finds the tape number in either half, it clears that half of the word. It also clears the "deleted" bit in fdbctl to make sure the files isn't expunged before it has a chance to be rearchived. This is useful if BSYS or the system crashes when BSYS is "marking" the fdb's after the file has been dumped to tape.

There is a further check not to delete the number if the file was archived 24 hours or more from the present time.

How to run arcmes

```
@Enable
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*ARCMES<CR>
```

```
Tape number to purge from backup words: #<CR>
; # - number of tape to purge
Number of hours to go back for purge: #<CR>
; # - files archived before that time will not be purged of
;      the tape number.
; Wait until the "*" BSYS prompt is typed
*EXIT<CR>
; exit BSYS
```

COUNT (directory file pages)

What count does

Count processes a single directory or the entire file system and adds up the number of disk pages in use and produces a report of counts by user. As an option it will update the working count in the directory overhead block(TENEX only). This option is particularly useful when enforcing the disc allocation option in TENEX versions 130 or later.

How to run count

counting a single directory

```
@Enable
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*COU<ALT>nt (file pages)<CR>

Listing only? Yes
    ;if NO is specified then as a byproduct of the
    ;count listing the working count (in the
    ;directory overhead block) is updated.
entire file system? No
directory: DIRECTORY-NAME<CR>
    ; BSYS now types (on the controlling tty)

directory-name      # files      # pages(##)      disc max= #
*E<ALT>xit<CR>
    ; the number following the word "pages" is The working
    ; count and only appears if its different than the
    ; actual count.
```

counting the entire file system

```
@Enable
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*COU<ALT>nt (file pages)<CR>

Listing only? Yes<CR>
    ;if NO is specified then as a byproduct of the
    ;count listing the working count (in the
    ;directory overhead block) is updated.
entire file system? Yes<CR>
Listing to file <cr> for tty: <CR>
    ; ie: LPT:, TTY: ..
*E<ALT>xit<CR>
```

DISMOUNT (magtape directory)

This BSYS function is intended for fixing magtape directories and should not be used except by knowledgeable systems people.

LIST (magtape directory)

What list does

The listing function produces a directory listing for any BSYS dump tape.

It also provides a feature to list the mapping of the file specified like the index or directory file that can be used to patch the file system instead of a complete re-load.

How to do a list

```
@Enable
!BSYS<CR>
  (site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*LI<ALT>st (magtape directory)<CR>

  enter tape unit mta #   listing to file <cr> for tty:<CR>
  ;"#" is the number of the tape unit
  ; ie: LPT:, ITY: ..
  List tape mapping for files? No<CR>
  entire tape? Yes<CR>
  ;if No
  tape directory: DIRECTORY-NAME<CR>
  ;if the mapping was requested the pages of the file
  ;are listed along with the page protection word
  ;set when the file was dumped giving the protection
  ;and disk page index.
*E<ALT>xit<CR>
```

MOUNT (magtape directory)

This BSYS function is intended for fixing magtape directories and should not be used except by knowledgeable systems people.

OCTAL PRINT (of directory)

What octal print does

OCTAL produces a formatted dump of either a system directory or a magtape directory. The dump produced is ala DDT and is quite useful in repairing smashed directories or simply verifying something about a directory. Try it you'll like it.

There is also an option to select the INDEX file for TENEX and select subindex 0,1,... This can also be very useful.

How to do an octal print

```
@Enable
!BSYS<CR>
  (site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*O<ALT>ctal print (of directory)<CR>
```

tape? Yes
; if no is specified the tape request is omitted
enter tape unit mta #
use index file? No<CR>
directory: DIRECTORY-NAME<CR>
listing to file <cr> for tty: LPT:<CR>
another? Yes<CR>
use index file? Yes<CR>
subindex number: #<CR>
listing to file <cr> for tty: LPT:<CR>
another? No<CR>
*
*E<ALT>xit<CR>

SAVE (archive directories on tape)

What Save does

Save dumps every archive directory to a tape to insure that users an/or the system don't clobber the user's archive information

How to do a save

```
@Enable
!bsys<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*SA<ALT>ve (ARCHIVE DIRECTORIES ON TAPE)<CR>

entire file system ? No<CR>
directory: DIR-NAME<CR>
enter tape unit mta #
    ; # - type proper unit number
listing to file <cr> for tty: <CR>
    ; ie: LPT:, TTY: ..
new tape? No [confirm]<CR>
;if yes then the following request
tape number #<CR>
    ; # - type tape number on tape reel
more users? No<CR>
*EXIT<CR>
```

TRIM (user directories) for TENEX systems only

What Trim does

Trim will process a directory (or all the directories in the file system) and delete all but the specified number of versions of each file in that directory. If "n" is greater than one BSYS retains the n-1 most recent versions and the oldest. However, Trim does not expunge these files. That is done in a separate operation.

How to do a trim

```
@Enable
!BSYS<CR>
(site name)-(system)-bsys      version date
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run
*TR<ALT>im (user directories)<CR>

enter number of versions to retain: #<CR>
really? Yes<CR>
entire file system? No<CR>
directory: DIRECTORY-NAME<CR>
trim completed
*
*E<ALT>xit<CR>
!RESET<CR>
(In the above, "n" is the number of versions to be left
undeleted. Usually this number is 1 (one).)
```

VERIFY (user directories)

What Verify does

Verify checks all the pointers in the FDB (File Description Block) for every file in the directory. If these pointers are not correct, BSYS cannot correct the problem, but will print an error concerning it. The conditions checked by BSYS are different from those checked by CHECKDSK.

1) How to do an full system verify

```
; <^W> can be used to get a type out of the directory  
; and file bsys is presently verifying  
@Enable  
!BSYS<CR>  
  (site name)-(system)-bsys      version date  
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run  
*V<ALT>erify (user directories)<CR>
```

```
Listing to file <cr> for tty: <CR>  
entire file system? Yes<CR>  
disc verify too? No<CR>  
verify complete  
*E<ALT>xit<CR>  
!RESET<CR>
```

; normal mode is not to verify disc because of the time factor.

2) How to do a single user verify

```
@Enable  
!BSYS<CR>  
  (site name)-(system)-bsys      version date  
type cntrl-d to abort type in, cntrl-p cntrl-c to abort run  
*V<ALT>erify (user directories)<CR>
```

```
Listing to file <cr> for tty: <CR>  
entire file system? No<CR>  
directory: DIRECTORY-NAME<CR>  
disc verify too? No<CR>  
; the directory header information is printed  
;for the directory of interest  
verify complete  
*E<ALT>xit<CR>  
!RESET<CR>
```

COMMAND SUMMARY

APPEND (two archive directories)
ARCHIVE (user files)
ARCMES (clear tape number from backup words)
AUDIT DISK USAGE
BUILD (archive directories)
CLEAR (backup words in FDB's)
CONFIGURE (BSYS for another site)
CONTINUE DUMP
COUNT (file pages)
DEBUG BSYS
DELETE (deleted files)
DISMOUNT (magtape directory)
DUMP DIRECTORY
EXIT
EXPAND (archive directory to include site number and/or dir string)
FULL DUMP (entire file system)
HELP
INCREMENTAL DUMP (changed files)
INITIALIZE BSYS (from given file)
INSERT (directory string after bdb in archive-directory)
INTERROGATE (the archive)
LIST (tape directory)
LOAD FILES (from magtape)
MAP (user directory)
MARK BACKUP WORDS
MOUNT (magtape directory)
OCTAL PRINT (of directory)
PRINT THE MAGTAPE ARCHIVE
PURGE GHOST FILES
QUIT
REAPER (Force archive of files in dir over allocation)
RESTORE FILES (from tape)
RETRIEVE (archived files)
RUN THE file system (utility)
SAVE (archive directories on tape)
SINGLE FILE
TAPE COPY
TRIM (user directories)
UNMOUNT (magtape directory)
VERIFY (user directories)

ERRORS/ACTIONS

Following is a list of errors that may be encountered using BSYS. Corrective action is supplied if applicable. Normal error format is:

"Label: ...error text..."

Label: is the BSYS program label preceding the error and is meant to be used as a debugging aid to programmers.

(errors are listed in alphabetical order without the "Label")

ATTEMPT TO EXPAND TAPE DIR BEYOND xxx PAGES

This is a catastrophic failure and means BSYS is really fouled (contact responsible programmer).

BLOCK SEQUENCE ERROR

This error may be ignored except when encountered while actually restoring a file. It is normally caused by tape unit malfunction and you should retry the restore. If the problem persists you should contact the responsible programmer.

CAN'T GET EXCEPTION LIST FILE - TRIM ABORTED

CAN'T OPEN EXCEPTION LIST FILE - TRIM ABORTED

The above two errors are caused by BSYS's inability to get the list of directories to except from the trim operation. you should check the file <ARCHIVE>BSYS-TRIM-EXCEPTIONS.;1

CANT CLOSE ARCHIVE DIRECTORY FILE

CLOSF jsys failure and can be ignored. If it happens regularly have someone check it out.

CANT CLOSE MAGTAPE

a random CLOSF jsys failure - no action

CANT GET USERS ARCHIVE DIRECTORY

CANT OPEN ARCHIVE DIRECTORY

Means that BSYS cant get access to a users archive directory. The archive run will be aborted and the BUILD function must be used to make the entries in the archive directory once the problem has been rectified. This error is usually caused by disk space (system or user) shortages.

CANT GET JFN FOR CONTINUE FILE??

CANT OPEN CONTINUE FILE?? ENTERING MANUAL MODE

NO CONTINUE FILE?? ENTERING MANUAL MODE

NO CONTINUE RECORD?? ENTERING MANUAL MODE

FAILED TO CLOSE CONTINUE DUMP FILE??

All of the above errors signify that something is wrong with the continue dump mechanism. Simply supply the data asked for and continue. BSYS is unable to save the state of the dump while in progress. This is not serious unless the dump aborts and you wish to restart with the CONTINUE command and even then it is just inconvenient. This is usually caused by disk space problems.

CANT WRITE TAPE HEADER - ABORTING

This is a catastrophic failure and should be looked at by the responsible programmer. Most probable cause is a bad tape.

CLOSF JSYS FAILURE ??

a random CLOSF jsys failure - no action

DATA ERROR READING FIRST RECORD OF FILE #

This error occurs when positioning a tape to the desired file and can generally be ignored.

DIRECTORY NUMBER ALREADY USED ON THIS TAPE??

This is caused by reused directory number conflicts and should only be encountered when "appending" to an old tape. Any other occurrence is indicative of BSYS program problems.

ERROR WHILE WRITING TAPE HEADER

ERROR WRITING TAPE DIRECTORY - PAGE #

The above two errors are indications of a bad or marginal tape. The tape should be checked for "mountability" and in the event of failure should be copied (see TAPE copy function) or if possible the data should be redumped.

INVALID DIRECTORY NUMBER FOR CNDIR

Indicates an invalid entry in the system index hash table. contact responsible programmer or TOPS20 people.

INVALID FILE DATA (ZERO DIRNUM)

The file data record (FDB, filename, etc..) is bad. normally not a problem except when rebuilding the directory (see TAPE copy function).

JSYS ERROR IN ERROR ROUTINE AAAAAAAHHHHHHHHHHHHH!!!!

ERSTR jsys failure in the BSYS error routine.

NO ROOM FOR NAME IN TAPE INDEX!!

There is no more space in the tape index. This should not happen and is symptomatic of a BSYS program problem.

NON-EXISTENT DIRECTORY NO.

The DIRST jsys has failed on a valid directory number (TOPS20 problem?)

NON-EXISTENT TAPE DIRECTORY NO.

A previously identified directory cannot be found in the tape index plus the equivalent disk directory does not exist - this should not normally happen and is symptomatic of BSYS program troubles and you should contact the responsible programmer.

SEQ ERR:

block numbers on tape records are not consecutive. This can be caused by tape unit malfunction or BSYS program troubles. In general can be ignored but if chronic should be investigated.

TAPE DIRECTORY DISAPPEARED??

BSYS attempt to remap a user tape directory failed - catastrophic problem and indicates BSYS program problem.

TAPE DIRECTORY SPACE EXHAUSTED DUE TO WRITE ERRORS

Indicates a Bad tape - no recovery - you must redump the data on this tape. (note: in some cases TAPE copy with rebuild option will work!)

THIS TAPE DOES NOT CONTAIN DATA TO CREATE USERS

IT'S NOT THE 1ST TAPE OF A DUMP

When reloading the disc the first tape of a full dump must be used first. After that tapes may be loaded in any order.

TRIM FUNCTION TABLE OVERFLOW:

EXPAND TABLE "EXLST" OR DECREASE NUMBER OF DIRECTORIES EXCEPTED

UNDETERMINED TAPE ERROR PLEASE CHECK TAPE AND

TYPE ANY CHARACTER TO CONTINUE

UNEXPECTED IO ERROR INTERRUPT...IGNORED

The above errors indicate trouble with the tape unit or controller. Continued trouble of this type means more or better

maintenance on hardware.

UNRECOVERABLE ERROR WRITTING TRAILER
TAPE IS GOOD(?) BUT, NOT FOR FUTURE APPENDS
TAPE MARKED AS FULL...

Bad or marginal tape - no action

UNRECOVERABLE TAPE READ ERROR

BSYS is unable to read the data from a tape. Retry after mounting
tape on another tape unit (if available) or cleaning the read
heads.

UNRECOVERABLE TAPE READ ERROR ATTEMPTING TO CREATE USERS

A read error has forced termination of the create users function
of restore. Use the DLUSER subsystem to create the user
directories and type "no" to BSYS when asked to create users.

UNRECOVERABLE WRITE ERROR WRITING DIRECTORY

WRITE ERROR IGNORED

BSYS writes detected error records until no errors occur. this
means recovery is possible (beware!). This usually indicates the
tape is marginal at best and redumping is strongly advised.

PROGRAMMERS MANUAL

INTRODUCTION

BSYS basically runs the file system structure "calling" specific function routines for each file encountered. It does this by mapping the system INDEX and copying the user hash table. It then maps each user subdirectory into its space and then processes each symbol table entry by following the file extension and version chains (see appendix "<SYSTEM>DIRECTORY FORMAT"). This allows for multiple functions to be performed on a single pass of the file system. However this facility is not presently used.

The flow of a typical BSYS command is as follows

A setup and initialization routine is called by the command decoder/recognizer. This setup routine sets the necessary function flag(s) for the selected command. The setup routine is responsible for getting all necessary files:(listing device, mag tape, input files, temporary files...). It then calls the routine CNTRL. CNTRL processes the file <SYSTEM>DIRECTORY, getting the "next" directory, and then calling the routine CHECK to process that directory. CHECK processes each entry in the directory symbol table running down the extension and version FDB chains. The functional processing routines (selected by function flags) are called for each file in the mapped directory. In order to process a single directory the setup routine needs only map the appropriate subdirectory pages and call routine CHECK.

MAKING A NEW BSYS

creating a site specific version

BSYS currently consists of 11 code files:

<BSYS>BSYSCM.MAC	first level command
<BSYS>BSYSDF.MAC	definitions
<BSYS>BSYSDR.MAC	dump/restore/archive
<BSYS>BSYSDV.MAC	device handlers
<BSYS>BSYSER.MAC	error handlers
<BSYS>BSYSFD.MAC	file system processing
<BSYS>BSYSFN.MAC	function execution
<BSYS>BSYSFS.MAC	file system subroutines
<BSYS>BSYSFT.MAC	cross network code
<BSYS>BSYSIN.MAC	initialization
<BSYS>BSYSTD.MAC	tapedirectory
<BSYS>BSYSUT.MAC	utilities
<BSYS>GETPRM.MAC	get configuration parameters

You should obtain the most recent version of the macro code files. You must then edit the parameters specified in the files in the sections of this manual dealing with configuration of BSYS and

archive-lookup. Please follow the convention of giving BSYS files at your site the same version numbers as the originals at SRI. This allows me to quickly determine the version of the BSYS you are running. Now follow the instructions for assembling a new version of BSYS. If (when?) you encounter problems call me!!

assembling a new version

A CTL is provided for Loading/assembling a new BSYS. The file is <BSYS>ASMBSY.CTL. This procedure uses CCL and only assembles the changed files. The CCL driver file is <BSYS>ASMBSY.CMD.

SUBMIT ASMBSY>CTL

```
ena
conn bsys
;
;delete tenex and tops20 versions
;
del bsys.exe.*,,bsys.sav.*

exp
;
;load bsys files
;
load @asmsby.cmd

;
;save tops20 version
;
sav bsys.exe.1
;
;save tenexe version
;
csave bsys.sav
;
;start bsys to initialize
;
start
exit
;
;delete initial version (sri has saved configured version)
;
del bsys.exe.1

exp
```

CCL driver file <BSYS>ASMBSY.CMD :

bsysdf.mac
bsyscm.mac
bsysdr.mac
bsysdv.mac
bsyser.mac
bsysfd.mac
bsysfn.mac
bsysfs.mac
bsysft.mac
bsysin.mac
bsystd.mac
osysut.mac
getprm.mac

ARCHIVE SYSTEM

GENERAL DESCRIPTION

The archive command is really just a special form of incremental dump with a different criteria for "incrementalness".

** IMPORTANT NOTE **

BSYS dumps a file on two (2) different tapes before it is considered archived. When it has been archived an entry is made in an archived files directory file. Entries are made in the form of a doubly strung list containing BACKUP DESCRIPTOR BLOCKS (BDB) plus name, extension and account strings. This has created the illusion for new users of the archive not working. As two passes (one each on different tapes) are required before any files are really archived. A standard operational ploy is to run the archive twice in a single evening to ensure all archivable files are really archived. This is obviously not necessary but none the less is still done.

THE ARCHIVE COMMAND

This command has two basic modes of operation:

Listing mode

Allows for generating a list of "archivable" files for a specific user(s) or the entire file system.

It will alternatively concatenate the file <BSYS>ARCHIVE-TEXT and a list of files to be archived for each user and append it to his message.txt file. It provides for mapping files-only directories to "owner" directories.

dumping mode

This mode is essentially "dump" with the dumping criteria being has the file been written or referenced in the last "n" days, where n is the run-time selected archival period.

The additional function of making entries in the file [ARCHIVE-DIRECTORYC.;1 is accomplished on the marking "pass".

MODIFICATIONS TO THE TOPS20 EXECUTIVE

The following commands have been added to the EXECUTIVE to support archiving and retrieving of user files.

EXEC Command to invoke archiving of a specific file

@ARCHIVE filespecs [,] optional comma invokes subcommands *'s are allowed in all fields

SUBFUNCTIONS:

DELETE filespecs [,] mark the file(s) as deleted
this makes the file invisible to further archive status commands. This function can be reversed by the UNDELETE subfunction.

EXPUNGE all files that are marked as deleted. This file removes the entries from the archive directory and can not be undone

FILE filespecs [,] marks the file(s) for archiving.

RESET filespecs [,] reset file(s) archive status bits except for the already archived bit.

STATUS filespecs [,] archive status of file(s)

UNDELETE filespecs [,] clears the deleted bit in the file(s) bdb in the archive directory.

SUBCOMMANDS: (\$ means normal defaults)

@@DEFERRED(\$) - archive this file at next regular archival run of BSYS

@@IMMEDIATE - (not implemented yet)
copy this file to directory <archive> with a funny name and when regular archiving done archive it in original directories archive with the original name.

@@DON'T ARCHIVE - do not archive this file
(BSYS will ignore this file for all archival functions)
this will include deletion of the funny named file in <ARCHIVE> if one exists.

@@DELETE(\$) - delete this file after it is archived

@@DON'T DELETE - dont delete this file after it is archived

@@RESET - resets all archival attributes of this file.
this does not "unarchive" a file if it has been previously been archived.

@@STATUS - type the current "archival status" of the specified file(s)

EXEC COMMAND TO INTERROGATE THE ARCHIVE DIRECTORY FILE

@INTERROGATE (ARCHIVE) FILENAME

either types "THAT FILE IS NOT ARCHIVED" "
or "ARCHIVED ON [site nickname]TAPES NNN AND MMM"
If the file is found in the archive directory file
"DO YOU WANT IT RETRIEVED?" will be asked. If the answer
is yes a message will be logged on a special logger. The
message contains time and date, filename, tape nos.,
requesters name, tty, and job number.

When the file has been retrieved the user will be
notified via the sndmsg facility.

INTERROGATE has a number of subcommands which allow
the user to expand the qualifications of the file
specification and to get additional information. Each
file is specified in the archive-directory by a backup
directory block (BDB). The commands are specified
in the section on Interrogate subcommands.

FILES USED BY BSYS

TAPEDIRECTORY.TMP

purpose:

This file is the tape analog of <system>directory. It is built and dump(archive) time and is written on the tape after completion (as file 0).

format:

It is identical in format to <SYSTEM>DIRECTORY with the following exceptions.

The field "FDBADR" which normally contains the disk address of the index block for a file contains the "tape address" of the first record of the file on tape. This address has the form xwd file#,block#.

file# = sequential file number (directory is file 0)

block# = monotonically increasing tape block number

<SYSTEM>ARCHIVE-FILES-ONLY.TXT

purpose:

This file is an input file by the archive "deliver messages to user" function and is used to map FILES ONLY directories to owners. For files only directories, the list of archivable files will be delivered to the owners MAIL.TXT file

format:

It is a sequential text file (editable by teco). It consists of directory name pairs. The user directory name must appear first, followed by the files only directory name, separated by a comma ending in cr lf (ie: USER,FILES-ONLY-DIR<cr lf>). Input is terminated by the first null entry (two cr lf's in a row).

<ARCHIVE>ARCHIVE-MESSAGE.TXT

purpose:

This file contains an arbitrary message to be delivered to users who have "archivable files". It is appended to the users message.txt file along with a list of the files to be archived.

format:

Sequential text file (editable by teco). It is assumed to be an asciz string. message is terminated by the first null (o) byte.

<SYSTEM>BSYS-EXCEPTED-DIRS - see BSYS function exceptions.

<SYSTEM>BSYS.PARAMETERS - see BSYS configuration parameters.

<SYSTEM>BSYS-FUNCTION-EXCEPTIONS

purpose:

This file is built by bsys when the file BSYS-EXCEPTED-DIRS is changed. It is a binary file that is indexed by directory number and gives the flags set to correspond with the function specified.

<SYSTEM>ASSOC.BSYS

purpose:

This file is used to allow current directories to access obsolete directory files from the archive. It assumes that the archive directory files have been merged and the parameter ASSOC has been set in the BSYS-EXCEPTED-DIRS file.

format:

The file is binary with the first two pages reserved to be indexed by directory number for a pointer to an asciz string of directory names to be associated with this current directory as BSYS looks for the file requested from the archive.

<SYSTEM>RETRIEVE-REQUESTS.TXT

purpose:

This file is built by <SYSTEM>ARCHIVE-LOOKUP.SAV when the BSYS or exec INTERROGATE command is given. It is used to build the RETRIEVE-REQUESTS.BINARY file that BSYS checks for retrieve requests.

<SYSTEM>RETRIEVE-REQUESTS.BINARY

purpose:

This file gives the requested file description including the directory to retrieve into and the user requesting the file. The two archive tapes for each file are also given in the entry. At present there are a maximum of 40 requests processed by BSYS for the retrieve command. The rest are processed by the next retrieve command.

<*>]ARCHIVE-DIRECTORY[..1

purpose:

This file is a directory of all archived files for this directory. It is built by BSYS at archive marking time and is used by the EXEC command INTERROGATE to "lookup" archived files..

format:

The file is binary and consists of two parts.

word 0 - next available free storage word address
word 1 - LH: pointer to current last BDB
 RH: pointer to first BDB
a reserved block (6 octal words)
free storage area:
contains BDB's and strings associated with archived file.

Backup (file) Directory Block(BDB) definition

```
block 1           ;the header (not referenced
symbolically)
bdbctl: block 1   ;lh = control bits (see below)
                  ;rh = pointer to file name block
bdbext: block 1   ;lh = pointer to extension string
                  ;rh = pointer to next bdb
bdbadr: block 1   ;lh = tape # of 1st archive
                  ;rh = tape # of 2nd archive
bdbprt: block 1   ;file protection word
bdbad1: block 1   ;time and date of 1st archive
bdbad2: block 1   ;time and date of 2nd archive
bdbver: block 1   ;lh = version number
                  ;rh = pointer to previous bdb
bdbact: block 1   ;account info for charging
                  ;+ for location of string
                  ;- for number
bdbusw: block 1   ;user setable word
;following is optional for SRI cross net retrieve (experimental)
bdbsit: block 1   ;lh = dir string pointer (if it exists)
                  ;rh = site number where file is archived
                  ;specifies site and medium
bdblen:
```

Bits in LH of BDBCTL (primarily for FDB compatibility)

BDBTMP_400000	;File is temporary
BDBPRM_200000	;File is permanent(TENEX)
BDBNEX_100000	;No extension for this bdb yet ;(File does not exist yet)
BDBDEL_040000	;File is deleted (bdb too)
BDBNXF_020000	;First write not complete ;(File does not exist yet)
BDBLNG_010000	;Long file
BDBSHT_004000	;Compressed page table(TENEX)
BDBFLG_002000	;This is a backup block (BDB)

BDB's are doubly strung. This is done to facilitate reconstruction of archive directories.

FIXING SMASHED DIRECTORIES FOR TENEX

The need for piecing directories back together has diminished greatly since RST found the garbage collection bug a while back, but it is still necessary to perform this job once in a while. The following are some pointers as to how to accomplish this task for new TENEX KINGS as well as some old timers. These methods are certainly TENEX version dependent, but have remained stable for some time. There are two kinds of smashed directories and each requires a different fix.

Invalid Pointers, Strings, FDB'S etc..

This type of trouble can range from very minor (easy to fix) to major foulups of almost everything. A system crash while EXPUNGING a directory is a rather catastrophic event and may dictate following the Absolute Trash solution. The BSYS VERIFY function will catch most problems with directories and should be used to "diagnose" the trouble. The output of this function is a list of problems and can be used to one-by-one fix them. The OCTAL PRINT function produces a formatted dump of the directory and is quite useful in getting a global view of the directory structure as well as the specific data in the directory. To actually fix the bad data you can either use the BSYS MAP function or the MDDT mapdir method (see below).

Absolute trash

This situation is caused by a variety of glitches such as bugs, fat fingers, or flakey hardware but requires major surgery on the directory involved. The basic scheme is to "reinitialize" the directory so that it appears as though it is empty. This means the symbol table is empty and the free storage stuff is all reinitialized.

In general the files in this directory will be lost or backed up to the last dump. GET into MDDT and

1. map the directory as follows

```
1/ directory number
2/ -1
call mapdir$x
```

2. initialize directory

```
1/ 25           ;most common block size (FDB length)
2/ 777         ;one page directory
3/ directory number
call iniblk$x
```

At this point the directory is locked so you must set DIRORG(DIRECT in BSYS) to -1. Also all the attributes (protection, groups, disk limits,...) of this directory are set to the system defaults and must be reset with the CREATE exec command or any other suitable means. You can now reload the users files from valid dumps (be sure the disk allocation is set up!).

Some interesting data (TENEX)

symbol table entries must be in ascending alphabetic order

Account strings have an entry in the symbol table of the form
XWD string pointer,,100000

XWD 400100,,25 - FDB header word

XWD 400001,,# - filename string header word
(# = string length + 1)

XWD 400002,,# - extension string header word
(# = string length + 1)

XWD -1,,# - account string header word
(# = string length + 2)
The second word is a use count

GENERAL file system PROCESSING

Running The file system

In the course of running a TOPS20 system situations arise where you would like to "process" all the files in a given directory or all the directories in the system and perform a "one time" modification or fix. albeit an infrequent requirement BSYS is an excellent vehicle to perform such operations. The command "RUN" is designed to process the file system. Control is passed to the dummy routine .DORUN once for each file. .DORUN is a block of 100 POPJ's and can be used to either patch or assemble in any special functions you may desire. The state of the directory run is contained in a set of cells in BSYSDF (cvf,cef,adrfdb,...) and can be used to get

information about the current, next or last file processed (ie: file name, extension etc.).

Mapping directories

BSYS provides an analogous function to the MDDT call mapdir method of mapping user directories and inspecting or modifying them. The MAP command has the following advantages:

- specify the directory name (not number)
- specify read/write access (a guard against fat fingers)
- ability to use any BSYS subroutines or prewritten user routines to perform fixups etc..

If you GET BSYS.SAV and go into DDT, put a breakpoint at cell BPLOC then start BSYS (start\$g). The MAP command will take the breakpoint and you can do as you wish. \$P will continue BSYS and all will be cool. Much thanks to ED TAFT@PARC for contributing this BSYS function.

BSYS Magtape Format

All files consist of "n" records and are separated by EOF marks. The record size depends on the installation as specified below. The first two words of each record have the following format.

```
word 1  lh= not used
         rh= block number
word 2  lh= file number
         rh= page number
```

where block number is a monotonically increasing tape block sequence number, file number is the sequence number of this file (directory = file 0) and page number is the page number of the file as it would appear on disk.

There are four special cases for word 2.

```
word 2= -1          "unused" directory file block.
word 2= -2          user data record (for CRDIR)
word 2= file#,-1   end of data record
word 2= file#,-3   file data record (FDB + strings)
```

Directory file:

The directory file is the only "rewritable" file on a BSYS format tape. This file consists of a header record (length= 64 words) and 200 512 word "pages". Provision is made for this to be alterable as the number of directory pages is contained in the header record. This file is prewritten by BSYS by positive response to the question "NEW TAPE?". The rewritability of this file is accomplished by writting 12 inches of gap (blank tape) at the end of this file at initialization time and subsequently only writting 6 inches at rewrite time. This scheme has been quite successful at SRI as we

have not encountered any problems due to this process.

Format of header record:

```
tphdr:
tpblk:  0      ;header is block 0
tpnum:  0      ;tape number
nxtblk:  0      ;saved last block number used (this tape)
usrblk:  0      ;block # of 1st record if user data file
tpspac:  0      ;space left on tape
tpfiles: 0      ;count of # of files on this tape
site:   0      ;site nickname
pages:  0      ;count # of pages used
tdpgs:  0      ;tape directory pages used
tpseq:  0      ;consecutive dump tape sequence count
dblks:  ^D200  ;200 blocks reserved for directories
tapver:  0      ;format version number of tape
lngfln:  0      ;start block, file number for long file
lngnxt:  0      ;next tape number for long file
lngfst:  0      ;first tape for long file
lngnpg:  0      ;long file number of pages
reserved: block 2
tptxt:  block 20      ;id entered by operator
```

The follow data is site dependent but the length of the header record cannot exceed 64 words.

```
tpid:  asciz  /Artificial Intelligence Center
Stanford Research Institute
333 Ravenswood Drive
Menlo Park, California 94025
(415)326-5200/
```

Tape directory index:

Subdirectory zero is used as an analog to the TENEX file <SYSTEM>INDEX and is used for mapping directory name to tape directory number and vice versa. It has a symbol table ala regular directories with entries of the form:

```
lh - pointer to string block containing dir name
rh - directory number
```

This allows for independence of directory numbers on tape and disk. This solves the problem of deleting a directory and then subsequently creating another with the same name but different number.

***ISI has forced all tapes to be written with 30 pages per directory as if they were all version 4. This means that TENEX tapes are still tapver 3 but the tape directory is mapped with 30 pages/dir instead of 20.

When a tape is read and the routine TODISC is called the tape directory size is determined by the first non-zero directory number on the tape.

User Data Files (TENEX optional):

This file consists of "n" records each containing all of the data necessary to create a directory (GTDIR). This file will only appear on tape created by a "full" dump. TOPS20 directories

File system Files:

These files consists of "n+1" records corresponding to the "n" pages in the as it appeared on disk plus proceeded by one record containing the directory name, directory number, FDB, and all the strings associated with the file.. There is a one to one mapping between the "n" pages and the pages on the disk. There is no zero compression of files ala 1050 save files.

Trailer Record:

After the last file on the tape (for non-full tapes) a special record is written . This record is used for positional verification when adding files to a tape. This record is simply the first page of the "next" file that would be added with a -1 in the page number field

Record Lengths:

The lengths of the tape records are site dependent. The standard is 515 (decimal). The HDRLNG, BLKLNG, SDMFLG, and EIOFLG BSYS configuration parameters determine the record length.

KNOWN DEFICIENCIES OR GLITCHES

DEFICIENCIES:

- 1) The Trim (excess file versions) function should use the "default file retention" field as its criteria in deleting files. It presently asks the operator for the number to keep.
- 2) The LOAD command is implemented but will default to <SYSTEM> if the "to" directory is not specified.
- 3) The cross network retrieval code is still in development.
- 4) The TOPS20 logical names are not supported by interrogate.

GLITCHES:

- 1) The "deliver to users" option of the archive command was designed and implemented before the advent of SNDMSG and its resultant rigid MESSAGE.TXT file format restrictions. The method used for generation of the BSYS archival list makes it difficult if not impossible to supply the length of the message in a SNDMSG type header. A possible solution is to get MAILER to deliver the messages (since it supplies a header in SNDMSG format). This would require BSYS to drop out a file of the type MAILER likes and "poke mailer". This seems like a rather round about way to get things done and a such nothing has been done. Thus the "deliver to users function" is rather useless in its present form but could be fixed if anyone comes up with a better solution or a need for its use.
- 2) The record size of the "user data" record has been changed from 64 to normally 514 words. This was done because of a persistent error message when working with tapes containing the data to recreate users. This has the effect that the restore entire file system function is incompatible with "old" BSYS tapes. This is thought to be a rather unlikely event (to be restoring a non-current file system!), but if there is a need to do such a thing the cell RWRCRD must be changed from IOWD ^D514,BLKNO to IOWD ^D64,BLKNO. The ^D514 is again site dependent.

BSYS configuration parameters

Name	Type	Description
acsstr	asciz string	;(cross net only) a string of octal numbers ;which specify the acceptable cross site ;numbers for this site. Seperated by commas ;and terminated by an extra comma.
arcnms	asciz string	;name of archive directory file ;default - (^v)(rubout)(^v)]archive-directory(^v)[
ardflg	0/1	;0/1 - always delete/delete if over allocation ;default - 0 delete after archive
arcpro	asciz string	;protection for archive directory ;converted to a numeric value for tenex systems
bdbsiz	octal value	;size of bdb entries in archive dir ;default - 12 words per bdb ;optional - 13 words per bdb for SRI cross net ;bdb which includes sitnum
blklng	octal value	;tape data block length ;default - 1003 - normal ;optional - 1104 to allow ISI to switch tapes ; between their KA and KL
chpflg	0/1	;1/0 - check for valid user/don't ;default - 0 -don't check ;optional - 1 - verify that user name appears ; in <system>bsys-allowed-users.lst
crnflg	0/1	;1/0 - cross net code/none ;default - 0 - no cross net code ;optional - 1 - cross net retrieves for SRI ; (still experimantal)
drsflg	0/1	;1/0 - add dir string to bdb's/don't ;default - 0 - don't append directory string ;to end of each bdb. ;optional - 1- Append dir string to end of bdb ;inserting pointer to dir string in left half ;of bdb'sit (only after bdb's have been expanded
dydstr	asciz string	;function listings to <daily-dump> ;default - all automatic listings to LPT: ;optional string of functions whose automatic ;listings will go to <DAILY-DUMP>tpnum.ext ;where tpnum is tape number input by operator ; and ext is: ARC for archive listing ; FUL for full dump listing ; INC for incremental listings
eiouflg	0/1	;1/0 - extended/dumpi(o) instruction ;default - 0 - dumpi/dumpo jsys' ;optional - 1 - extended code to write/read ; tapes for ISI which can be ; switched between their tenex ; and tops20 systems. Used in ; conjunction with hdrlng and ; blklng params.

```

fmtver  octal value      ;file system directory size
                                ;options available
                                ;1 - tenex split directory format
                                ;2 - tenex compact directory format (^d514
                                ;   words per data record )
                                ;3 - tenex compact directory format (^d515
                                ;   words per data record )
                                ;4 - tops 20 normal directory size (30 blocks)
                                ;5 - tops 20 expanded dir size (60 blocks)
fundrs  asciz string     ;name of function exception file if it exists
hdrlng  octal value     ;tape header block length
                                ;default - 100 word tape headers
                                ;optional - 110 word header for ISI to switch
                                ;   tapes between their tenex and
                                ;   tops 20 systems.
jbzflg  octal value     ;1/0 - run as job zero
                                ;default - 0 - don't run BSYS as job zero for
                                ;   system verification on start up.
                                ;optional - 1 - allow BSYS to be run as part
                                ;   of job zero
mftflg  0/1             ;1/0 - check for extra word as part of site
                                ;in tape header
                                ;default - 0 - don't check for two word site
                                ;optional - 1 - check for two word header and
                                ;generate proper tape header format
ndirs   octal value     ;maximum number of directories on system
niknam  asciz string     ;nickname to be specified if not in host table
perflg  1/0             ;1/0 - perpetual bit for archive dir/none
priflg  0/1             ;1/0 - priority jsys avail/none
                                ;default - 0 - no priority jsys available
                                ;optional - 1 - SRI tenex skusr jsys to enable
                                ;   BSYS to get higher priority
savflg  0/1             ;1/0 - save after config/don't save
                                ;default - 0 - don't save configured BSYS
                                ;optional - 1 - save BSYS after initial
                                ;   configuration
sdmflg  octal value     ;0/# - ignore/set data mode
                                ;default - 0 - don't set tops 20 tape data
                                ;   mode
                                ;optional - 4 - set tape data mode to
                                ;   4 ("industry compatable mode")
                                ;   for ISI tape switching.
site0   asciz string     ;tape number header string to be printed when
                                ;tape number is requested from operator
sitnum  octal value     ;site number for cross net retrievals
spool   asciz string     ;cross-net spool directory (default:bsys-spool)

```

```
todflg  0/1          ;1/0 - special tdir mapping/none
                    ;default - 0 - no special mapping
                    ;optional - 1 - ISI developed code to be
                    ;          intelligent for mapping directories
                    ;          from tape which no longer exist in the
                    ;          file system
                    ;following two parameters for tape copy
tpcrlld  0/1          ;0/1 - optional rebuild/always rebuild
tpccmp   0/1          ;0/1 - optional compare/never compare
tpidp   asciz string ;tape id - name and address of site for
                    ;the version of BSYS is being run
unlflg   0/1          ;1/0 - unload tapes/rewind tapes
                    ;default - 1 - unload tapes after BSYS is done
                    ;optional - 0 - rewind only for SRI drives
                    ;          which don't have unload
```

The following is the configuration file for the KL system at SRI. The parameters do not have to appear in any order but any parameter specified in the file must appear in the above list. If the default value is desired, the parameter specification need not appear. The file [aic]<system>bsys.parameters contains:

```
ARCNMS:ASCIZ /JARCHIVE-DIRECTORY/
ACSSTR:ASCIZ /2,,/
CHPFLG:1
EIOFLG:0
CRNFLG=1
PRIFLG:1
TODFLG:0
TPCRLD:0
TPCCMP:0
SAVFLG:1
FMTVER:5
NDIRS:1400
HDRLNG:100
BLKLNG:1003
BDBSIZ:13
SITNUM:2
XCPFLG:1
DYDSTR:ASCIZ /ARCHIVE,FULL,INCREMENTAL/
SITE0:ASCIZ / AIC tape /
TPIDP:ASCIZ /Artificial Intelligence Center
Stanford Research Institute
333 Ravenswood Drive
Menlo Park, California 94025
(415)326-6200/
```

ARCHIVE-LOOKUP configuration parameters

Name	Type	Description
arcnms	asciz string	;name of archive directory file ;default - (^v)(rubout)(^v)larchive-directory(^v)[
arcpro	octal value	;protection for archive directory
lokdrp	asciz string	;name of directory where archive-lookup ;reside. Used in connection with savflg for ;saving configured version of BSYS. ;default - SUBSYS
ndirs	octal value	;maximum number of directories on system
niknam	asciz string	;nickname to be specified if not in host table
savflg	0/1	;1/0 - save after config/don't save ;default - 0 - don't save configured BSYS ;optional - 1 - save BSYS after initial ; configuration
sitnum	octal value	;site number for cross net retrievals ;(still experimaental)

The following is the configuration file for the KL system at SRI. The parameters do not have to appear in any order but any parameter specified in the file must appear in the above list. If the default value is desired, the parameter specification need not appear. The file [aic]<system>lookup.parameters contains:

```

ARCNUMS:ASCIZ /JARCHIVE-DIRECTORY/
SAVFLG:1
NDIRS:1400
SITNUM:2

```

BSYS Function exceptions

BSYS use a file to determine which functions are to be excepted for which directories. For example, if there are certain directories which are to be excepted from archiving and or incremental dumps, their names would be included in <system>bsys-excepted-dirs. BSYS uses this asciz string file to create a bit table file <SYSTEM>bsys-function-exceptions which it uses for checking to see if the presently specified function is to be performed any or all directories. A new version of bsys-function-exceptions is created anytime BSYS is started up and BSYS determines that bsys-excepted-dirs file has been changed.

The format of <system>bsys-excepted-dirs is a directory name string terminated by a colon and followed by the name(s) of the functions to be excepted for the specified directory. The exception file for SRI KL system appears below as an example. The example shows that the directory SPOOL is to be excepted from archive and incremental dump functions and ROOT-DIRECTORY is to only be excepted from archive.

The following functions are acceptable after the directory specification:

- ARCHIVE - Don't auto archive from this directory, but accept specific archive requests.
- ASSOC - This directory has access to directories specified in the <SYSTEM>ASSOC.BSYS file.
- AUDIT - Don't show disk usage for this directory.
- COUNT - Don't show disk usage for this directory.
(Tenex side affect - replace the count presently in the directory by that just calculated for the directory.)
- DUMP - Don't dump files from this directory (DUMP BSYS function).
- FULL - Don't dump files from this directory as part of a full system dump (normally all directories).
- INCREMENTAL - Don't dump change files from this directory.
- MSG - Don't send message after the retrieve request to this director
- PURGE - Don't purge ghost files from this directory
(files that don't exist yet).
- SAVE - Don't save the archive directory from this directory.
- TRIM - Don't trim intermediate versions of files in this directory.
- UPRVER - Don't auto archive the highest version of any files unless specifically requested.

Example of [aic]<system>bsys-excepted-dirs

BSYS-SPOOL:ARCHIVE,INCREMENTAL
ROOT-DIRECTORY:ARCHIVE
GEOFF:ARCHIVE
GEOFF2:ARCHIVE
101B-MONITOR:ARCHIVE
101B-SOURCES:ARCHIVE
101B-SUBSYS:ARCHIVE
101B-EXEC:ARCHIVE
DOCUMENTATION:ARCHIVE
SOURCES:ARCHIVE
SYSTEM:ARCHIVE
SUBSYS:ARCHIVE
NEWSYS:ARCHIVE
SUPPORT:ARCHIVE
FRONT-END:ARCHIVE
BINARY:ARCHIVE
MFEXEC:ARCHIVE
DEV-RSEXC:ARCHIVE
TV:ARCHIVE
M:ARCHIVE
C:ARCHIVE
FE:ARCHIVE

Interrogate subcommands

@@ALL.FILES - displays deleted and undeleted bdb information.

@@BEFORE.DATE - only display files archived before specified date.

@@DATES - print out dates when file was archived.

@@DELETED.FILES.ONLY - only display deleted files (bdb)

@@DOUBLE.SPACE - listing format control.

@@EVERYTHING - all data for files.

@@INDIVIDUAL - select option to display file information and wait for user command before continuing. This option interacts with the user allowing simplified retrieval of multiple files. The user commands are:

- B - backup to previous file data
- D - mark this bdb as deleted. The bdb goes away only when an "ARCHIVE EXPUNGE" EXEC command is typed.
- Q - go back to exec.
- R - retrieve this file. The "Do you want this file retrieved" question is not asked and consequently this is an easier way to retrieve a large number of files.
- U - undelete the presently displayed file (BDB). If the ALL.FILES or DELETED.FILES.ONLY options are selected then deleted bdb's will be displayed and can consequently be undeleted.
- ^ - up arrow is same as "B" backup command.
- <lf> - display next file.
- <cr> - display next file.

@@LPT - Listing to LPT:

@@NO.HEADING - don't print heading.

@@NUMBERS - absolute index of bdb in archive-directory.

@@OUTPUT.TO.FILE - listing to specified file.

@@PROTECTION - print protection of file.

@@REVERSE.ORDER - display oldest bdb data first.

@@SINCE.DATE - display data for files since date spec.

@@STATUS - delete/undelete status of bdb.

@@TAPE - tape number associated with file spec.

@@TIMES.AND.DATES - when file was archived.

@@VERBOSE - full print of command data.

@@CARRIAGE RETURN TO GO - start display of files.

The following commands are undocumented at the present time, but will be added in the near future.

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BSYS. CHANGES
from ISI 4-30-81

- bsyscm - added "bypass restore checks " question to initial RESTORE code. Cleanup RETRIEVE subcommand code. Add EXIT to RETRIEVE subcommand to return to BSYS primary command level. Added auto heading code for archive,full and incremental dumps. Added auto heading to SAVE function. Clean up RETRIEVE code. Make tape copy, be smart about EOI on write. Expanded list to be able to select one directory off the tape to list. Made tape copy code finally work. Added append archive directories command and code. Added insert directory string after bdb in archive directory (requires expanded archive=directory). Fixed octal dump so that it uses directory number from tape for dumping directories from tape (required changes to bsysut = user code). Added initialize command to check out bsys.paramters files before they are installed on the system.
- bsysdf - Added new cross net site number and perflq for new perflq initialization parameter.
- bsysdr - Add perpetual file bit chfdb instruction. Provide more information for GETARC failure. Added code to tapdsk to clear archive pending, dump not complete and dumper bits from backup flag bits. Made reading fo the fdb data at the beqining of the file into a seperate routine to enable the reading pages at the end of a long file (page number 77777 specifically)
- bsysdv - Added code to tapei so that 1) BSYS will accept any BSYS tape format (ie. 100,110 octal header length, 511.,512.,.... data record length). 2) In conjunction with a switch in todisc, allow differnt start numbers for record number sequencing (blkno). Put in auto continue for tape sequence number difference of only 1. Added chkptn tape code to attempt to read the tape before writing dummy directory. If the tape is an archive tape, then bsys halts. If it is a dump tape, then bsys will ask if the user wishes to continue. Addition to an existing tape is not affected. Corrected longstanding problems connected with eot processing. Added code to ptfle to make searching down tapes faster by eliminating reading of the fdb data from the front of each file until the tape is close to the file number of interest.
- bsysfd - Corrected a bug in cntrol which prevented specific archives from directories which had auto archives excepted
- bsysfn - Added code for append archive directories. Added code to insert dir string in archive directory bdb's. Modified expand and bdb building code to support append and insert functions. Added isi code to prevent overwrite of perpetual files on restore. Expanded bldrst to allow (via drsflq) appending of a dir string to the end of bdb's. (future plans call for the adding of a symbol table to the archive directory to keep track of dir strings associated with various bdb's) added code to allow (via the exceptions file code) to auto archive all but the highest version of a file which has not been read in "n days".
- bsysfs - Fixed bugs in the full restore code.
- bsysin - Added code for perpetual bit capability

rearranged code so that the init command would work properly

Fixed bugs in the getcmd code.

bsystd - Fix bug in allfls. add code to todisc to correspond to tapei code for determining tape record lengths. Added check in scan to keep it from running away if number of pages in tape header does not match actual read in. Added code to inittd so that copy will copy the data as it is on tape and not do dirst's from the file system.

Added code to inittd so that on tape copy, BSYS will get the string from page+100 instead of a dirst.

corrected long file page count problem in dmpeot.

Corrected ancient bugs in the code used to expand the index of directories on the tape.

Added sscan and expanded scan to allow scanning of single tape directory.

Changed tdirst so that it will not default to the file system dir num.

bsysut - Added tuser to get user number from tape instead of file system.

10-MAY-76 21:43:48=PDT,1097;000000000001

Date: 8 AUG 1974 2143=PDT

From: NAGEL

Subject: BSYS 3.02

BSYS INFO

8 - 8 - 74

A NEW VERSION OF BSYS HAS BEEN INSTALLED. THE NEW BSYS OFFERS THREE NEW FEATURES THAT WILL ALLOW THE USER TO MANIPULATE THEIR LIST OF ARCHIVED FILES. THE THREE FEATURES ARE INTERROGATE, DELETE, AND UNDELETE. INSTALLATION OF THE NEW BSYS HAS CAUSED SOME OF THE ARCHIVE LIST TO READ "TAPE 0". THIS SHOULD BE IGNORED BY THE USER. THE NEW FEATURES ARE DESCRIBED BELOW.

BSYS (CR)

TENEX=BSYS 3.02 6-AUG-74

*INTERROGATE (THE ARCHIVE) (CR)

.;* , ;ALTMODE COMMA WILL GET YOU INTO SUBCOMMAND

???

ALL.FILES

DELETED.FILES.ONLY

UNDELETED.FILES.ONLY

VERBOS

EVERYTHING

DATES

TIMES.AND.DATES

PROTECTION

BEFORE.DATE

SINCE.DATE

DOUBLE.SPACE

NO.HEADING

REVERSE.ORDER

OUTPUT.TO.FILE

LPT
CARRIAGE RETURN TO GO

BSYS DELETE AND UNDELETE FUNCTION

*DELETE (ARCHIVE ENTRY) (CR)
FILENAME.EXT;VER [CONFIRM] (CR)
*UNDELETE (ARCHIVE ENTRY) (CR)
FILENAME.EXT;VER [CONFIRM] (CR)
*EXIT (CR)

@

11-Apr-78 16:10:35 PST,1706;000000000001
Date: 11 Apr 1978 1610 PST
From: WMOORE
Subject: BSYS changes

Full restore on tops20 should work now. The directory files from the root directory are dumped at the beginning of each inc or full dump. The tape directory is not told that the files are there because there is not enough room in the tape directory. A temporary file called RUTDIRECTORY.TMP is generated from these files and used to create users and for restore checks.

A list of directories is checked to prevent the larchive=directory[file from being generated at the time of the archive. (printer,xqp,..etc.)

The octal print command allows the INDEX file to be specified and gives the format of the subindices that are selected for tenex.

The build command generates the archive=directory entries from the second tape of the archive only.

Non-privileged users may dump their own directories with BSYS.

The perpetual and ephemeral bits are restored from tenex tapes to tenex sites.

The load command can store files or groups of files from a tape directory to the same or other system directory as new files.

The wild card, *, should work now.

Archive, dump, restore and retrieve of multi-tape files should work now.

The map function with write access should work now for tops20.

The page mapping for a file can be specified with the list command.

The mark command will now connect to the directory that is specified.

The delete subcommand to retrieve should work now.

The code for UPRVER= don't auto archive the highest version of any files unless specifically requested" has been fixed.

The automatic listing has been taken out for archive.

17-AUG-78 11:02:41=PDT,323;000000000000
Date: 17 AUG 1978 1102=PDT
From: WMDDRE
Subject: BSYS.SAV;50458

Don't archive the [ARCHIVE=DIRECTORY] file.

Add ASSOC parameter to access old directories.

Don't clear tape with ARCMES if the archive date is older than 24 hours.

Take the extra eof out of the tape copy after writing the directory.

24-AUG-78 17:16:57=PDT,120;000000000000
Date: 24 AUG 1978 1716=PDT
From: WMDDRE
Subject: BSYS.SAV;50459

The REAPER command has been implemented.

28-AUG-78 17:06:28=PDT,214;000000000000
Date: 28 AUG 1978 1706=PDT
From: WMDDRE
Subject: BSYS;50460

Permanent files are dumped even if deleted and have zero pages.

The dump listings print the directory name even if no files are dumped.

30-AUG-78 13:36:55=PDT,276;000000000000
Date: 30 AUG 1978 1336=PDT
From: WMDDRE
Subject: BSYS;50461

The subcommand for retrieve will now list large tape numbers.

The check for existing file for retrieve has been changed.

The incremental dump will list only directories that have files dumped.

15-DEC-78 10:33:49-PST,257;000000000000

Date: 15 DEC 1978 1033-PST

From: WMOORE

Subject: BSYS;50464

Implement conversion of time and date between tenex and tops20 when restoring, loading, retrieving, and single file transfer of files written on one system and read into the other.
