Release Note for the
Data Backup and Recovery Guide
(RLN11224-1LA)

December 1988

This Release Note, RLN11224-1LA, provides three update appendices and a replacement Index for the Data Backup and Recovery Guide (DOC10129-1LA). It documents the operation of the Physical Save and Restore (PSR) utility as implemented at PSR Independent Product Release 1.0-22.0

Add the enclosed appendices to the appendices in the Data Backup and Recovery Guide. Remove the current Index from the Data Backup and Recovery Guide, and replace it with the enclosed Index.

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Physical Save to Tape :PSR

INTRODUCTION

The PSR (Physical Save and Restore) command enables you to

- Save a physical disk partition to tape
- Restore a physical disk partition from tape
- Copy a physical disk partition to another disk partition
- Protect a partition from being accidentally overwritten by a restore or copy

This appendix describes how to use PSR to save a partition to tape. For details of how to restore and copy partitions, refer to Appendix M, RESTORING A PHYSICAL SAVE: PSR, and Appendix N, PHYSICAL COPY BETWEEN DISKS: PSR.

OVERVIEW OF PSR SAVE

In save mode, PSR saves an entire physical disk partition to tape. It does so without reference to the logical structure of the data on disk, and a partition is therefore the smallest unit that you can restore from a PSR save.

A physical save has the advantage of being considerably faster than a logical save of an entire partition, but is not as convenient if you

subsequently want to restore only a small number of files. However, a physical restore of an entire partition is much faster than a logical restore of a partition. You make physical saves in order to be able to recover as quickly as possible from, for example, a disk crash.

If you save a partition that has related files on another partition, remember to save this other partition also, to ensure that the files remain a logically consistent set. For example, a ROAM file may consist of a master file and several slave files, and the slave files might not be on the same partition as the master file.

Note

PSR cannot save the command device (COMDEV). To save the command device, use one of the logical backup utilities.

When you use PSR to save a partition, PSR offers the following features that are specific to a save:

- Base saves
- Incremental saves
- Archive saves
- Multiple save streams
- Unique partition identifiers

PSR also has general features, applicable to a save, restore, or copy:

- Partition write protection
- Interactive interface
- Error handling
- Comprehensive help system

These features are described in the following sections.

Base, Incremental, and Archive Saves

This section defines base saves, incremental saves, and archive saves. It also explains when you should use each type of save.

Base Save: A base save is a save of an entire partition, excluding any unused records on the partition. After a base save, PSR resets a date/time field in the partition's Record Availability Table (RAT);

this field records the date and time of the base save. A base save provides the basis for subsequent incremental saves.

Incremental Save: An incremental save is a save of all the records on a partition that have changed since the most recent base save of that partition. An incremental save is faster than a base save, because it saves fewer records, and needs fewer tapes. The PSR incremental saves are cumulative saves. This means that an incremental save records all changes since the associated base save, not just changes since the previous incremental save.

Archive Save: When you run an archive save, PSR saves the same data as for a base save; that is, PSR saves the entire partition, excluding any unused records. However, for an archive save, PSR does not update the base save date/time field, which continues to record the date and time of the most recent base save. An archive save thus enables you to save a partition without affecting the cycle of base and incremental saves for that partition. It is useful, for example, when you want to save a partition to tape in order to restore it onto another system.

Running Base and Incremental Saves: After you have performed any of the following operations you must run a base save of a partition, rather than an incremental save.

- Run MAKE on the partition
- Run PSR or PHYRST to restore data to the partition
- Run PSR or COPY_DISK to copy data to the partition

All these operations set the base save date/time field in the partition's RAT to an invalid state, and you can only return the field to a valid setting by making a base save.

After a partition base save, future saves of that partition can be either base saves or incremental saves.

If you have made an incremental save, and you subsequently want to restore the partition, you must do this in two stages:

1. Restore the most recent incremental save
2. Restore the most recent base save

It is thus quicker to restore a partition on which you have run only base saves. However, this consideration is outweighed by the greater speed of incremental saves, and the greater number of tapes used, as opposed to base saves. Saves are a regular occurrence, whereas you will need to restore a partition only occasionally, for example after a disk crash. In most cases you should therefore seek to maximize the speed of your saves, rather than of the restores.

The section MAXIMIZING PERFORMANCE, later in the appendix, suggests several ways of doing this.

Note

You cannot run incremental saves on pre-Rev. 22 partitions, because PSR cannot identify changed records on such partitions.

Multiple Save Streams

PSR allows you to make parallel saves of the same partition to tape through a single invocation of PSR. Parallel saves are faster than several separate saves, and they guarantee that you have identical copies of the save. They enable you, for example, to write a security copy for offsite storage at the same time as you make a local copy.

When you invoke PSR it prompts you to define the first save, which is always on save stream 1. After you have defined the save on stream 1, you have the opportunity to specify further target devices for that save. For each target tape drive, PSR establishes another save stream. For example, you could specify that you want parallel saves to tape drives MT0, MT1 and MT4. For each drive, PSR would set up a separate save stream: stream 1 (for MT0), stream 2 (for MT1), and stream 3 (for MT4).

Note

The tape volumes (reels) written on a save stream are a single logical entity. When you make multiple parallel saves, take care not to mix the volumes written on different save streams. If you restore, for example, a two-volume save, you cannot use the first volume from save stream 1, and the second volume from save stream 2. This is because the point at which the break between volumes occurs is usually different on each stream.

Unique Partition Identifier

PSR allows you to use a unique partition identifier to specify the partition that you want to save. This identifier consists of the disk volume ID and the partition's physical device number (pdev), in the format volume_id:pdev. volume_id is a user-created string that must comply with normal PRIMOS filename standards, and the System Administrator has to decide what naming conventions the IDs should follow. For example, a partition identifier could be PACK9:20662, where PACK9 is the name that the Administrator has given to the disk pack, and 20662 is the physical device number of a partition on that pack.

PSR also allows you to specify a partition by its pdev alone, but a pdev is not a unique identifier. For example, if you mount a disk pack on another drive, the pdevs of the partitions on that pack will probably change; or, if you remove a disk pack from a given drive, and mount a new pack, you may have partitions with the same pdevs as partitions on the previously mounted pack. To avoid such situations, it is advisable to use the unique identifier, volume_id:pdev, when you save a partition.

When you restore a partition, PSR displays messages that use the partition identifier you supplied when you saved that partition. If you have used the unique identifier, the PSR messages output during a restore enable you to be sure that you are restoring the correct partition from the correct disk pack, and not a partition that just happens to have the same pdev as the partition you want to restore.

Partition Write Protection

When you create a partition using MAKE it is automatically write protected against PSR. PSR allows you to remove this write protection before you restore, or copy a partition, and to reinstate the protection after the restore or copy operation has ended. For details of how to use PSR to control partition write protection, refer to Appendix M, RESTORING A PHYSICAL SAVE, and Appendix N, PHYSICAL COPY BETWEEN DISKS.

If you save a partition that has been left in an unprotected state, PSR issues the warning message

```
Source device <id> is backup write enabled
```

where id is in the format volume_id:pdev, or pdev, depending on how you identified the partition to PSR when you ran the save.

To reinstate write protection, issue the command

```
OK, PSR -PROTECT [id]
```

If you omit id, PSR prompts you for the partition ID.

Note

PSR write protection only restricts PSR restores and copies. It does not affect any other disk I/O operations.

Interactive Interface

When you invoke PSR, you receive a series of prompts that enable you to control the save interactively. The sequence of prompts and responses is termed the PSR dialog, and is explained in the section INVOKING PSR, later in this appendix.

Error Handling

PSR first attempts to recover from write errors by rewriting the data. If this fails, PSR repositions the tape to the previous checkpoint, terminates the tape volume at that point, and prompts for a new volume. Checkpoints are markers that PSR writes to tape at regular intervals, to aid error recovery.

PSR Help

To obtain general information about PSR, issue the command

```
OK, PSR -HELP
```

The following is an example of PSR -HELP:

```
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
One of the following must be supplied:

-SAVE          Save a disk partition
-RESTore       Restore a disk partition
-COPY          Copy a partition
-PROtect       Set DRB write protection on partition
-No_PROTect    Clear DRB write protection on partition

For help on one of the above, use -HELP with the option.
For example, PSR -SAVE -HELP gives more details for -SAVE.
```

If you require specific help about how to use PSR to save a partition, issue the command

```
OK, PSR -SAVE -HELP
```

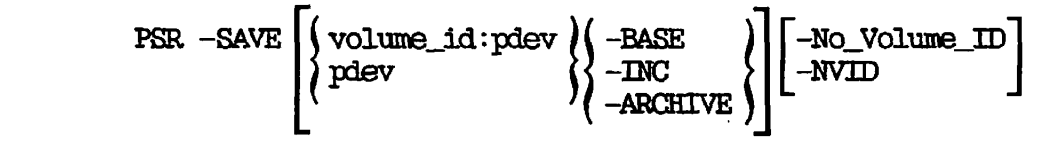
During the PSR dialog, you can obtain help about how to respond to a PSR prompt by entering HELP in response to the prompt.

The following is an example of PSR -SAVE -HELP:

```
[PSR Rev.  1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]

The -SAVE option is used to save a disk partition to tape.

The command line format is

PSR -SAVE [ source { -BASE | -INC | -ARCHIVE } ] [ -No_Volume_ID]

where
     source            Identifies the source disk partition
     -BASE             Performs a base save
     -INC              Performs an incremental save
     -ARCHIVE          Performs an archive save
     -No_Volume_ID     Tapes do not have unique volume IDs
```

INVOKING PSR

The format of the PSR command to save a partition is:



where:

-SAVE	Tells PSR that you want to save data to tape.
volume_id:	A user-created string that names the disk pack, for example PACK6. This is an optional part of the command line, but is recommended as a means of uniquely identifying each disk pack.
pdev	The partition's physical device number. You can specify the partition by just pdev, or you can use pdev in conjunction with volume_id:. If you specify both volume_id: and pdev, the format is volume_id:pdev.
-BASE	Tells PSR to run a base save that is to be the start of a sequence of incremental saves.
-INC	Tells PSR to make an incremental save.
-ARCHIVE	Tells PSR to make an archive save.

-NO_VOLUME_ID -NVID	Tells PSR that you are not using uniquely identified tapes, and that it should not prompt you for the volume ID.

Valid command lines are:

OK, PSR -SAVE (the default command)

OK, PSR -SAVE pdev -BASE

OK, PSR -SAVE pdev -INC

OK, PSR -SAVE pdev -ARCHIVE

OK, PSR -SAVE pdev (pre-Rev. 22.0 partitions only: generates an archive save)

Note

If you save a pre-Rev. 22.0 partition, you can only make archive saves. You cannot make either base or incremental saves.

After you issue a PSR command, you enter the PSR dialog, which is described below in the section PSR Dialog. The content of the dialog depends upon the PSR command line.

For example, if you have a Rev.22.0 partition, and you issue the default PSR command

OK, PSR -SAVE

the PSR dialog begins by prompting you to identify which partition you want to save, and to specify the type of save you require. With a pre-Rev.22.0 partition, this default command would also initiate the PSR dialog, but PSR would not prompt for the type of save; it would assume you require an archive save.

The -BASE, -INC, and -ARCHIVE options enable you to specify on the command line that you want to run a base, an incremental, or an archive save. For example, the commands

OK, PSR -SAVE 2060 -BASE

and

OK, PSR -SAVE PACK9:2060 -BASE

both tell PSR that you want to run a base save of physical device number 2060. The PSR dialog that follows the command does not prompt for the source disk, nor for the type of save. In the second example, the command line identifies the disk pack as PACK9.

To specify on the command line that you want to run an incremental save, use the -INC option instead of the -BASE option. For example, the command

```
OK, PSR -SAVE PACK9:2060 -INC
```

tells PSR that you want to run an incremental save of pdev 2060.

To specify that you want to run an archive save, use the -ARCHIVE option on the command line. For example, the command

```
OK, PSR -SAVE PACK9:2060 -ARCHIVE
```

tells PSR that you want to archive pdev 2060.

If you have a pre-Rev. 22.0 partition, you can only make archive saves, and you do not need to include the -ARCHIVE option on the PSR command line. The command

```
OK, PSR -SAVE PACK9:2060
```

tells PSR that you want to archive the pre-Rev. 22.0 partition pdev 2060. If you specify a partition that is not in pre-Rev. 22.0 format, you receive an error message.

PSR Dialog

This section describes the PSR prompts and messages you receive when you run a save. You do not receive all the prompts listed below, because the dialog depends upon the PSR command line, and upon the format of the partition (Rev. 22.0, or pre-Rev. 22.0). There are also slight variations in the dialog if you use a cartridge tape drive; the description of the dialog identifies these variations.

For online help about how to respond to a prompt, enter HELP.

To exit from the dialog, enter QUIT in response to any of the PSR prompts.

Refer to the section EXAMPLE COMMAND LINES AND DIALOGS, later in this appendix, for examples of the PSR dialog.

PSR Prompts and Messages	User Response
Enter source disk:	You receive this prompt if you have not specified the partition on the PSR command line. Enter the partition ID in the format volume_id:pdev or pdev.
Is this a Base (B), Incremental (I) or Archive (A) save?	You receive this prompt if you issued the default PSR command, and you specified a Rev. 22.0 partition in response to the previous prompt, 'Enter source disk'. Enter B to run a base save. Enter I to run an incremental save. Enter A to run an archive save.
Enter media for save stream 1. Use physical device:	Enter the tape drive identifier, for example MT0.
Volume ID is <serial-id>	If the tape is labeled, PSR reports the volume serial ID. No user action is needed, other than to check that you have mounted the correct tape.
Media does not contain a valid volume label. Enter volume ID:	You receive this prompt if the tape is not labeled, and you have not included the -NO_VOLUME_ID option on the PSR command line. Enter the serial ID of the tape volume you have mounted. The ID is a string of 1 through 6 characters that uniquely identify the reel.

The string is ANSI-87 standard and can be alpha-numeric characters or symbols excepting # $ \ [ ] ~ { } | and `.

The ID should be the same as the name written on the paper label on the reel.

If you specify fewer than six characters, they are blank-padded to the right.

Displays details of the tape's position, the save at that position, and the date the save was made

PSR displays several messages to inform you about the content of the tape. No user action is required, other than to check that you have mounted the correct tape.

Enter required save number or Append (A):

If the tape holds data, PSR prompts for the point at which you want to position the tape.

Enter the save number at which you want to position the tape. For example, first save is 1, second, 2, etc.

If you enter a save number that already exists on the tape, PSR overwrites the existing save without asking for confirmation.

If you want to append to the tape, enter A.

If you save a partition to a cartridge tape, you do not receive a prompt for a save number. You can only write from the start of the tape, or append to the tape, and you receive the following prompt:

Append (A) or Overwrite(O) the media?

You receive this prompt if you save a partition to a cartridge tape.

Enter A if you want PSR to append the save to the tape.

Enter O if you want PSR to write from the beginning of the tape.

Enter recording density (bpi):

If the save begins at the start of the tape, PSR prompts for the density at which you want to write the data.

Enter the density you want, or press the RETURN key to select the density for the tape drive previously specified when using the ASSIGN command.

You do not receive this prompt if you save to a cartridge tape drive.

Enter media for save stream 2.
Use physical device:

To define a save on stream 2, enter the tape drive identifier for this save stream, for example MT1. PSR then repeats the prompts described above, for the volume ID, save number, and recording density.

If you want to terminate the definition of save streams, and to begin the save, press the RETURN key at this prompt.

This save is not part of an incremental save sequence.
OR
This base save is the start of a new incremental save sequence.
OR
The base save for this incremental was made on <date-and-time>

PSR issues one of these messages reminding you the type of save invoked: archive, base, or incremental.

Operation complete.	PSR issues this message when the save has ended successfully.
Please record the following information for use when restoring: <details of save type and saved partition> <details of stream, volume serial ID, and save number>	You should record the information that PSR displays about the save. You need this information if you have to restore the save.

End of Volume: If a save reaches the end of a volume, PSR initiates the following dialog.

PSR Prompts and Messages	User Response
End of media detected on <serial-ID (tape-drive-ID)> Enter media for continuation. Use physical device:	Mount the continuation volume, and enter the ID of the tape drive on which it is mounted, for example MT2.
Displays details of the tape's position, the save at that position, and the date the save was made	PSR displays several messages to inform you about the content of the tape. No user action is needed, other than to check that you have mounted the correct tape.
OK to overwrite the media?	You cannot append to a continuation volume. If the volume already holds data, PSR requests permission to overwrite it. To continue the save, and overwrite the tape, enter Y.

If you do not want to overwrite the tape, answer N. PSR then repeats the cycle of prompts, starting with "Use physical device:". Mount a new continuation reel, and begin the end-of-volume procedure again.

EXAMPLE COMMAND LINES AND DIALOGS

This section gives examples of PSR command lines and dialogs to:

- Make a base save that spans two volumes of tape
- Append an archive save to a tape
- Make an incremental save

There is also an example CPL program that drives a PSR save.

Making a Base Save to Two Volumes

The following example is of a base save that spans two reels. The continuation reel already contains data, and PSR asks whether it is all right to overwrite that data.

```
OK, PSR -SAVE PACK7:20662 -BASE
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
Enter media for save stream 1.
Use physical device: MT0
Volume ID is 117202.
This volume begins with save number 1,
a physical base save of 10662
created on 22 Mar 88 15:55:24 Tuesday.
Enter required save number or Append (A): 1
Positioning to beginning of media ...
Enter recording density (bpi) : 6250
Enter media for save stream 2.
Use physical device: <RETURN>

This base save is the start of a new incremental save sequence.
Saving...
End of media detected on 117202 (MT0).
Enter media for continuation.
Use physical device: MT1
Positioning to beginning of media ...
Volume ID is 117205.
This volume begins with save number 1,
a continuation of a physical base save of 10662
created on 22 Mar 88 15:55:24 Tuesday.
```

```
OK to overwrite the media ? Y
Positioning to beginning of media ...
Operation complete.
Transferred 25350 records.

Please record the following information for use when restoring:
Media contains base save of Rev 22 partition PACK7:20662
Stream 1 initial volume is 117202, save number 1
and continues on volume(s) 117205
OK,
```

Appending an Archive Save

The following example shows the prompts you receive when you use the default PSR command. If there were only one save on tape IKT001, this example would append save 2, an archive save, to the tape. However, if save 2 already existed, PSR would automatically overwrite it with the archive save. PSR would not ask you for confirmation that you wanted to overwrite save 2, and the dialog would be the same as if PSR were appending the save. Alternatively, if you entered append (A), PSR would not overwrite any existing saves, but would start after the last save on tape.

```
OK, PSR -SAVE
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
Enter source disk: 20662
Is this a Base (B), Incremental (I) or Archive (A) save? A
Enter media for save stream 1.
Use physical device: MT0
Volume ID is IKT001.
This volume begins with save number 1,
a physical base save of 10662
created on 22 Mar 88 15:55:24 Tuesday.
Enter required save number or Append (A): 2
Positioning to required save ...
Enter media for save stream 2.
Use physical device: <RETURN>

This save is not part of an incremental save sequence.
Saving...
Operation complete.
Transferred 25350 records.

Please record the following information for use when restoring:
Media contains archive save of Rev 22 partition 20662
Stream 1 initial volume is IKT001, save number 2
OK,
```

Making an Incremental Save

In the following example, the PSR command line specifies that PSR is to run an incremental save of partition 10662, which is on the disk named PACK3. This incremental save is save 2 on tape DRB001, which already holds a previous incremental save of the partition.

```
OK, PSR -SAVE PACK3:10662 -INC
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
Enter media for save stream 1.
Use physical device: MT0
Volume ID is DRB001.
The volume is positioned at the end of save number 1,
a physical cumulative incremental save of PACK3:10662
created on 24 Mar 88 11:45:19 Thursday.
Enter required save number: 2

Enter media for save stream 2.
Use physical device: <RETURN>

The base save for this increment was made on 22 Mar 88 15:55:24
Saving ...
Operation complete.
Transferred 2500 records (10% of records in use).

Please record the following information for use when restoring:
Media contains cumulative incremental save of Rev 22 partition PACK
3:10662
Stream 1 initial volume is DRB001, save number 2
OK,
```

CPL Program to drive a PSR Base Save

The following is a very simple CPL program example, that would drive a PSR base save. There is no error checking or assigning of disks, tape drives, and so on included. You have to customize the program accordingly, depending on your particular circumstances.

```
/* Example of how to invoke PSR -SAVE from CPL.
/*
/* START-DESCRIPTION:
/*
/* This is a very simple program to demonstrate the use of CPL to
/* run the physical backup product, PSR, to do a base save of a
/* partition.
/*
/* Usage:  PSR_SAVE <pdev> -TO <MTn>
/*
```

```
/* <pdev> is the physical device number of the partition to be
/* saved. <MTn> is the drive number on which the save will be
/* started; if the tape already contains data, this save will
/* be appended to the end. Continuation devices are prompted
/* for when required. The user must assign the partition to
/* be saved, and the tape drives to be used, before running this
/* program. All media used is assumed to be labeled, either
/* explicitly by the LABEL command, or by previous use by PSR.
/*
/* END-DESCRIPTION
/*
/* START-CODE:
/*
/* Parse the command line
/*
   &args pdev:oct; -
         to_arg:-TO first_mt:char
/*
/* Check if the source pdev and the first MT unit were supplied
/*
   &if [null %pdev%] | [null %first_mt%] -
   &then -
      &stop 1 &message Usage: PSR_SAVE <pdev> -TO <MTn>
/*
/* Set variable for null responses
/*
   &set_var null :=
/*
/* Run PSR to do the save
/*
   &data PSR -SAVE
      %pdev%            /* source device
      Base              /* save tape
      %first_mt%        /* device for stream 1
      Append            /* save number
      %null%            /* density
      %null%            /* device for stream 2
      &tty              /* continuation devices, if required
   &end
/*
/* Check the error severity
/*
   &if %severity$% = 0 -
   &then -
      &stop 0 message *** Save of %pdev% completed OK.
   &else -
      &stop %severity$% &message *** Save of %pdev% failed.
/*
/* END-CODE
/*
```

MAXIMIZING PERFORMANCE

There are a number of ways in which you can maximize the speed of a backup:

- Use alternate tape drives.
- For multistream saves, use tape drives on different controllers.
- Use incremental saves.
- Schedule the save for a time when the system is lightly loaded.
- Close the entire system to users before you begin the backup.

If a save requires more than one reel of tape, you can reduce the time that a save takes by using alternate tape drives. Mount the continuation reel on the unused drive while the save proceeds on the other drive. When PSR reaches the end of the reel and prompts for the next reel, you can quickly resume the save on the standby drive.

If you run a multistream save, the save will be faster if you select tape drives on different controllers.

An incremental save is normally faster than a base save, because the incremental only saves records that have changed since the most recent base save; PSR saves fewer records than for a base save, and needs fewer reels. You should therefore assess the rate of change of the data you want to save, and only run base saves when a large proportion of the records have changed since the previous base save.

The save also proceeds more quickly if the system is lightly loaded, or closed entirely to users. The section SAVE PROCEDURE, later in this appendix, explains how to close the system to users as part of the save procedure.

PREPARING FOR A SAVE

Before you begin a save you need to know:

- The physical device number of the partition you want to save.
- The tape drive identifier.
- The volume serial ID, if the tape is not already labeled.
- Whether the tape already holds data. If it does hold data, you need to know how many saves there are, and which saves, if any, you want to overwrite.

You need this information so that you can answer the PSR prompts.

You must also decide whether you want to close the entire system to users, or to close only the partition that you want to save. The next section discusses the factors you must consider when you make this decision.

System Preparation

Before you begin to save a partition, you must decide whether to

- Close the entire system to users.
- Close only the backup partition.

When you want to maximize the speed of the backup, take the entire system out of service. If you close down only the backup partition, this may be more convenient to users, but will probably cause the backup to run more slowly.

Regardless of PSR performance considerations, it is advisable to close the entire system to users if your backup partition

a. Holds many users' origin directories (20% or more of system users)

b. Holds files accessed by most of the users on the system

c. Is on the same disk pack as a paging partition

If either (a) or (b) applies, the users cannot work while PSR saves the partition. If (c) applies, users can work, but the system will be very slow.

If you intend to save partitions that hold master and slave ROAM files, you should either close the entire system to users, or ensure you shut down at the same time all partitions that hold related ROAM files.

The step-by-step procedure in the following section explains how to take either the system or a partition out of service, and how to return them to service after the backup.

SAVE PROCEDURE

Unless otherwise specified, perform the steps below from the supervisor terminal. The procedure does, however, allow you to run part of the backup from a user terminal. Figure L-1, at the end of this section, illustrates the backup procedure.

Step 1 below describes the procedure for closing the entire system to users. If you have decided to close only the backup partition, begin at step 2. The previous section, System Preparation, discusses the relative merits of the two approaches.

1. If you have decided to close the entire system to users, do this by following steps (a) through (d) below, and then continue at step 3.

   a. Inform users of the impending shutdown by issuing a series of messages. The first message should give users plenty of advance notice of the shutdown. For example:

```
OK, MESSAGE ALL
SYSTEM CLOSING DOWN AT 14:00 HOURS TODAY
.
.
OK, MESSAGE ALL -NOW -FORCE
SYSTEM CLOSING DOWN IN 5 MINUTES - PLEASE LOG OUT
```

   b. Prevent new users from logging in, then begin to shut down the subsystems. See your CPU Handbook for specific procedures. For example:

```
OK, MAXUSR 0
OK, PROP PRO -STOP
OK, FTOP -STOP_SRVR FTP
OK, BATCH -STOP
```

   If you have any batch jobs running, you may want to shut them down yourself, to ensure a tidy shutdown.

   Wait until

   - A BATCH -STATUS command shows no jobs running
   - All the spooler phantoms log themselves out (indicated by messages to the supervisor terminal)
   - All the FTS servers log themselves out (indicated by messages to the supervisor terminal)

   c. Remind users about the impending shutdown. For example:

```
OK, MESSAGE ALL -NOW -FORCE
SYSTEM CLOSING IN 1 MINUTE - LOGOUT IMMEDIATELY
```

d. Log out any users who are still on the system:

```
OK, LOGOUT -usernumber
```

2. If you have decided to close only the backup partition to users, inform users of the impending shutdown by issuing a series of messages. The first message should give users advance notice of the shutdown. For example:

```
OK, MESSAGE
PARTITION <DSK3> CLOSING AT 14:00 HOURS TODAY
.
.
OK, MESSAGE ALL -NOW -FORCE
PARTITION <DSK3> CLOSING DOWN IN 5 MINUTES
```

3. Shut down the partition you want to back up, and then add it to the Assignable Disks Table. Do this by issuing the following commands:

```
OK, SHUTDN pdev
OK, DISKS pdev
```

4. It may be more convenient to run the save from a user terminal. If you do want to use a user terminal, choose one close to the tape drives. You cannot do this, however, if the partition to be saved contains your initial attach point.

   If you have closed the entire system to users, follow the procedure in step 4(a) to log into a user terminal. If you have only closed the partition that you want to save, follow the login procedure in step 4(b).

   After you have logged into a user terminal, you can run steps 5 through 12 from either this user terminal or the supervisor terminal.

   a. If you have closed the entire system to users, log into a user terminal in the following manner.

      At the supervisor terminal, issue the command

```
OK, MAXUSR
```

Go to the user terminal that you want to use, and log in:

```
OK, LOGIN user-id
```

Return to the supervisor terminal, and issue the command

```
OK, MAXUSR 0
```

b. To log into a user terminal when you have only closed the partition that you want to save, issue the command

```
OK, LOGIN user-id
```

5. Assign the partition you want to save:

```
OK, ASSIGN DISK pdev
```

6. Assign the tape drive(s) to which you intend to make the save. For example:

```
OK, ASSIGN MT0
OK, ASSIGN MT1
```

7. Mount the tape(s). It is recommended that before you mount a tape, you physically label the reel with the following information:

   - Your name
   - The date and time
   - The disk pack identifier, if you intend to use this on the PSR command line (for example, PACK2)
   - The pdev of the partition being saved
   - The name of the partition
   - The name of the system

- The recording density
- The tape number of this set, as in "Tape 1 of __"
- The fact that PSR is being used to save the tape
- The partition revision level
- Whether the partition is robust or standard

You should also leave room on the label for the volume serial ID, if it is not labeled permanently, and for the size of the save.

8. Invoke PSR. For example:

```
OK, PSR -SAVE 2060
```

specifies that you want to save physical device number 2060.

You now begin the PSR dialog, described earlier in this appendix, in the section INVOKING PSR.

9. When PSR has completed the save, remove the last tape. It is important to fill in the blanks on the tape reel labels to indicate the number of tapes in the set, the size of the save and to add the volume serial ID if the reel is not already labeled. Remember also to remove the write-enable rings from the backup tapes, to avoid accidental overwriting.

10. Unassign the tape drive(s). For example:

```
OK, UNASSIGN MT0
OK, UNASSIGN MT1
```

11. Unassign the partition you have saved:

```
OK, UNASSIGN DISK pdev
```

12. If you have run the backup from a user terminal, log out and return to the supervisor terminal.

13. Remove the partition from the Assignable Disks Table, and make it available to users. Do this by issuing the following commands:

```
OK, DISKS NOT pdev
OK, ADDISK pdev
```

14. If you have closed the entire system to users, return it to service by following steps (a) and (b).

    a. Start up the subsystems. For example:

```
OK, BATCH -START
OK, PROP PRO -START
OK, FTOP -START_MNGR
OK, FTOP -START_SRVR FTP
```

    b. Issue the following command to allow users to log in:

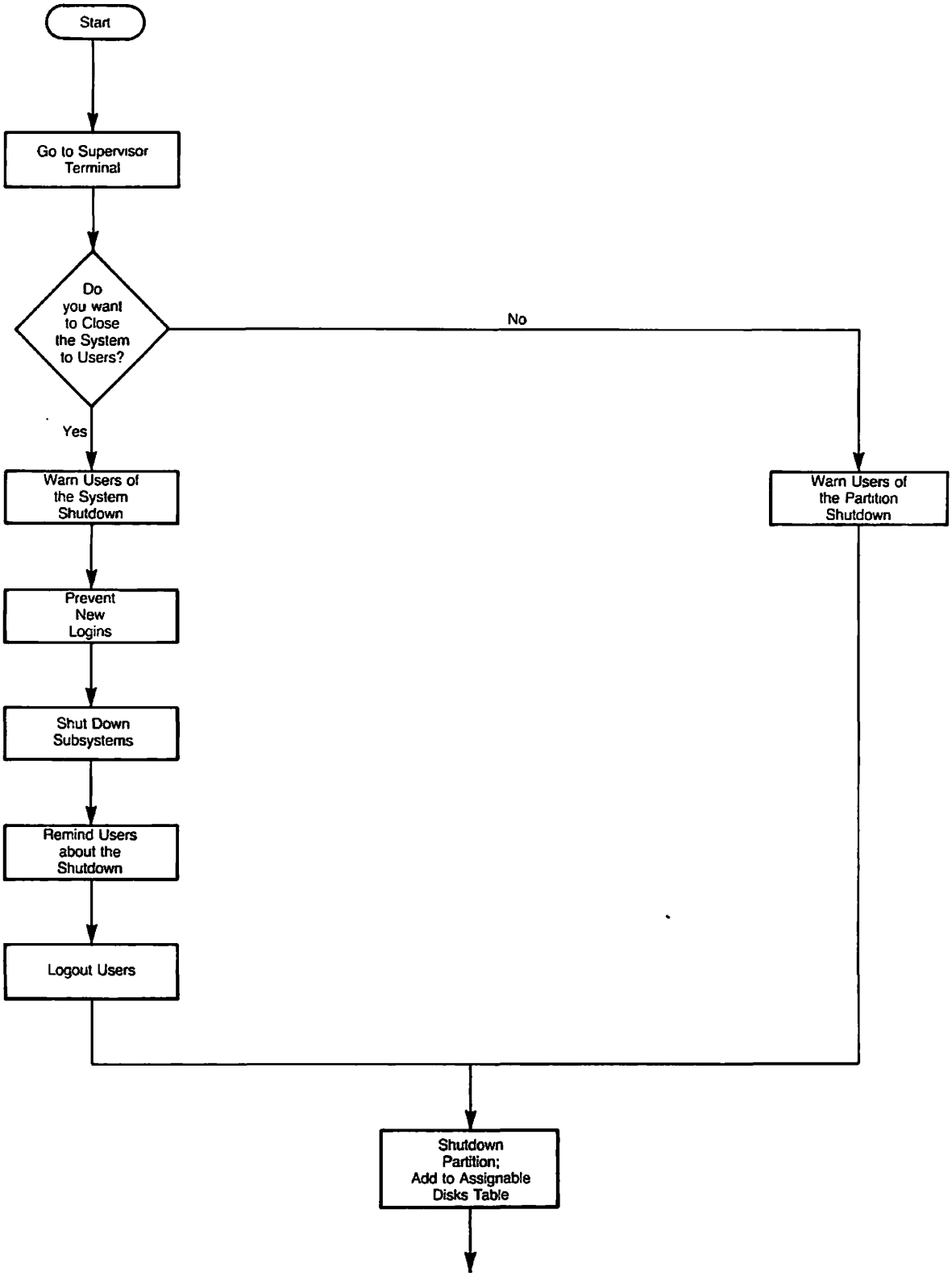
```
OK, MAXUSR
```

15. Issue a message to inform users that either the backup partition or the entire system is back in service. For example:

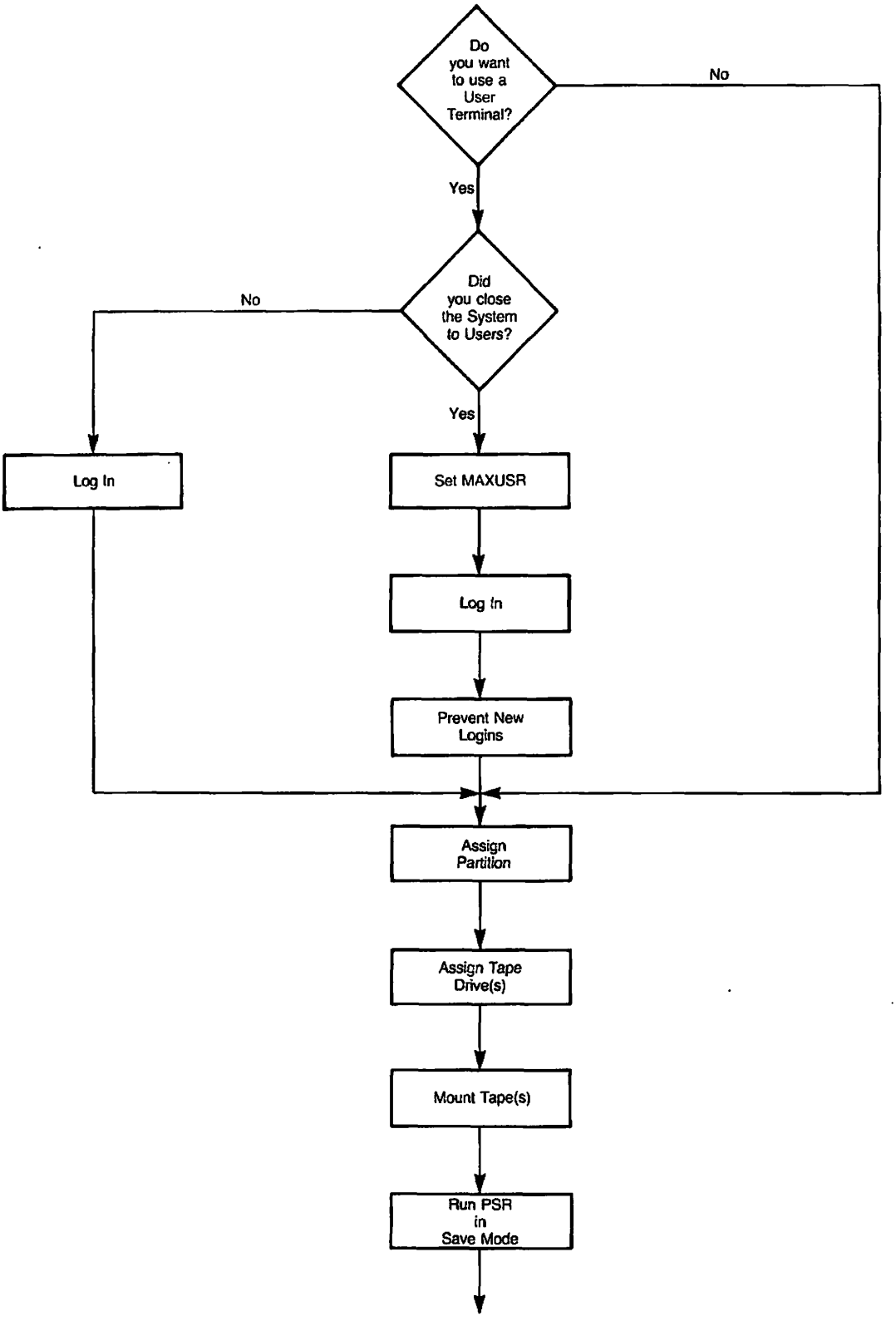
```
OK, MESSAGE -ALL -NOW
PARTITION DSK3 IS NOW AVAILABLE
```

or

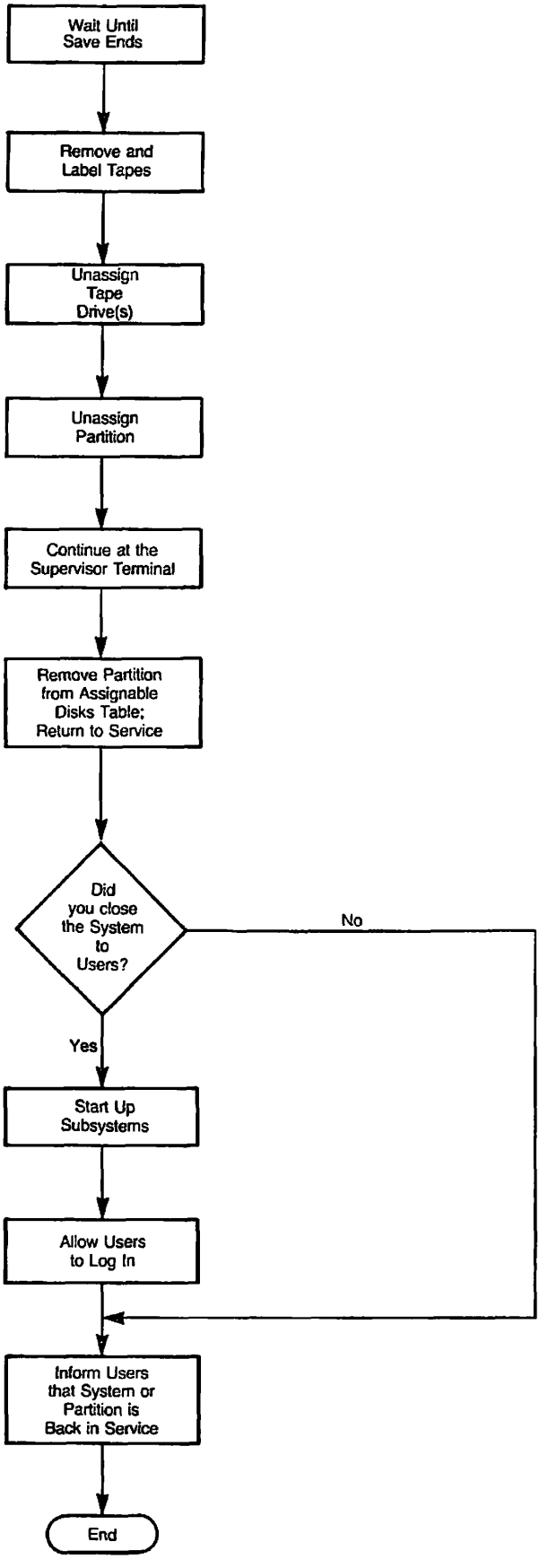
```
OK, MESSAGE ALL -NOW -FORCE
SYSTEM IS NOW UP AND RUNNING - PLEASE LOGIN
```



PSR Save Procedure
Figure L-1



PSR Save Procedure
Figure L-1 (continued)



PSR Save Procedure
Figure L-1 (continued)

M

Restoring a Physical Save :PSR

INTRODUCTION

The PSR (Physical Save and Restore) command enables you to

- Save a physical disk partition to tape
- Restore a physical disk partition from tape
- Copy a physical disk partition to another disk partition
- Protect a partition from being accidentally overwritten by a restore or a copy

This appendix describes how to use PSR to restore a partition from tape. For details of how to save and copy a partition refer to Appendix L, PHYSICAL SAVE TO TAPE: PSR, and Appendix N, PHYSICAL COPY BETWEEN DISKS: PSR.

OVERVIEW OF PSR RESTORE

In restore mode, PSR restores an entire partition from tape. The partition must have been saved to tape by PSR in its save mode. You cannot restore parts of a partition with PSR.

Typically, you use PSR to restore a partition after a disk crash, in order to return the data to a known point in time. A physical restore is much faster than a logical restore of an entire partition, and PSR

thus offers the fastest means of recovery from a disk crash.

Note

PSR cannot restore to the command device. To save and restore a command device, you must use logical save and restore utilities.

If the most recent save of a partition was an incremental save, you must first restore the incremental save and then restore the associated base save. When you have restored the incremental save, PSR identifies the associated base save, and prompts you to restore that save. PSR does allow you to restore a base save without restoring an associated incremental save, but the restored partition would not include any data changes made since the base save.

If you restore a partition that has related files on another partition, remember to restore this other partition also, to ensure that the files remain a logically consistent set. For example, a ROAM file may consist of a master file and several slave files, and the slave files might not be on the same partition as the master file.

In restore mode, PSR has the following features:

- The target disk can differ in size and geometry from the source disk.
- Partitions can be protected against an accidental restore.

PSR also has general features, applicable to a save, restore, or copy:

- Interactive interface
- Error handling
- Comprehensive help system

These features are described in the following sections.

Valid Source and Target Partitions

PSR is very flexible, in that it allows you to restore a partition to a disk that differs from the source disk in terms of size and geometry. The term disk geometry covers the number of

- Sectors per track
- Cylinders
- Heads

The only restrictions on a restore are that

- You cannot restore to the command device.
- The target partition must be large enough to hold the restored data.
- The source and target partitions must be the same revision.
- You must restore a robust partition to another robust partition, and a standard partition to a standard partition.

Partition Write Protection

When you create a partition using MAKE, it is automatically write protected against PSR. This guards the partition against an accidental overwrite, for example, if you restore a partition to the wrong disk pack.

PSR enables you to remove the write protection before you restore a partition, and to reinstate the write protection for that partition after the restore has ended.

If you attempt to restore to a protected partition, PSR displays the warning message

```
Target device <id> is backup write protected
```

and again prompts you to identify the partition you want to restore. You can enter another partition ID, or enter QUIT to exit from the restore.

If you exit from the restore, you can remove write protection by issuing the command

```
OK, PSR -NO_PROTECT pdev
```

where pdev is the physical device number of the partition from which you want to remove write protection.

When you have completed the restore, you can reinstate the protection on the partition by issuing the command

```
OK, PSR -PROTECT pdev
```

The section RESTORE PROCEDURE, later in this appendix, explains how to remove and reinstate partition write protection as part of the step-by-step restore procedure.

Note

PSR write protection only restricts PSR restores and copies. It does not affect any other disk I/O operations.

Interactive Interface

When you invoke PSR, you receive a series of prompts that enable you to define the restore interactively. The sequence of prompts and responses is termed the PSR dialog, and is explained in the section INVOKING PSR, later in this appendix.

Error Handling

If unrecoverable tape read errors occur during a restore, PSR displays a detailed error message and asks:

Do you wish to continue with the restore?

If you answer NO, the restore aborts. You must then run MAKE on the target partition, because it will be in an inconsistent state. You are not able to rerun the restore until you have run MAKE on the target partition.

If you answer YES, the restore continues, and PSR displays the warning

Disk records have been lost

PSR also checks for errors on the target partition. You can ask PSR, via either the PSR dialog or a command line option, to read back the data it has written to the target partition. The read is a means of checking whether the disk has new badspots. If PSR cannot read some of the data, it recovers by writing the data elsewhere on the partition.

WARNING

At the end of the restore you must run FIX_DISK to reset record pointers.

PSR Help

To obtain general information about PSR, issue the command

```
OK, PSR -HELP
```

The following is an example of PSR -HELP

```
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
One of the following must be supplied:

-SAVE           Save a disk partition
-RESTore        Restore a disk partition
-COPY           Copy a partition
-PROtect        Set DRB write protection on partition
-No_PROTect     Clear DRB write protection on partition

For help on one of the above, use -HELP with the option.
For example, PSR -SAVE -HELP will give more details for -SAVE.
```

If you require specific help about how to use PSR to restore a partition, issue the command

```
OK, PSR -RESTORE -HELP
```

During the PSR dialog, you can obtain help about how to respond to a PSR prompt by entering HELP in response to the prompt.

The following is an example of PSR -RESTORE -HELP

```
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]

The -RESTore option is used to restore a disk partition from tape.

The command line format is

PSR -RESTore [-CHECK]

where
     -CHECK     Performs read after write verify
```

INVOKING PSR

The PSR command syntax to restore a partition is:

PSR -RESTORE [-CHECK] where:

-CHECK	Specifies that you want PSR to read back the data it restores to the target partition in order to check that the restored data is readable.

After you issue the PSR command, you begin the PSR dialog, which is described in the next section.

PSR Dialog

For online help about how to respond to a prompt, enter HELP.

To exit from the dialog, enter QUIT in response to any of the PSR prompts.

Refer to the section EXAMPLE COMMAND LINES AND DIALOGS, later in this appendix, for examples of the PSR dialog.

Restoring an Archive or a Base Save: This section describes the dialog for restoring either an archive or a base save. It also describes the first part of the dialog for restoring an incremental save; if you restore an incremental save you follow the dialog as far as the prompt "Check read after disk writes?", and after that prompt you continue with the dialog described in the next section, Restoring an Incremental and a Base Save. Remember that if you have made incremental saves, you must restore the most recent incremental save BEFORE you restore the associated base save.

PSR Prompts and Messages	User Response
Enter media for restore stream. Use physical device:	Enter the tape drive identifier, for example MTO.

Displays details of the volume serial ID, the tape's position, the save at that position, and the date the save was made	
	PSR displays several messages to inform you about the content of the tape. No user action required, other than to check that you have mounted the correct tape.
Enter required save number:	Enter the save number at which you want to position the tape. For example, first save is 1, second, 2 etc.
<details of the save>	PSR displays details of the save you have selected. No user action is needed, other than to check that you have selected the correct save.
Target disk:	Enter the physical device number of the target partition.
Check read after disk writes?	Answer Y if you want PSR to attempt to read back the data it has written to disk. The read is a means of checking for new badspots on the target disk, and it adds to the total time required for the restore. If you do not want PSR to read back the data, answer N. If you are restoring an incremental save, the dialog continues as described in the next section.
Operation complete.	PSR issues this message when the restore has ended successfully.

If you have requested "Check read after disk writes", PSR displays the following message if a read error occurs:

Unrecovered disk read error reading record <nnn> from device <pdev>.
Record <nnn> on device <pdev> has been added to the badspot file.

> **Caution**
>
> If you receive this message, you must run FIX_DISK on the target partition after the restore has ended. FIX_DISK corrects pointers to records that have been remapped to avoid the badspots.

Restoring an Incremental and a Base Save: If you restore an incremental save, the dialog is as described above, up to the prompt "Check read after disk writes?". After this prompt, the dialog continues as follows:

PSR Prompts and Messages	User Response
End of restore of increment.	PSR has restored the incremental save. No user action is needed.
Please load the volume containing the base save of <partition-id> created on <date> Use physical device:	Enter the ID of the tape drive on which the base save tape is mounted, e.g. MT1.
<details of the volume serial ID, and the base save number>	PSR displays several informational messages. No user action is needed, because PSR finds the base save associated with the incremental save you have just restored.
Operation complete.	PSR has restored the base save, and the whole restore operation has ended successfully.

If you have requested "Check read after disk writes", PSR displays the following message if a read error occurs:

Unrecovered disk read error reading record <nnn> from device <pdev>.
Record <nnn> on device <pdev> has been added to the badspot file.

> **Caution**
>
> If you receive this message, you must run FIX_DISK on the target partition after the restore has ended, and before you use the partition. FIX_DISK corrects pointers to records that have been remapped to avoid the badspots.

End of Volume: If a save that you restore spans more than one reel, PSR prompts for the continuation reel, and displays the prompt "Use physical device:". Enter the ID of the tape drive on which you have mounted the continuation reel.

EXAMPLE COMMAND LINES AND DIALOGS

This section gives examples of PSR command lines to

- Restore a base save
- Restore an incremental save and the associated base save

Restoring a Base Save

In the following example, PSR restores save number 3 from the tape on drive MT4 to the partition with physical device number 10662. Save number 3 is a base save of pdev 20662, from the disk pack named PACK12.

```
OK, PSR -RESTORE
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
Enter media for restore stream.
Use physical device: MT4
Volume ID is DRB001.
The volume is positioned at the start of save number 1,
a physical archive save of PACK12:20662
created on 14 Mar 88 17:05:16 Monday.
Enter required save number: 3
Positioning to required save ...
About to restore save number 3,
a physical base save of PACK12:20662
created on 15 Mar 88 12:20:52 Tuesday.
Enter target disk: 10662
Check read after disk writes? N
Restoring...
Operation complete.
Transferred 25350 records.
OK,
```

Restoring an Incremental Save and a Base Save

In the following example, PSR restores an incremental save of partition 20662, from tape DRB002 on drive MT4, to physical device number 10662. After it has restored the incremental save, PSR displays messages that identify the base save associated with this incremental save. The user mounts tape DRB001, which holds the base save, on tape drive MT0, and enters MT0 in response to the PSR prompt "Use physical device:". PSR then restores the base save, which in this example is save 1.

```
OK, PSR -RESTORE
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
Enter media for restore stream.
Use physical device: MT4
Positioning to beginning of media ...
Volume ID is DRB002.
The volume is positioned at the start of save number 1,
a physical cumulative incremental save of 20662
created on 15 Mar 88 10:15:27 Tuesday.
Enter required save number: 2
Positioning to required save ...
About to restore save number 2,
a physical cumulative incremental save of 20662
created on 18 Mar 88 17:09:36 Friday.
Enter target disk: 10662
Check read after disk writes? N
Restoring...
End of restore of increment.
Please load the volume containing the base save of 20662
created on 11 Mar 88 17:05:16 Friday.
Use physical device: MT0
Volume ID is DRB001.
Positioning to required save ...
Restoring base save number 1.
Restoring...
Operation complete.
Transferred 25350 records.
OK,
```

MAXIMIZING PERFORMANCE

There are three ways in which you can maximize the speed of the restore:

- Use alternate tape drives.
- Schedule the restore for a time when the system is lightly loaded.
- Close the entire system to users before you begin the restore.

If the restore is from more than one reel of tape, you can reduce the time the restore takes by using alternate tape drives. Mount the continuation reel on an unused standby drive while the restore proceeds on the first drive. When PSR reaches the end of the first reel and prompts for the next reel, you can quickly resume the restore on the standby drive.

The save also proceeds more quickly if the system is lightly loaded, or closed entirely to users. The section RESTORE PROCEDURE, later in this appendix, explains how to close the system to users as part of the restore procedure.

PREPARING FOR A RESTORE

Before you begin the restore, you need to know

- Which tape volume holds the save you want to restore
- The number of the save you want to restore
- The physical device number of the target partition

You need this information because PSR asks you to input the save number and the partition's physical device number.

Ensure that the source and target partitions are valid partitions, as defined in the section Valid Source and Target Partitions, earlier in this appendix, and discussed below.

To be sure that the partitions are valid, you need to know:

- The size of the source and target partitions
- Whether the partitions are robust or standard
- The revision of the source and target partitions

All the information you require about the source partition should be on the reel's paper label, which you should have filled in when you ran the save.

To display the size of the target partition, use the AVAIL command; the target partition must be large enough to hold the restored data.

To find out whether a partition is robust or standard, use the LIST_DISKS, STATUS DISKS or LD command. You must restore a robust partition to another robust partition, and a standard partition to another standard partition.

The revision of the target partition and the save type should have been noted at the end of the save. The source and target partitions must be the same revision. A partition's revision is displayed when you run

either FIX_DISK or ADDISK.

Also as part of the preparation for a restore, you must decide whether you want to close the entire system to users, or only the restore partition. The next section discusses the factors you must consider when you make this decision.

System Preparation

Before you begin to restore a partition, you must decide whether to

- Close the entire system to users
- Close only the target partition

When you want to maximize the speed of the restore, take the entire system out of service. If you close down only selected partitions, this may be more convenient to users, but will probably cause the restore to run more slowly.

Regardless of PSR performance considerations, it is advisable to close the entire system to users if your target partition

a. Holds many users' origin directories (20% or more of system users)

b. Holds files accessed by most of the users on the system

c. Is on the same disk as a paging partition

If either (a) or (b) applies, the users cannot work while PSR saves the partition. If (c) applies, users can work, but the system will be very slow.

If you intend to restore partitions that hold master and slave ROAM files, you should either close the entire system to users, or ensure you shut down at the same time all partitions that hold related ROAM files.

The step-by-step procedure in the following section explains how to take either the system or a partition out of service, and how to return them to service after the restore.

RESTORE PROCEDURE

Unless otherwise specified, perform the steps below from the supervisor terminal. The procedure does, however, allow you to run part of the restore from a user terminal. Figure M-1 at the end of this section illustrates the restore procedure.

Step 1 describes the procedure for closing the entire system to users. If you have decided to close only the partition you want to restore, begin at step 2.

1. If you have decided to close the entire system to users, do this by following steps (a) through (d) below, and then continue at step 3.

   a. Inform users of the impending shutdown by issuing a series of messages. The first message should give users plenty of advance notice of the shutdown. For example:

```
OK, MESSAGE ALL
SYSTEM CLOSING DOWN AT 14:00 HOURS TODAY
                .
                .
OK, MESSAGE ALL -NOW -FORCE
SYSTEM CLOSING DOWN IN 5 MINUTES - PLEASE LOG OUT
```

   b. Prevent new users from logging in, and begin shutting down the subsystems. See your CPU Handbook for specific procedures. For example:

```
OK, MAXUSR 0
OK, PROP PRO -STOP
OK, FTOP -STOP_SRVR FTP
OK, BATCH -STOP
```

   If you have any batch jobs running, you may want to shut them down yourself, to ensure a tidy shutdown.

   Wait until

   - A BATCH -STATUS command shows no jobs running
   - All the spooler phantoms log themselves out (indicated by messages to the supervisor terminal)
   - All the FTS servers log themselves out (indicated by messages to the supervisor terminal)

   c. Remind users about the impending shutdown. For example:

```
OK, MESSAGE ALL -NOW -FORCE
SYSTEM CLOSING IN ONE MINUTE - LOGOUT IMMEDIATELY
```

d. Log out any users who are still on the system:

```
OK, LOGOUT -usernumber
```

2. If you have decided to close only the partition you want to restore, inform users of the impending shutdown by issuing a series of messages. The first message should give users advance notice of the shutdown. For example:

```
OK, MESSAGE
PARTITION <DSK1> CLOSING AT 14:00 HOURS TODAY
.
.
OK, MESSAGE ALL -NOW -FORCE
PARTITION <DSK1> CLOSING DOWN IN 1 MINUTE
```

3. Shut down the partition you want to restore, and then add it to the Assignable Disks Table. Do this by issuing the following commands:

```
OK, SHUTDN pdev
OK, DISKS pdev
```

4. It may be more convenient to run the restore from a user terminal. If you do want to use a user terminal, choose one close to the tape drives.

   If you have closed the entire system to users, follow the procedure in step 4(a) to log into a user terminal. If you have only closed the partition that you want to save, follow the login procedure in step 4(b).

   After you have logged into a user terminal, you can run steps 5 through 16 from either this user terminal, or the supervisor terminal.

   a. If you have closed the entire system to users, log into a user terminal in the following manner.

      At the supervisor terminal, issue the command

```
OK, MAXUSR
```

      Go to the user terminal that you want to use, and log in

```
OK, LOGIN user-id
```

Return to the supervisor terminal, and issue the command

```
OK, MAXUSR 0
```

b. To log into a user terminal when you have only closed the partition that you want to restore, issue the command

```
OK, LOGIN user-id
```

5. Assign the partition you want to restore:

```
OK, ASSIGN DISK pdev
```

6. If the target partition is write protected, remove that protection by issuing the command

```
OK, PSR -NO_PROTECT pdev
```

7. Assign the tape drive(s) from which you want to restore the partition. For example:

```
OK, ASSIGN MT0
OK, ASSIGN MT1
```

8. Mount the first tape.

Note

Ensure that the tapes you intend to restore were all written on the same save stream. See Appendix L, PHYSICAL SAVE TO TAPE: PSR, for an explanation of save streams.

9. Invoke PSR:

```
OK, PSR -RESTORE
```

You now begin the PSR dialog, described earlier in this appendix in the section INVOKING PSR.

10. When PSR has completed the restore, remove the last tape.

11. PSR may print the message

```
FIX_DISK required.
Please run FIX_DISK on device <pdev> before using it.
```

If you receive this message, continue at step 12. If you do not receive this message, omit step 12 and continue at step 13.

For detailed information about badspots and the way that utilities handle badspots, refer to the Operator's Guide to File System Maintenance.

12. Run FIX_DISK on the restored partition. Include the -FIX option on the command line.

```
OK, FIX_DISK -DISK pdev -FIX
```

13. If you want to protect the target partition from accidental overwrite using PSR, issue the command

```
OK, PSR -PROTECT pdev
```

14. Unassign the tape drive(s). For example:

```
OK, UNASSIGN MT0
OK, UNASSIGN MT1
```

15. Unassign the partition you restored:

```
OK, UNASSIGN DISK pdev
```

16. If you have run the restore from a user terminal, log out and return to the supervisor terminal.

17. Remove the partition from the Assignable Disks Table, and make it available to users. Do this by issuing the following commands:

```
OK, DISKS NOT pdev
OK, ADDISK pdev
```

18. If you have closed the entire system to users, return it to service by following steps (a) and (b).

    a. Start up the subsystems. For example:

```
OK, BATCH -START
    OK, PROP PRO -START
    OK, FTOP -START_MNGR
    OK, FTOP -START_SRVR FTP
```

    b. Issue the following command to allow users to log in:

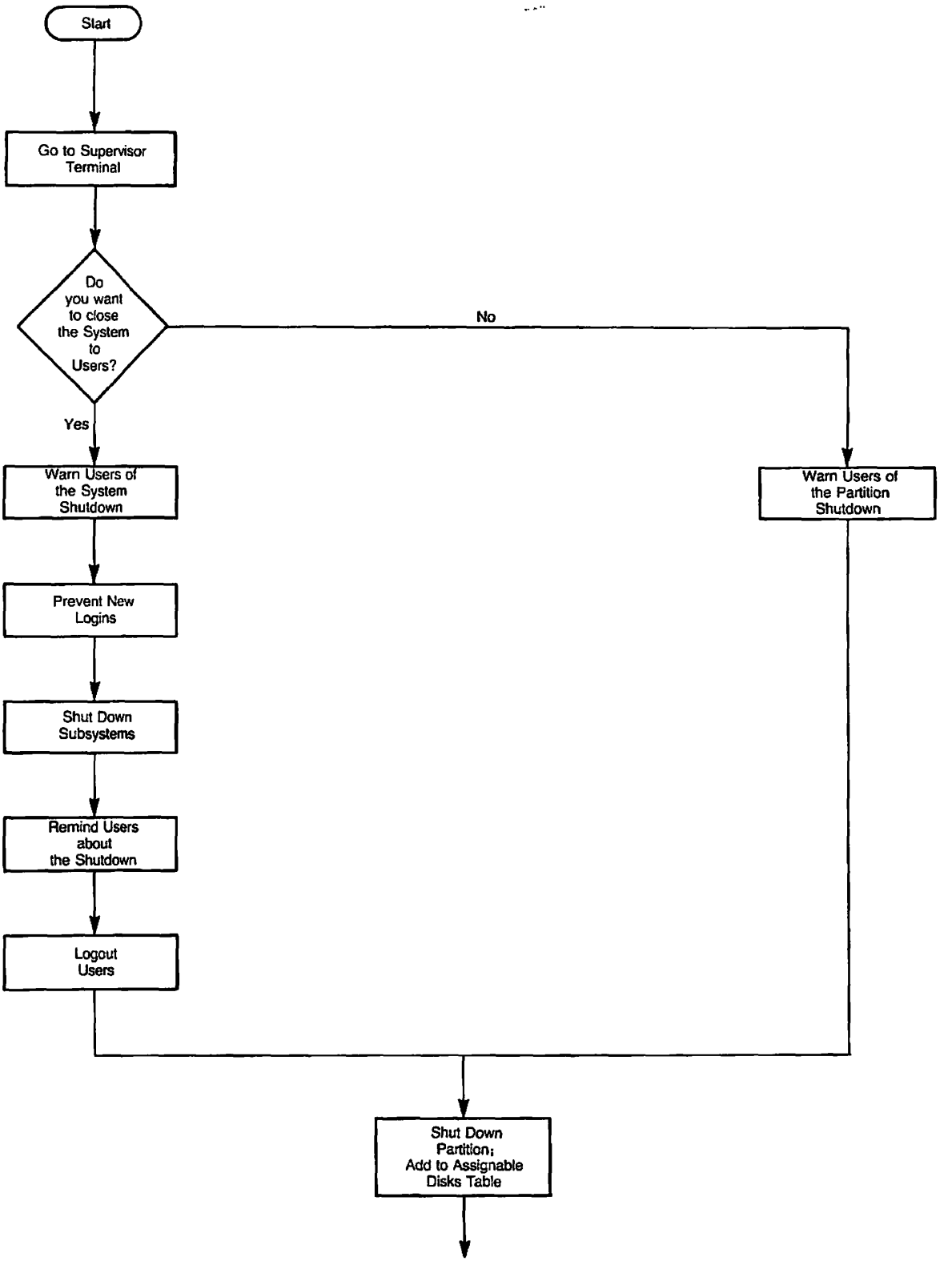
```
OK, MAXUSR
```

19. Issue a message to inform users that either the partition or the entire system is back in service. For example:

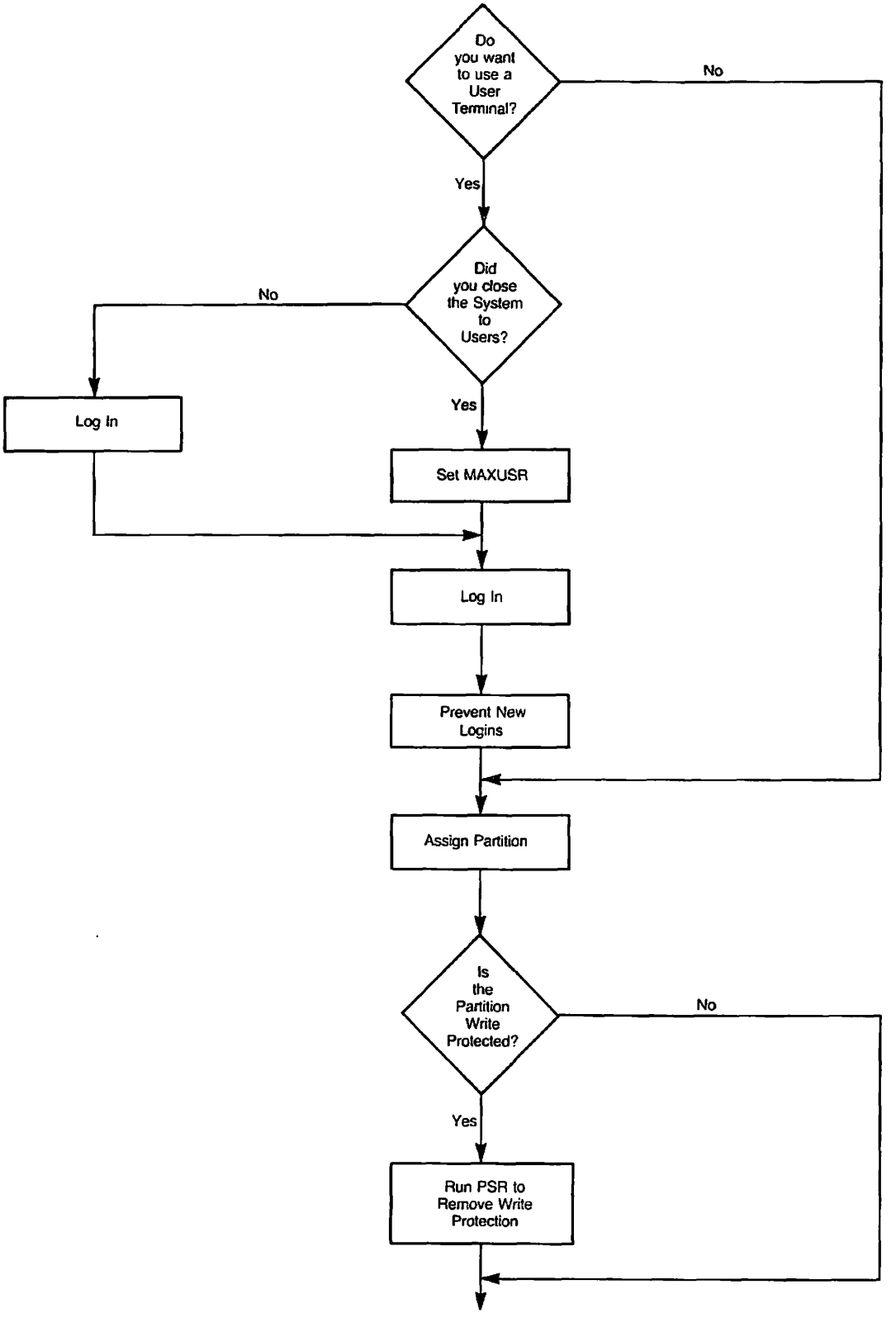
```
OK, MESSAGE ALL -NOW -FORCE
SYSTEM IS NOW UP AND RUNNING - PLEASE LOGIN
```

or

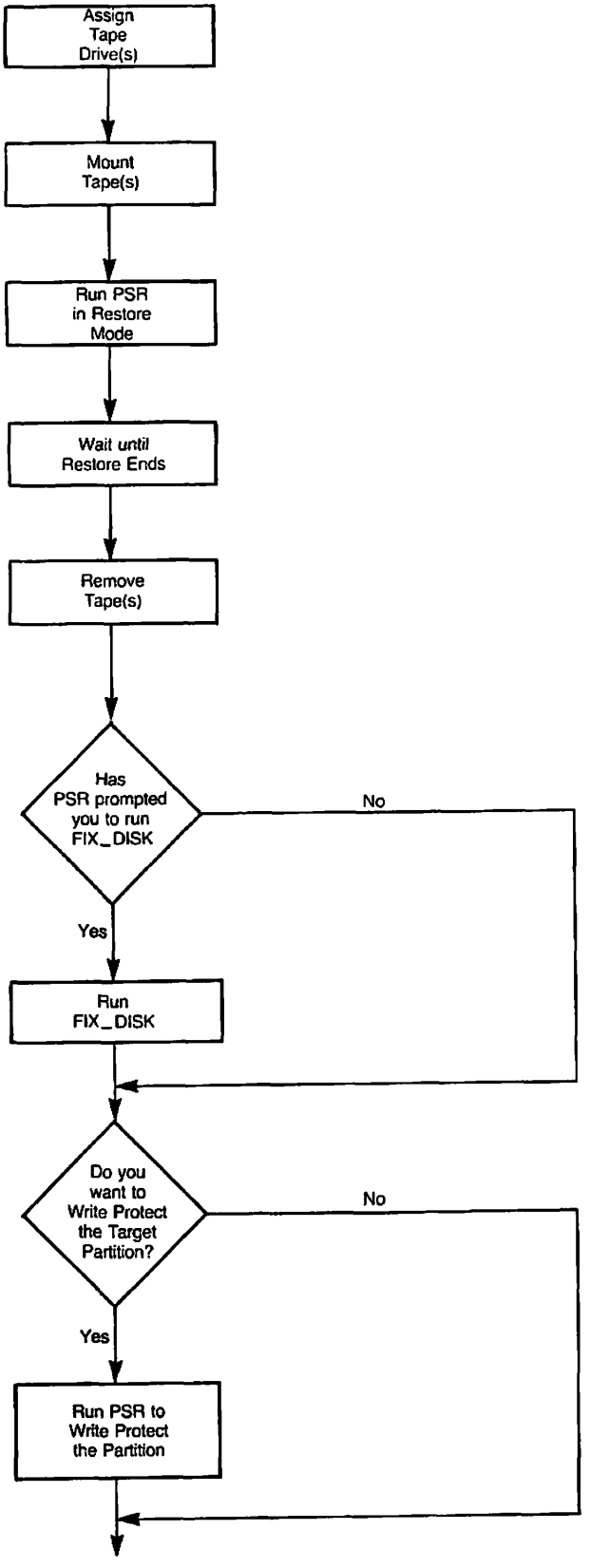
```
OK, MESSAGE -ALL -NOW
PARTITION <DSK1> IS NOW AVAILABLE
```



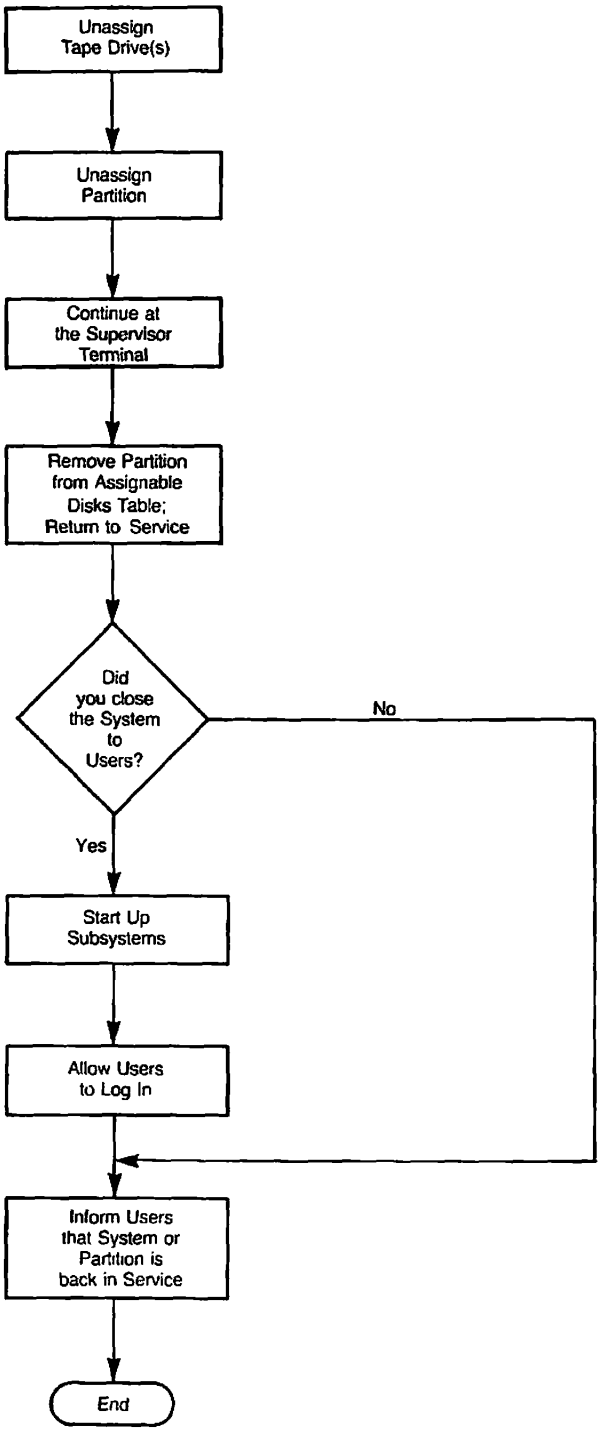
PSR Restore Procedure
Figure M-1



PSR Restore Procedure
Figure M-1 (continued)



PSR Restore Procedure
Figure M-1 (continued)



PSR Restore Procedure
Figure M-1 (continued)

N

Physical Copy between Disks :PSR

INTRODUCTION

The PSR (Physical Save and Restore) command enables you to

- Save a physical disk partition to tape
- Restore a physical disk partition from tape
- Copy a physical disk partition to another disk partition
- Protect a partition from being accidentally overwritten by a restore or a copy

This appendix describes how to use PSR to copy a partition to another partition. For details of how to save and restore a partition on tape refer to Appendix L, PHYSICAL SAVE TO TAPE: PSR, and Appendix M, RESTORING A PHYSICAL SAVE: PSR.

OVERVIEW OF PSR COPY

In copy mode, PSR copies an entire partition to another partition. It has the following features:

- The source disk can differ in size and geometry from the target disk.

- Partitions can be protected against an accidental overwrite by PSR.

PSR also has general features, applicable to a save, restore, or copy:

- Interactive interface
- Error handling
- Comprehensive help system

These features are described in the following sections.

Notes

You cannot copy to or from the command device. If you want to either save, or restore the command device, use a logical utility.

If you copy a partition that has related files on another partition, remember to copy this other partition also, to ensure the files remain a logically consistent set. For example, a ROAM file may consist of a master file and several slave files, and the slave files might not be on the same partition as the master file.

Valid Source and Target Partitions

PSR is very flexible, in that it allows you to copy a partition to a disk that differs from the source disk in terms of size and geometry. The term disk geometry covers the number of:

- Sectors per track
- Cylinders
- Heads

The only restrictions on what you can copy are:

- You cannot copy to or from the command device.
- The target partition must be large enough to hold the data you want to copy.
- The source and target partitions must be the same revision.
- You must copy a robust partition to another robust partition, and a standard partition to a standard partition.

- The source and target partitions must not be the same partition.

Partition Write Protection

When you create a partition using MAKE, it is automatically write protected against PSR. This guards against the risk of an accidental overwrite, for example if you copy a partition in the wrong direction.

PSR enables you to remove the write protection before you copy to a partition, and to reinstate that protection after the copy has ended.

If you attempt to copy to a protected partition, PSR displays the warning message

```
Target device <id> is backup write protected
```

and again prompts you to identify the partition you want to copy. You can enter another partition ID, or enter QUIT to exit from the copy.

If you exit from the copy, you can remove write protection by issuing the command

```
OK, PSR -NO_PROTECT pdev
```

where pdev is the physical device number of the partition from which you want to remove write protection.

When you have completed the copy, you can reinstate the protection on the partition by issuing the command

```
OK, PSR -PROTECT pdev
```

The section COPY PROCEDURE, later in the appendix, explains how to remove and reinstate partition protection as part of the step-by-step copy procedure.

Note

PSR write protection only restricts PSR restores and copies. It does not affect any other disk I/O operations.

Interactive Interface

If you invoke PSR without identifying the source and target partitions on the PSR command line, PSR prompts you to identify the partitions.

The sequence of prompts and responses is termed the PSR dialog, and is explained in the section INVOKING PSR, later in this appendix.

Error Handling

You can ask PSR, via either the PSR dialog or a command-line option, to read back the data it has written to the target partition. The read is a means of checking whether there are new badspots on the target partition. If PSR cannot read some of the data, it recovers by writing the data elsewhere on the partition.

> WARNING
>
> At the end of the copy you must run FIX_DISK to reset record pointers.

PSR Help

To obtain general information about PSR, issue the command

```
OK, PSR -HELP
```

The following is an example of PSR -HELP

```
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
One of the following must be supplied:

-SAVE           Save a disk partition
-RESTore        Restore a disk partition
-COPY           Copy a partition
-PROtect        Set DRB write protection on partition
-No_PROTect     Clear DRB write protection on partition

For help on one of the above, use -HELP with the option.
For example, PSR -SAVE -HELP will give more details for -SAVE.
```

If you require specific help about how to use PSR to copy a partition, issue the command

OK, PSR -COPY -HELP

During the PSR dialog, you can obtain help about how to respond to a PSR prompt by entering HELP in response to the prompt.

The following is an example of PSR -COPY -HELP

```
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]

The -COPY option is used to copy one disk partition to another.

The command line format is

PSR -COPY [ source -TO target [-CHECK] ]

where
     source     Identifies the source disk partition
     target     Identifies the target disk partition
     -CHECK     Performs a read after write verify
```

INVOKING PSR

The format of the PSR command to copy a partition is

PSR -COPY [source -TO target [-CHECK]]

where:

-COPY	Tells PSR that you want to copy a partition.
source	Identifies the partition that you want to copy, the source partition pdev.
-TO target	Identifies the partition to which you want to make the copy.
-CHECK	Specifies that you want PSR to read back the data it copies to the target partition, in order to check that the copied data is readable.

For example, the default PSR command line

OK, PSR -COPY

would initiate a short PSR dialog, which is described in the next section, PSR Dialog. PSR prompts you for the source and target partition pdevs, and asks whether you want PSR to read back the data.

Alternatively, you can identify the partitions via the PSR command line. For example, the command

OK, PSR -COPY 10662 -TO 20662

copies the partition with a pdev of 10662 to the partition with a pdev of 20662, without verifying the copy.

PSR Dialog

This section describes the PSR dialog when you invoke the default PSR copy command.

For online help about how to respond to a prompt, enter HELP.

To exit from the dialog, enter QUIT in response to any of the PSR prompts.

Refer to the next section, EXAMPLE COMMAND LINES AND DIALOGS, for an example of the PSR dialog.

PSR Prompts and Messages	User Response
Enter source disk:	Enter the partition pdev.
Enter target disk:	Enter the partition pdev.
Check read after disk writes?	Answer Y if you want PSR to attempt to read back the data it writes to disk. The read is a means of checking for badspots on the target disk, and adds to the total time required for the restore. Answer N if you do not want PSR to read the data back.

Operation complete.	PSR issues this message when the copy has ended successfully.

If you have requested "Check read after disk writes", PSR displays the following message if a read error occurs:

Unrecovered disk read error reading record <nnn> from device <pdev>.
Record <nnn> on device <pdev> has been added to the badspot file.

> Caution
>
> If you receive this message, you must run FIX_DISK on the target partition after the copy has ended, and before you use the partition. FIX_DISK corrects pointers to records that have been remapped to avoid the badspots.

EXAMPLE COMMAND LINES AND DIALOGS

This section has examples of

- A PSR copy command that identifies the source and target partitions on the command line
- A PSR copy command in which the source and target partitions are identified interactively

Copy With PSR Command-line Arguments

In the following example, PSR copies partition 2060 to partition 2162.

```
OK, PSR -COPY 2060 -TO 2162
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
Copying...
Operation complete.
Transferred 25350 records.
OK,
```

Notice that when you specify the source and target partitions, PSR does not prompt for the -CHECK option.

Copy Without PSR Command-line Arguments

In the following example, PSR copies partition 20662 to partition 20664.

```
OK, PSR -COPY
[PSR Rev. 1.0-22.0 Copyright (c) 1988, Prime Computer, Inc.]
Enter source disk: 20662
Enter target disk: 20664
Check read after disk writes? N
Copying...
Operation complete.
Transferred 25350 records.
OK,
```

MAXIMIZING PERFORMANCE

There are two ways in which you can maximize the speed of the copy:

- Schedule the copy for a time when the system is lightly loaded
- Close the entire system to users before you begin the copy

The section COPY PROCEDURE, later in this appendix, explains how to close the system to users as part of the copy procedure.

PREPARING TO COPY

Before you begin a copy you must know the

- Source partition's physical device number
- Target partition's physical device number

Check that they are valid partitions, as described in the section Valid Source and Target Partitions, earlier in this appendix.

To be sure that the partitions are valid, you need to know:

- The size of the source and target partitions
- Whether the partitions are robust or standard
- The revision of the source and target partitions

To display the size of a partition, use the AVAIL command; the target partition must be large enough to hold the copied data.

The revision of the partitions, and their robust/standard status,

should already be documented, for example in your system logbook. The source and target partitions must be the same revision. A partition's revision is displayed when you run either FIX_DISK or ADDISK.

To find out whether a partition is robust or standard, use the LIST_DISKS, STATUS DISKS or LD command. You must restore a robust partition to another robust partition, and a standard partition to another standard partition.

Also as part of the preparation for a copy, you must decide whether you want to close the entire system to users, or to close only the source and target partitions. The next section discusses the factors you must consider when you make this decision.

System Preparation

Before you begin to copy a partition, you must decide whether to

- Close the entire system to users
- Close only the source and target partitions

When you want to maximize the speed of the copy, take the entire system out of service. If you close down only selected partitions, this may be more convenient to users, but will probably cause the copy to run more slowly.

Regardless of PSR performance considerations, it is advisable to close the entire system to users if either your source or target partition

a) Holds many users' origin directories (20% or more of system users)

b) Holds files accessed by most of the users on the system

c) Is on the same disk as a paging partition

If either (a) or (b) applies, users cannot work while PSR copies the partition. If (c) applies, users can work, but the system will be slow.

> **Caution**
>
> If you intend to copy partitions that hold master and slave ROAM files, you should either close the entire system to users, or ensure you shut down at the same time all partitions that hold related ROAM files.

The step-by-step procedure in the following section explains how to take either the system or a partition out of service, and how to return

them to service after you have completed the copy.

COPY PROCEDURE

Unless otherwise specified, perform the steps below from the supervisor terminal. The procedure does, however, allow you to run part of the copy from a user terminal. Figure N-1 at the end of this section illustrates the copy procedure.

Step 1 describes the procedure for closing the entire system to users. If you have decided to close only the source and target partitions, begin at step 2.

1. If you have decided to close the entire system to users, do this by following steps (a) through (d) below, and then continue at step 3.

   a. Inform users of the impending shutdown by issuing a series of messages. The first message should give users plenty of advance notice of the shutdown. For example:

```
OK, MESSAGE ALL
SYSTEM CLOSING DOWN AT 18:00 HOURS TODAY
.
.
OK, MESSAGE ALL -NOW -FORCE
SYSTEM CLOSING DOWN IN 5 MINUTES - PLEASE LOG OUT
```

   b. Prevent new users from logging in, and begin shutting down the subsystems. See your CPU Handbook for specific procedures. For example:

```
OK, MAXUSR 0
OK, PROP PRO -STOP
OK, FTOP -STOP_SRVR FTP
OK, BATCH -STOP
```

   If you have any batch jobs running, you may want to shut them down yourself, to ensure a tidy shutdown.

   Wait until

   - A BATCH -STATUS command shows no jobs running
   - All the spooler phantoms log themselves out (indicated by messages to the supervisor terminal)

- All the FTS servers log themselves out (indicated by messages to the supervisor terminal)

c. Remind users about the impending shutdown. For example:

```
OK, MESSAGE ALL -NOW -FORCE
SYSTEM CLOSING IN ONE MINUTE - LOGOUT IMMEDIATELY
```

d. Log out any users who are still on the system:

```
OK, LOGOUT -usernumber
```

2. If you have decided to close only the source and target partitions to users, inform users of the impending shutdown by issuing a series of messages. The first message should give users advance notice of the shutdown. For example:

```
OK, MESSAGE
PARTITIONS <DSK1> AND <DSK3> CLOSING AT 14:00 HOURS
                    .
                    .
OK, MESSAGE ALL -NOW -FORCE
PARTITIONS <DSK1> AND <DSK3> CLOSING DOWN IN 1 MINUTE
```

3. Shut down the source and target partitions, and add them to the Assignable Disks Table. Do this by issuing the following commands for each partition:

```
OK, SHUTDN pdev
OK, DISKS pdev
```

4. It may be more convenient to run the copy from a user terminal.

   If you have closed the entire system to users, follow the procedure in step 4(a) to log into a user terminal. If you have only closed the partition that you want to save, follow the login procedure in step 4(b).

   After you have logged into a user terminal, you can run steps 5 through 12 from either this user terminal or the supervisor terminal.

a. If you have closed the entire system to users, log into a user terminal in the following manner.

   At the supervisor terminal, issue the command

   OK, MAXUSR

   Go to the user terminal that you want to use, and log in:

   OK, LOGIN user-id

   Return to the supervisor terminal, and issue the command

   OK, MAXUSR 0

b. To log into a user terminal when you have only closed the partitions that you want to copy, issue the command

   OK, LOGIN user-id

5. Assign the source and target partitions by issuing the following command for each partition:

   OK, ASSIGN DISK pdev

6. If the target partition is write protected, remove that protection by issuing the command

   OK, PSR -NO_PROTECT pdev

7. Invoke PSR to copy the partition. For example:

   OK, PSR -COPY 40462 -TO 100460

   would copy partition 40462 to partition 100460.

8. PSR may print the message

```
FIX_DISK required.
Please run FIX_DISK on device <pdev> before using it.
```

If you receive this message, continue at step 9. If you do not receive this message, omit step 9 and continue at step 10.

For detailed information about badspots and about the way that utilities handle badspots, refer to the Operator's Guide to File System Maintenance.

9. Run FIX_DISK on the target partition; include the -FIX option.

```
OK, FIX_DISK -DISK pdev -FIX
```

10. If you want to protect the target partition from accidental overwrite, issue the command

```
OK, PSR -PROTECT pdev
```

11. Unassign the source and target partitions by issuing the following command for each partition:

```
OK, UNASSIGN DISK pdev
```

12. If you have run the copy from a user terminal, log out and return to the supervisor terminal.

13. Remove the source and target partitions from the Assignable Disks Table, and return them to service, by issuing the following commands for each partition:

```
OK, DISKS NOT pdev
OK, ADDISK pdev
```

14. If you have closed the entire system to users, return it to service by following steps (a) and (b):

    a. Start up the subsystems. For example:

```
OK, BATCH -START
OK, PROP PRO -START
OK, FTOP -START_MNGR
OK, FTOP -START_SRVR FTP
```

    b. Issue the following command to allow users to log in:

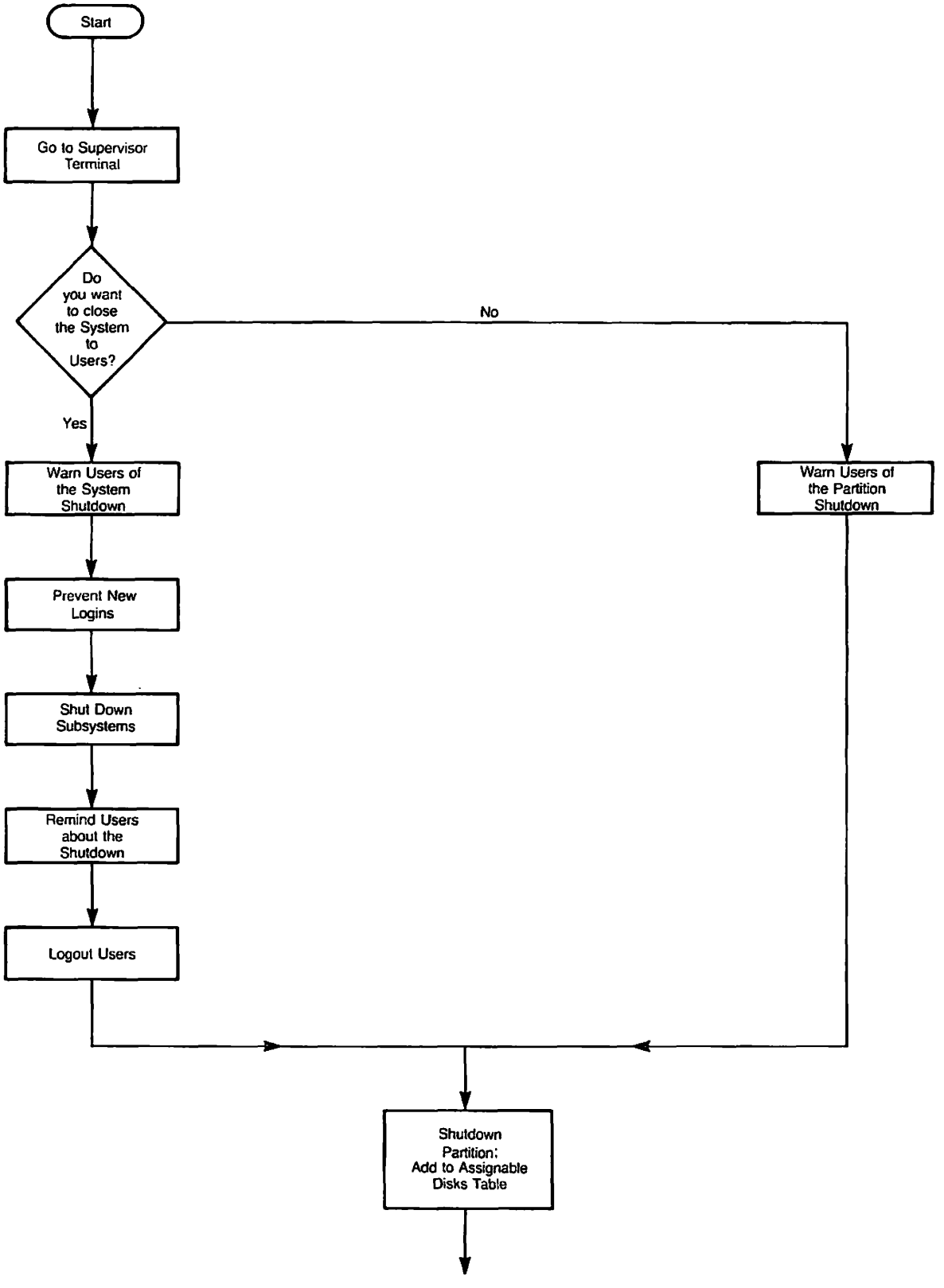
```
OK, MAXUSR
```

15. Issue a message to inform users that either the partitions or the entire system have been returned to service. For example:

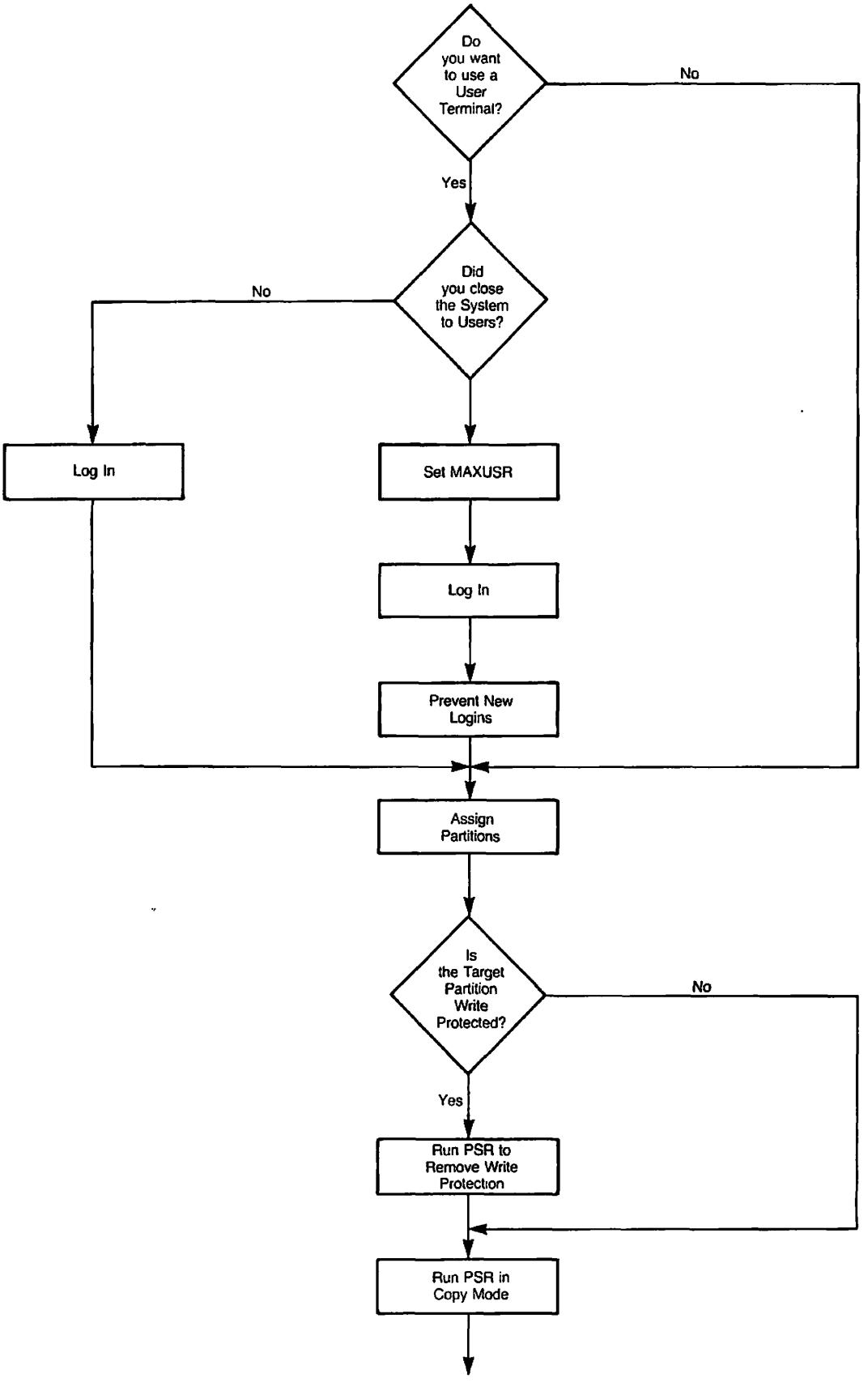
```
OK, MESSAGE -ALL -NOW
PARTITIONS DSK1 AND DSK3 ARE NOW AVAILABLE
```

or

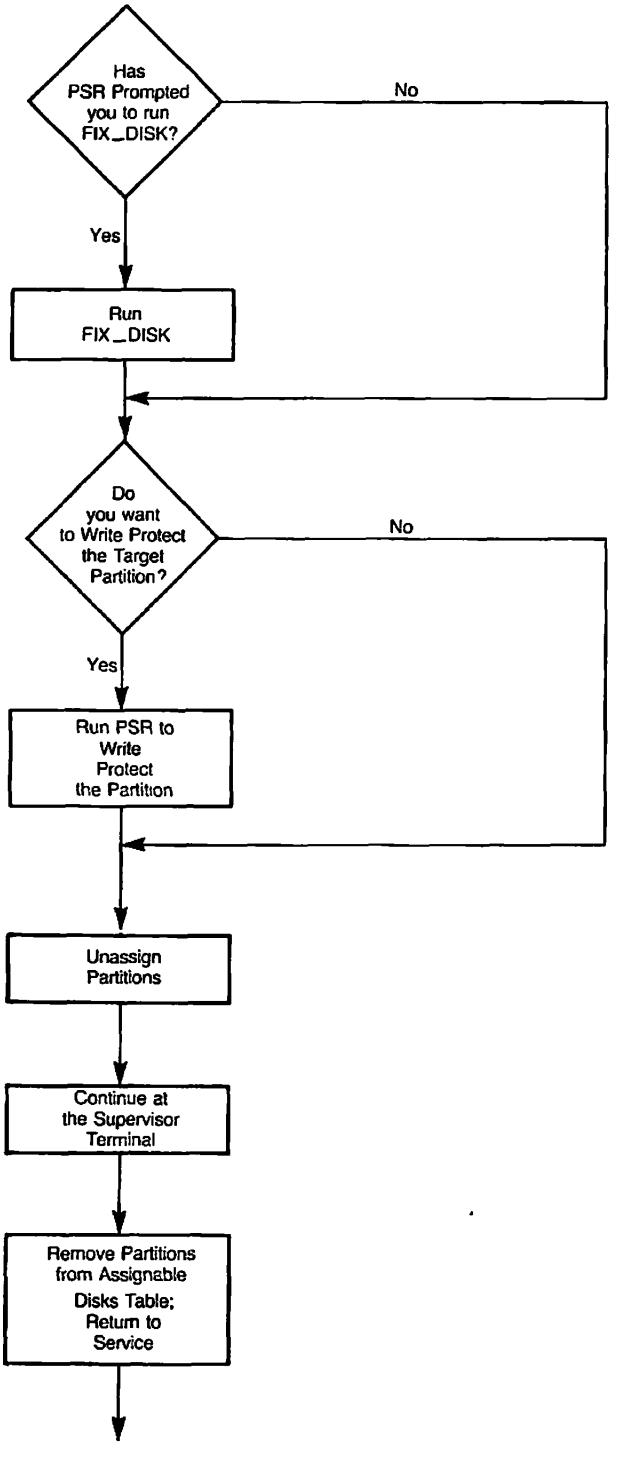
```
OK, MESSAGE ALL -NOW -FORCE
SYSTEM IS NOW UP AND RUNNING - PLEASE LOGIN
```



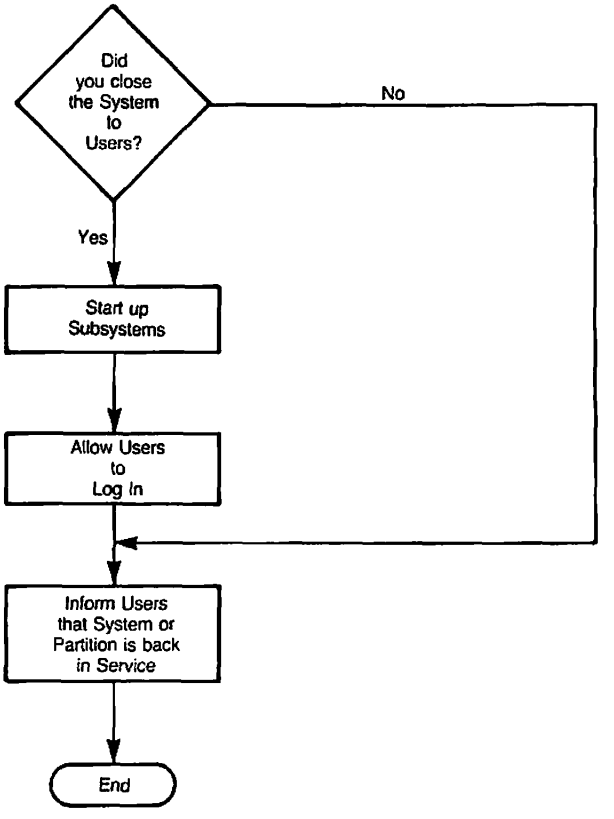
PSR Copy Procedure
Figure N-1



PSR Copy Procedure
Figure N-1 (continued)



PSR Copy Procedure
Figure N-1 (continued)



PSR Copy Procedure
Figure N-1 (continued)

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