

# Global Tape Utility Manual Version 8.1

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# 1. Introduction

\$TAPE is a utility program that creates backups of units on hard disk onto a streaming tape device, and allows them to be restored. The collection of units saved in one backup operation is called a save set, which may contain up to 500 units, spread across up to 30 tapes. Usually each unit contains all the files associated with a particular set of data. If a tape contains backups of a number of units, then individual units (but not individual files) can be restored. If you want to extract individual files you must restore to a work unit, and then copy off the files you need.

\$TAPE operates at the maximum speed that your tape drive and disk drives are capable of. Normally the speed is determined by the speed of the tape drive, but if you have a very fast tape drive and a slow disk, the tape may not be kept "streaming" at full speed so that it constantly stops and starts. In addition to being very slow, this can make the backup less reliable.

\$TAPE obtains exclusive use of the computer while a backup or restore is in progress as this is essential in order to keep the tape operating at full speed. Also, it is important that when files are backed up they are not being used or updated (if they were, the backup would be inconsistent). \$TAPE checks that files are closed before starting the backup of each unit.

\$TAPE on a LAN system will take backups of units on other computers on the network. For each unit on the remote computer \$TAPE copies files to a local staging (work) unit on \$WK (which must, therefore, be large enough to hold all the files on any remote unit) and then saves the contents of the staging unit to tape. This ensures that the tape is kept "streaming" which might not be possible if the data was saved directly over the network. Because the operation of a save across a network is in two parts the overall speed will not be as high as a backup of local disks. However, you will be able to use the remote computer while the backup is in progress, provided you are not using the files being backed up.

If there is a read error on the tape, \$TAPE will attempt to allow you to restore any units other than the one on which the error occurs. However, some tape errors, such as a damaged tape, may prevent the drive from reading past that point on the medium. If a backup is on several tapes, you only need to be able to read the tapes that actually contain the units to be restored in order to perform the restore.

If you are backing up data from several linked applications (e.g. Sales Ledger and Nominal Ledger) you should back them all up at the same time. If you need to restore one of them, you may need to restore all of them: the manuals for the modules concerned will give you guidance on this.

## 1.1 Backup Cycles

Although you could always create your backups onto the same set of tapes, this is not safe. Instead, you should have several sets of tapes: this gives you more security for the following reasons.

Firstly, an error can occur which escapes detection for some time (such as the corruption of Payroll data that might be accessed only once a week): if you take a daily backup, your tape will have the corrupt data on it. Secondly, if an error occurs while a backup is being taken you could lose all copies of the files, both on disk and on the backup tape.

Therefore it is recommended that you use a **cycle** of backup tapes. For example you might have five sets, one for each working day during the week. \$TAPE allows for a one character cycle code in the tape name, e.g. A, B, C, D, E.

It is also advisable to take additional backups on a separate set of tapes at less frequent intervals (say once a week); these should preferably be stored off site, e.g. at your home. This gives you extra security against either fire or loss of data that is not detected for some weeks. Again, you should use several sets of such tapes (at least three) and it is wise to take an extra backup at the end of your financial year.

## 1.2 Tape Names

The tapes used by \$TAPE should be labelled with a name of the form:

- one to six character name of backup
- a hyphen
- a cycle code letter
- a two digit tape number, 01 for the first tape in a set.

Thus if your backup is called BACKUP and is cycle A, then the first tape is BACKUP-A01, the next BACKUP-A02, and so on.

## 1.3 Compatibility

Tapes created on one computer/host operating system can only be restored on another computer with the same operating system and compatible drive (i.e. the same tape format and capacity) provided the units have similar directory formats. In practice, this means that the disk drives should have the same sector size and units the same maximum number of files.

## 1.4 Operating Notes

The following points should be remembered when using \$TAPE:

- Backups of units with 99 files per unit cannot be restored onto units reconfigured to have 250 files per unit and vice versa.
- \$TAPE and \$TDUMP produce entirely incompatible tapes.
- All tapes in a multi-tape backup must all have the same capacity.

- A subvolume cannot be split across two tapes. This means that a subvolume cannot be saved which is larger than the capacity of a tape.

## **1.5 Tape format**

Each tape contains a 5K header, the subvolumes and a 5K trailer to mark the end of the data. Each subvolume has a 5K header block describing the subvolume, and then the subvolume data as saved from the hard disk. The data saved extends from the start of the Global System Manager directory to the end of the (physically) last file on the subvolume; hence you can reduce the amount of data saved by condensing units.

## 2. Installation

This section explains how to install the \$TAPE software onto your computer.

### STEP 1 - INSTALLING GLOBAL SYSTEM MANAGER

If Global System Manager is not already installed on your computer, this must be done before you can install \$TAPE.

Refer to your Global Operating Manual for step-by-step instructions on installing Global System Manager.

### STEP 2 - THE INSTALLATION DISKETTES

The \$TAPE utility is distributed on a single diskette which is labelled either TEA or TFA, depending on which product you have ordered. This section describes the installation for the TE product. If you are installing the TF product, then you should substitute TF for TE.

This diskette is only used during the installation process. It should be retained in a safe place once the installation has been completed. It may be needed again to re-install the software if the operational disks are lost or damaged.

Do not attempt to copy the installation diskettes. This would infringe TIS Software's copyright. If the diskettes are damaged, return them to your supplier, quoting the serial number which is shown on the screen each time you start up Global System Manager. Your supplier will then be able to arrange a replacement.

### STEP 3 - STARTING THE INSTALLATION PROGRAM

A program named TEINS is provided to automate the installation. This program asks a series of questions to decide how the installed software is to be arranged, then prepares the required hard disk volume, copies the software to them, and updates the menu on your computer to include a line for Tape Backup.

Global System Manager includes a system command called \$INSOFT which simplifies the running of installation programs such as TEINS. If you have the Global System Manager menu on the screen and it has a line with the text "Install Global software", type this line number and key <CR> to run the command. Otherwise, you can run the \$INSOFT command by typing its name to the menu selection prompt.

**Figure 2.1 - The Installation Program, initial screen**

**Figure 2.2 - Allocating the Program Volume**

You are then asked to type the name of the first installation diskette (TEA in this case) and the diskette format code, which is printed after the word "format" on the diskette label. You are then asked to insert the TEA diskette in the diskette drive (if there is more than one drive you will be told which one to use).

The installation program will now be loaded from the TEA diskette and the screen should appear as in figure 2.1. You can now proceed to step 4.



#### STEP 4 - ALLOCATING THE PROGRAM VOLUME ON THE HARD DISK

The \$TAPE programs occupy about 500K of space. If this space is available on SYSRES you are given the option of installing all the \$TAPE software onto SYSRES. If you choose not to, or if there is insufficient space then a separate unit will be allocated.

The standard name of this volume is TEPROG, but you can choose a different name if you wish. You might do this if you want to use some already allocated unit that has sufficient spare space. You can type a volume name of up to six characters, or key <CR> to use TEPROG.

If a volume with the name specified is already present on the disk, the installation program will ask whether you want to install the programs on it. You can reply Y or N as appropriate.

If a new program volume is needed, the first unused unit number on the hard disk is will be allocated for it. The size of this volume is approximately 500K bytes. The unit number to be allocated is displayed as shown in figure 2.2.

#### STEP 5 - UPDATING THE MENU

The Global System Manager menu on your computer should be extended to include a line for Tape Backup. This can be done automatically as part of the installation process, and you are asked whether you want to do this. You reply Y or N as appropriate. It is advisable to update the menu even if you are re-installing Tape Backup and already have a line in the menu for it, to be sure that the menu is consistent with the software.

Some systems may have more than one Global System Manager menu: typically, a main menu (\$\$MENUS) and one or more submenus. This installation program will update **whichever menu it is run from**.

You can choose to add the new line to the end of the menu (by keying A), or to replace an existing line (by keying R and the line number), or to insert the new line before an existing line (by keying I and the line number).

Next you can choose the description that is to appear on the menu line. Normally this will be "Global Tape Backup", and you should key <CR> to obtain this, but you can type a different description if you wish.

If you need to update the menu by hand, then the only essential unit-id to be set up is either \$CP (if the Global Tape Utility is run as \$TAPE, from SYSRES) or \$P (if it is run as \*TAPE, from a program unit).

If you are using a network system, and intend to backup units over the network, you will need to allocate a local work unit \$\$WORK and assign \$WK to this unit in the menu, this must be done by hand. **The work unit must be large enough to contain all the files on any unit to be backed up across the network.**

#### STEP 6 - CONFIRMING THE INSTALLATION

You have now provided all the information needed to install \$TAPE, and you can give a final confirmation that the installation is to proceed

or you can abandon it and start again. You type Y to confirm, or N to abandon. If you abandon the installation at this point, no changes will have been made to any software or data currently installed.

#### **STEP 7 - ALTERING THE TAPE CONFIGURATION**

You now may have to configure \$TAPE for the type of tape drive installed. Also, if you are using a tape drive which takes several different tape lengths you should configure \$TAPE for the length you normally intend to use.

Details of how to configure the tape drive depend on the type of drive, and are given in Appendix E. You will also need to install and configure the tape drive itself, as described in the Global Operating Manual.

#### **STEP 8 - TESTING THE TAPE BACKUP**

When you have completed the installation, you should run the following test to ensure that the tape backup is working correctly:

- Initialise or erase a tape;
- Save a single unit in a backup called BACKUP-A;
- Verify the tape to check that the backup has been written;
- Allocate a temporary unit using the \$V command equal in size to the unit backed up;
- Restore the backup to the temporary unit just allocated (use \$TAPE "Restore", specify the original unit number, then key the number of the new unit where it is to be restored);
- Use \$F with the input unit as the unit originally saved, and the output unit as the temporary unit;
- Key CFI then <CTRL B> to compare all the files.

If a message "Discrepancy at" or "File Size Differs" occurs then the backup has failed; otherwise your tape backup is working and you can deallocate the temporary unit using the \$V command.

## 3. Reference

When you run \$TAPE, a menu is displayed as shown in figure 3.1 or 3.2. Note that the difference between the two menus is the presence in figure 3.1 of the Save and compare option. This option is only available if the hardware you are using is capable of supporting it. The options on these menus are described below.

**Figure 3.1 - Default \$TAPE Menu**  
**Figure 3.2 - Alternate \$TAPE Menu**

### 3.1 Retension Tape

Before you access any tape which has not been used for some time you are advised to use the retension option by replying 1 to the selection prompt. This operation loads the tape currently in the drive, fast winds it forward and rewinds it. This procedure should ensure that the tape tension is correct for your machine, and hence improve the reliability of accesses to the tape.

### 3.2 Erase Tape

Selecting this option will erase all information from the tape, it does not format the tape and hence cannot be used to remove corrupt parts of a faulty tape.

The dialogue used in this option is identical to that used in initialise (see section 3.3 below).

Note that in previous versions of \$TAPE (V6.0 and V6.0A) this option was referred to as Format. This is a misleading term since none of the tape drives currently supported by \$TAPE provide a format command. The V7.0 \$TAPE menu has been updated to give a better representation of what will happen to the tape.

Note also that the tape drives supported by \$TAPE do not normally require tapes to be erased before they are used, i.e. it is sufficient to just initialise tapes as described in the next section.

### 3.3 Initialise Tape

Before you can use a tape for the first time you must initialize it to write a "label" to the front of the tape. This label contains a blank name which is recognised by other \$TAPE operations to indicate the tape has not been used for a save. In particular, save will only use a tape with this blank name or the backup name given, so if you want to re-use a tape for a new backup with a different name or cycle code you must re-initialise it to overwrite the previous backup name. The erase option will also write this special label onto the tape.

\$TAPE is careful not to initialise previously used tapes, i.e. ones that could contain valuable information, so it makes an attempt to read the tape. If it finds a valid tape header then it will display a confirmation prompt as follows:

```
DESTROY tttttt (title) of time date? :N
```

If you key N or <ESC> then the initialise operation will be aborted and the information on the tape will remain intact.

### Figure 3.3 - Initialising a tape

After you have chosen to overwrite a tape or if no valid header is found, i.e. if it is a new tape or one that has been used for other purposes (e.g. \$TDUMP, tar, etc.), then you will be prompted for the tape size as follows:

```
Please enter the capacity of the tape ( 60M):
```

The default size offered should be correct, but some drives accept several different lengths of tape and so you will need to specify the appropriate size (Appendix E gives details of the different tape drives supported). If you do need to enter a different value then it can be specified in terms of megabytes or gigabytes by appending an M or G to the number respectively, e.g. if you are initialising a DC6150 tape in a 150M tape drive then you would enter 150M at this prompt. The maximum values you can specify at this prompt are 8750000M or 8500G.

After the size has been entered \$TAPE writes the special blank header onto the tape, so that it is ready to be used for saving data.

The initialise operation is modified by three parameters on the options screen:

1. The "read tape before initialise" flag is normally set to Y which forces \$TAPE to ensure that tapes cannot be initialised without checking. This flag was introduced to overcome problems on tape drives which could not read new tapes, and should only be used for this purpose. If this flag is set to N then the following prompt will be displayed:

```
CONFIRM CORRECT TAPE MOUNTED?
```

You must key Y in order to continue with the initialise, otherwise it will be aborted.

2. The default tape size sets the value shown in brackets when the tape size is prompted for.
3. The fixed tape size governs whether or not the tape size will be prompted for. If this flag is set to Y then you will not be prompted for the tape size and \$TAPE will use the default size described above.

Figure 3.3 shows an example of initialising a 150M tape. Note that the read tape before initialise flag is set to Y, the fixed tape size flag is set to N and the default tape size is set to 150.

### Figure 3.4 - Starting a Save (1)

### Figure 3.5 - Starting a Save (2)

## 3.4 Save Data on Tape

The Save option allows you to select a list of units, and then save them on one or more tapes. The save operation can be considered as three separate steps. First enter a valid backup name and title, next create a list of units to save (called the save set) and finally the data will be saved onto the tape.

### 3.4.1 Entering a valid tape name

You are first asked for the tape name which consists of one to six characters, followed by a hyphen, the cycle letter and the tape number, e.g. BACKUP-A01 as used in figure 3.4. This name can be entered in various ways:

1. By keying in the whole name including the cycle letter and tape number. The tape number must be set to 1 otherwise you will be prompted to reset it as follows:

```
Tape number must be set to 1 - reset (Y)?
```

2. By keying in the whole name with the cycle letter but not the tape number, e.g. BACKUP-A. Since the tape number must be 1, \$TAPE will automatically add this to a valid name and cycle letter.
3. If you key between one and six characters (not including a hyphen) this will be accepted as the name and you will be prompted for a cycle letter on the baseline as follows:

```
Please key cycle letter (A)
```

After the cycle letter has been accepted \$TAPE will add the tape number, 1, automatically.

The tape in the drive is then read. If it is newly initialised, it is used. If it has previously been used then it is checked to have the same backup name as the current backup, and a confirmation prompt will be displayed:

```
DESTROY tttttt (title) of time date?
```

You must reply Y to continue. Note that this prompt is responded to automatically when running under Job Management, so dialogue does not need to be included for it in the job description. If the tape has been previously used, but has a different backup name to the one you have specified, you will be asked to mount the correct tape in the drive as follows:

```
INCORRECT VOLUME - PLEASE MOUNT TAPE tttttt-cnn AND KEY <CR>
```

### Figure 3.6 - Save main baseline prompt

### Figure 3.7 - Add units

There is another method to enter a valid backup name without keying the name in. If you key <CR> immediately to the tape name prompt, the tape header from the tape currently in the drive will be read and the name stored in this header will be accepted as the backup name. If the tape has not been used for a save, i.e. there is a blank header on the

tape, then the following warning will be displayed and you will have to enter the tape name as described above:

```
BLANK TAPE - PLEASE ENTER TAPE NAME
```

Note that this method should only be used if you are sure that you want to overwrite the tape currently in the drive. In particular, it **should not be used in jobs since it guarantees the tape that happens to be in the drive will be used.**

You are next prompted for the title of the backup, which can be up to 30 characters in length, see figure 3.5 for an example.

### 3.4.2 Building the save set

You must now select a list of up to 500 units to save either by manually adding and removing units or by using one of the template options. The screen shown in figure 3.6 is displayed, with the prompt:

```
Key Add, Back, Next, Remove, Start backup, Template, <ESC> to exit:
```

#### Add

To add units to the list key A and you will be prompted for the first unit number. If you specify a domain unit (e.g. 200) then all the volumes in that domain are added to the list. If you specify any other unit, then you are prompted for the last unit required, or <CR> to select just one. For example:

```
Key first (or only) unit to add: 201
last unit (<CR> for just this one): 204
```

will add units 201, 202, 203 and 204 to the list, assuming they are allocated, see figure 3.7 for an example. Note that the first and last units specified must correspond to a subunit of a domain, and if they are not you will be asked for them again. Various error conditions can arise when units in a range are processed which are documented in section 3.4.4.

Each unit backed up requires space on the tape for two file marks (the size of which depends on the type of drive), space for the header and directory (15-40K) and then space for the whole of the unit except for any unused space following the (physically) last file on the unit. Any spare space at the end of the unit is not saved. Units are saved in the order specified; if they won't all fit on one tape then extra tapes will be used, and the number of the tape is shown against the unit. All tapes used in one backup must be the same size.

If all your data won't fit on one tape, you may find it better to manually split your backup into two separate operations (using two save sets) rather than one backup save set on two tapes. This will allow you to take the backups at different times, or with different frequencies.

If the unit specified is on another computer on the network \$TAPE will try to copy the data to a work unit (called the staging unit) before writing it to tape, in order to keep the tape streaming. See section 3.4.3 for more details about how to set up and use a staging unit.

#### Remove

The dialogue used by Remove is identical to that described in **Add** above, i.e. domains or ranges of units can be removed from the save set.

### Template

You can also build a save set by using a pre-defined template. On choosing the template option another baseline prompt will be displayed. This prompt is dependent on the version of Global System Manager you are using and whether the tape in the drive is blank.

For pre-V7.0 systems with a blank tape the prompt will be:

Key Catalogue, <ESC> to exit:

For pre-V7.0 systems with a non-blank tape the prompt will be:

Key Catalogue, <CR> to use save set on tape, <ESC> to exit:

For V7.0 systems onwards with a blank tape the prompt will be:

Key Catalogue, Description, <ESC> to exit:

For V7.0 systems onwards with a non-blank tape the prompt will be:

Key Catalogue, Description, <CR> to use save set on tape, <ESC> to exit:

### Catalogue

This option allows you to specify the name of a catalogue file the contents of which will be used to build a template save set. You will be prompted on the baseline as follows:

Catalogue file BACMON Unit N19

The catalogue file name must be between 1 and 6 characters in length and \$TAPE makes an initial guess that it will be on the same unit as \$TAPE. The unit information is loaded from the catalogue and each unit is validated as described in section 3.4.4. In addition to the standard validation each subunit name is checked to ensure that it matches the one in the catalogue. If it does not then the following message will be displayed:

VOLUME NAME vvvvvv ON UNIT uuu INCONSISTENT WITH xxxxxx IN CATALOGUE, SAVE? N

If you accept the default reply, N, then the unit will not be added to the save set. If you key Y then the unit will be added to the save set so ensure it is the unit you require before replying in this way. If this error does occur then it is advisable to update the catalogue file to correct the problem. **Note that this error will terminate job management.**

If the catalogue file does not exist on the specified unit the following message will be displayed:

Catalogue file not found. Key <CR>

You will then be re-prompted for the catalogue file name.

### Description

When running \$TAPE on a V7.0 or later system you can build a save set by making \$TAPE search for a specified string in the long volume descriptions for all units on a domain. You will be prompted on the baseline as follows:

```
Key domain unit
```

You can enter any valid domain unit number at this point, including a network address, e.g. N00. If the unit number entered does not correspond to a domain then the following message will be displayed:

```
Invalid device. Key <CR>
```

Once a valid domain unit number has been entered you will be prompted for a string which will be searched for in the long volume descriptions of the specified domain. You will be prompted on the baseline as follows:

```
Search string
```

The search string can contain up to 50 characters (the maximum length of a long volume description) of which none are special, i.e. there are no wildcards. Once the entire domain has been searched you will be prompted for another string and the same domain will be searched again. If you do not wish to search for another string key <ESC> and you will be prompted for another domain unit to be searched. In this way you can build a save set from the long volume descriptions of various computers on a network. For example, if you are building up a save set from three machines on a network (computers A, B and C) which had the word BACKUP added to the long volume descriptions of all units to be saved, then the dialogue would typically look like this:

```
Key domain unit A00      (Choose domain from computer A)
Search string BACKUP      (Enter search string)
Search string <ESC>      (Move to next domain)
Key domain unit B00      (Choose domain from computer B)
Search string <CR>      (Note that the last search string
                        entered becomes the default response, so
                        it is sufficient to key <CR>)
Search string <ESC>      (Move to next domain)
Key domain unit C00      (Choose domain from computer C)
Search string <CR>      (Use BACKUP again)
Search string <ESC>      (Return to domain prompt)
Key domain unit <ESC>      (Return to main baseline)
```

Once the save set has been built you can return to the main baseline by keying <ESC> to the domain unit prompt.

### Save set on tape



If the tape in the drive has already been used for a save, i.e. a non-empty save set exists in its header block, then this save set can be loaded from the tape and used as a template. This option is chosen by keying <CR> to the template baseline prompt, and is especially useful if you make the same backup every day. All units are validated in the same way as described in the catalogue section above, in particular the subunit names are checked to ensure they match the ones on the tape and will give a warning if they are not equivalent. Note that this option is not available if the tape has no save set information on it.

All template options will return control to the main baseline prompt and you can add/remove units to/from the template save set manually in order to complete the save set. Note that the template option can only be used to start a new save set, i.e. if units have been added to the save set then the template option will be removed from the main baseline prompt.

### Next and Back

When units are added using any of the options described above they are immediately displayed on the screen. When the screen fills up (i.e. when more than 72 units have been added) the next screen will be displayed automatically. These options can be used at any time to page through the list of units.

### 3.4.3 Using a staging unit

The first time a staging unit is required, \$TAPE makes various checks on the work unit (a volume on unit \$WK named \$\$WORK). If \$WK is not defined then you will be asked to assign it as follows:

```
PLEASE ASSIGN $WK
```

The unit address keyed in at this point must be a local unit, otherwise \$TAPE will display the message:

```
NO LOCAL WORK UNIT                Key <CR>
```

If you do not wish to set up a staging unit then you can key <ESCAPE> to the assign prompt which will result in the message:

```
WORK UNIT ADDRESS ($WK) NOT SET UP  Key <CR>
```

If the work unit does not exist, i.e. it has not been initialised then the following message will be displayed:

```
WORK UNIT UNAVAILABLE              Key <CR>
```

If the work unit is not a subunit, e.g. a RAM disk, then \$TAPE will display the following message:

```
INVALID WORK UNIT                  Key <CR>
```

In all of the circumstances described above the following prompt will be displayed:

```
OMIT UNITS REQUIRING STAGING UNIT? N
```

If you key N to the prompt then the data will be transferred directly, but this is likely to result in the tape not "streaming", slowing down the backup and possibly reducing the reliability of the tape produced. If you reply Y to the prompt the units concerned are not added to the list of units to be saved. Note that none of the above error messages will terminate job management and none of the units will be omitted.

### Figure 3.8 - Save set showing staged units

\$TAPE also checks the name of the work unit before using it as the staging unit. If it is not called \$\$WORK then the following prompt will be displayed:

```
* WARNING: WORK UNIT NOT CALLED $$WORK, OVERWRITE? N
```

If you accept the default reply, N, then the "work unit address not set up" error will be displayed and a staging unit will not be used. If you key Y then the unit will be overwritten during the course of the save, so ensure that the \$WK assignment is correct before continuing. **Note that this warning will terminate job management.**

The size of each unit to be staged is checked and if it is too large then the following prompt will be displayed:

```
WORK UNIT TOO SMALL FOR UNIT xxx - OMIT IT? N
```

If you accept the default, N, at this prompt the unit will be added to the save set and the data will be transferred directly across the network. Otherwise the unit will not be added to the save set. If \$TAPE is being run under job management then the default response will be automatically accepted so these units will be saved directly across the network.

\$TAPE also allows local units to be backed up via a staging unit by terminating either unit number of a range with <CTRL C> instead of <CR>. This has two uses:

1. Slow disks may not be able to keep a fast tape drive streaming, so units from this disk could be backed up via a quicker disk using a staging unit.
2. Since files are copied onto an empty staging unit, there will be no gaps between each file which minimizes the amount of data to be saved by \$TAPE.

On the save set display, units to be saved via a staging unit are tagged with an "s". Figure 3.8 shows an example of a backup taken on computer I, note how the units from computer N are staged and those from computer I will be saved directly.

#### 3.4.4 Potential problems whilst processing a range

Whilst a range is being processed, various conditions may occur which cause one or more units to be ignored. The most common problem will be that \$TAPE detects open files on a unit, in which case the following message will be displayed:

```
* FILES OPEN ON UNIT uuu - Key Continue, Ignore unit, Retry:
```

Keying **R** will cause the test to be repeated immediately, **I** will cause the unit to be ignored (**\$TAPE** moves straight on to the next unit in the range), and **C** will cause the unit to be added to the save set regardless. Note that in this last case you will need to close files on the relevant unit before starting the save, otherwise the same prompt will be displayed again just before that unit is saved. There is a flag on the options screen (ignore open files during save set creation) which effectively gives a continue response to this prompt.

Other error conditions will occur because either the operator requested that units should be ignored (e.g. because a unit was too large to be staged) or **\$TAPE** could not process them (e.g. because 500 units had already been added). When the whole range has been processed, one of the following explanatory messages may appear:

```
Warning: Unit(s) ignored because save set capacity was exceeded
Warning: Unit(s) already present in save set
Warning: Unit(s) too large were not added
Warning: Unit(s) requiring staging were not added
Warning: Unit(s) larger than work unit were not added
Warning: Unit(s) not added - all tapes full
Warning: Unit(s) not added - volume name(s) inconsistent
Warning: Unit(s) not added - volume(s) not allocated
Warning: Unit(s) were not found in save set
```

### 3.4.5 Start backup

When you are satisfied with the list of units, key **S** to start the save, or alternatively key **<ESC>** to abandon the save, and return to the main menu.

If you start the save without selecting any units, the following message will be displayed:

```
* Warning: $TAPE cannot save an empty save set. Key <CR>
```

On keying **<CR>** you will be returned to the main baseline prompt.

If the save requires more than one tape then the following message will be displayed on the baseline:

```
This backup will require n tapes, continue (Y)?
```

If you accept the default response then the backup will continue. If you key **N** then **\$TAPE** will return to the main baseline prompt, to allow you either abort the backup or to remove units so the backup will fit onto fewer tapes. Note that when running **\$TAPE** under job management the default response will be accepted automatically so no job dialogue is required to get past this prompt.

Each unit that you have selected is processed in turn, in the following way.

First, **\$TAPE** will check to see if you have keyed **<CTRL G>** in order to abort the save. If you have, the prompt:

```
Key <ESC> to terminate backup, <CR> to continue:
```

will appear. **<CR>** should be keyed to continue the backup from where it left off.

Next, \$TAPE will make sure that the currently mounted tape is the right one for the unit about to be saved. If it is not, the current tape is rewound, the header is checked, and the next tape is asked for:

```
PLEASE MOUNT TAPE n (tttttt-cnn) AND KEY <CR>:
```

\$TAPE will continue with the backup if you mount the correct tape or one with the blank name written by the initialize option. If you mount any other tape you will be prompted as follows:

```
DESTROY tttttt (title) of time date?
```

If you key Y in response to this prompt \$TAPE will continue with the backup and overwrite the tape in the drive. Otherwise the mount prompt will be re-displayed.

### Figure 3.9 - Time estimates and unit counts

\$TAPE checks each unit before saving, making sure that it is still available, and that there are no open files on the unit. If files are open, the following prompt will be displayed:

```
* FILES OPEN ON UNIT uuu - Key Continue, Ignore unit, Retry:
```

Keying R will cause the test to be repeated immediately, I will cause the unit to be ignored (\$TAPE moves straight on to the next unit in the list), and C will cause the unit to be saved regardless. Note that in this last case, the data saved may be corrupt due to files being open. As with the build save set options, there is a flag on the options screen (ignore open files during save) which will automatically provide a continue response to this prompt.

If the unit is to be staged, files are copied from the unit to the work unit, \$WK. The following message indicates that this is in progress:

```
Copying data from volume vvvvvv unit uuu to staging unit...
```

If an error should occur during the copy, the unit will not be saved onto tape, and the following message will be displayed:

```
Stage procedure aborted - this unit has not been processed.
```

If, for whatever reason, \$TAPE decides to exclude a unit, it moves on to process the next unit in the list. It also includes a line in the print report (if enabled) indicating that the unit was not saved.

Once the unit checks and staging, if any, have been completed, the time estimates and unit counts are updated as shown in figure 3.9, and the unit is saved to tape. The screen shows the unit currently being saved (identified by both the unit number and subvolume name), except when files are being copied to a staging unit, in which case it refers to the unit just saved.

The rest of the information gives an indication of the progress of the save and when it will complete. The saved and failed counts indicate

how many units have been saved successfully and unsuccessfully respectively and, when the save completes, their sum will be the total number of units set up in the save set.

The units remaining value does not include the current unit, hence this value will be 0 when saving the last unit. These unit counts are all held on a per tape and per backup basis, so the values will differ on multiple tape backups. The completion time is estimated by using an average transfer rate which can be set on the options screen. Note that this value is modified as the save progresses so the completion time will vary accordingly.

### **Figure 3.10 - Restore tape**

### **Figure 3.11 - Restore list**

When all the units in the save set have been saved, the final tape is rewound, and its header is checked. If it is valid and all units have been saved successfully, the following message will be displayed:

```
BACKUP COMPLETED SUCCESSFULLY Key <CR>
```

If the header is validated, but there were problems with one or more units (in which case the failed units count would not be zero), the following message will be displayed:

```
WARNING: NOT ALL SUBVOLUMES WERE SAVED - Key <CR>
```

Note that this warning will not terminate job management.

If the header is found to be invalid, the following message will be displayed:

```
BACKUP VERIFICATION ERROR Key <CR>
```

\$TAPE will display a write error whenever an error occurs whilst attempting to write data to the tape; if the operator keys <CTRL G> to interrupt a save, and then keys <ESCAPE> to terminate the operation; or if the tape header is checked after the save and is found to be invalid. Informative messages are written to the system log file and the print report (where appropriate). If an error occurs during a backup the following message will be displayed:

```
* ERROR DURING BACKUP - OPERATION ABORTED. Key <CR>
```

\$TAPE will, if possible, write a trailer to the tape to mark the end of the save. Job management is terminated by this error.

## **3.5 Restore Data from Tape**

The restore data option restores backups taken previously. As with save this operation can be considered as three separate steps. First you must enter a valid tape name, then you can choose which units to restore and their destinations and finally the data will be restored.

### **3.5.1 Entering a valid tape name**

On selecting the restore option you will be prompted for a tape name, see figure 3.10. This name can be entered in any one of the three

methods described in save data, with the exception that the tape number need not be 1. Also the option to read the name from the tape currently in the drive is available. This option is probably of more use in restore than it is in save. The units contained within the save set are then listed, as shown in figure 3.11, with the prompt:

Key All units, Back, Next, Select, <ESC> to exit:

### Next and Back

These options allow you to page forwards and backwards through the list of units in the save set.

## Figure 3.12 - Selecting units

### All units

This option allows you to select all units for restore using the units from which they were saved as the destination.

### Select

This option allows you to select individual units and their destinations to be restored.

## 3.5.2 Selecting units to be restored

The selection phase of the restore is entered by keying either A or S to the first baseline prompt. The baseline prompt will change to:

Key Back, Clear range, Next, Peruse, Restore, Select range, <ESC>:

### Next and Back

These options allow you to page forwards and backwards through the list of units in the save set.

### Select range

Use this option to select a range of units to be restored. You will be prompted for the first and last units of the range, for example:

```
Key first (or only) unit: Z08
last unit (or <CR> for just this one): Z10
```

Your responses will be rejected if the units you specify are not in the save set. For each unit in the range, the following prompt will be displayed:

Key unit to restore vvvvvv onto, <ESC> to stop:

The default response displayed will be the unit from which the unit was originally saved (the "source unit"), unless you have already selected the unit to be restored, in which case the destination you specified then will be displayed. Special terminating keys for this prompt are defined:

<CR> process this unit, and then move on to the next unit in range;

<ESC> stop processing the range;

<CTRL A> repeat current unit, with the default destination as the source unit. This option is only useful if you have

previously changed the destination unit from the original source unit;

<CTRL B> process all remaining units in range with default responses;

<CTRL C> force staging of this unit if possible, and then process the next unit.

Destination units will be assessed by \$TAPE and rejected if found to be invalid, with the destination prompt reissued. If this should happen following <CTRL B>, the automatic processing of the remaining units will be halted. As each unit is selected, it will be highlighted on the screen. Figure 3.12 shows how units are selected. A range is being processed, units 202 to 204, where 202 will be restored to unit 252 and the destination unit for 203 is being requested.

### Clear range

This will prompt you for a range in a similar manner, and then de-select all units in that range. The screen display will be updated accordingly.

### Peruse

This option loops through the entire save set, asking if you wish to select each unit, for example:

```
Restore SYSRES? Y/N:
```

The default response will be N if the unit is not already selected, or Y if it is. Entering N will cause the unit to be de-selected, and the next one will be prompted for. Responding Y will cause the further prompt

```
onto unit:
```

The default destination unit is determined as for Select range described previously, with <CTRL A> and <CTRL C> also having the same meaning.

Keying <ESC> will go back to the Y/N prompt; keying <ESC> to the Y/N prompt will exit the Peruse option.

### Restore

By using the various selection methods available, it is possible to select units to restore quickly and easily. Once you are satisfied with the selection, R will start the actual restore process as described in section 3.5.3.

#### <ESC> to abandon

Keying <ESC> will abandon your current selection, after confirmation, returning to the "All units..." baseline prompt, as described in section 3.5.1.

### 3.5.3 Restoring data

For each unit selected, the destination is checked for open files. If files are in use, the following prompt will be displayed:

```
FILES OPEN ON UNIT uuu - Key Continue, Ignore unit, Retry:
```

If you elect to ignore the unit, or if the destination unit cannot be scratched for some other reason, \$TAPE will skip to the next one you want to restore.

The baseline will display the current subvolume on the tape, its unit number, and the one which is being searched for. For example:

```
Current subvolume vvvvvv unit uuu - searching for subvolume xxxxxx
```

Note that the unit number uniquely identifies the current subvolume so it is possible to determine how far the restore has progressed.

This message is updated as \$TAPE steps through the tape. Sequence errors and inconsistent volume information are checked for once the required unit has been located. Other checks are performed which may cause the unit to not be restored, and the following messages may be produced:

```
Destination unit is not large enough.
```

```
Stage unit is not large enough.
```

```
Incompatible directory sizes.
```

```
Incompatible volume types.
```

If an error is detected, the unit is not restored, and the next one selected is processed. However, if the error is serious, \$TAPE may abort the entire restore operation.

While the data is being read from the tape, one of two messages will be displayed on the baseline.

If the unit is being restored directly to the chosen unit the message will be:

```
Restoring volume vvvvvv onto unit uuu
```

If the staging unit is being used then the message will be:

```
Restoring volume (unit uuu) vvvvvv onto staging unit
```

When the unit has been restored to the staging unit the files will then be copied to the destination unit and the following message will be displayed:

```
Copying files from staging unit to volume vvvvvv unit uuu
```

Should an error occur during the copy procedure, a message will appear indicating that the unit was improperly restored, and the next unit will be processed. A record is written to the system log file for each subvolume successfully restored.

When all selected units have been restored, the tape is rewound. The operator can interrupt the process by keying <CTRL G>.



If units are selected from different tapes in a multiple tape save set, they will be processed in order, from the start of the save set. A mount prompt will be issued whenever a different tape is required.

Note that it is only possible to restore whole units using \$TAPE. If you want to restore individual files, restore the unit they are on to a work unit (which must be different from the staging unit) and then use \$F to copy the files you want.

**Figure 3.13 - Verify tape**

### 3.6 Verify Tape

This option reads through the tape currently in the drive, to check that every block is present and readable. It does not compare the data with that saved, but the checks built into the tape hardware should detect any errors when the tape is written. If a valid, non-blank tape header is found then the screen shown in figure 3.13 will be displayed. This shows similar information to the save/restore/list screens but has the tape number column replaced by a unit verified column which indicates whether a unit has verified correctly or the error returned when attempting to verify that unit. Note that this display only shows the units saved on that particular tape.

Each unit is highlighted to indicate that it will be verified and \$TAPE begins to verify the tape using the following procedure.

It scans for a tape header and if one is found then the following message will be displayed on the baseline:

```
Verifying volume vvvvvv unit uuu
```

The unit data is then read into memory in the same way as when restoring, but of course, nothing is written to disk. If all the data from the unit can be read then that unit will be flagged as verified on the screen with a Y in the unit verified column.

This procedure is repeated until a tape trailer is read, or a fatal error occurs. The operator can interrupt the verification at any stage by keying <CTRL G>. When the current tape operation has completed, the following prompt will be displayed:

```
Key <ESC> to exit, or <CR> to continue
```

Keying <ESC> will abandon the verify pass at that point and the following message will be displayed:

```
VERIFY OPERATION ABORTED. Key <CR>
```

After all units on the tape have been verified you will be prompted on the baseline in one of the following ways:

If the print option is disabled the prompt will be:

```
Key Back, Next, <ESC> to exit
```

If the print option is enabled the prompt will be:

```
Key Back, Next, Print, <ESC> to exit
```

**Back and Next**

These options allow you to page backwards and forwards to look at all units on the tape.

**Figure 3.14 - Completed verify pass****Print**

Choosing Print will generate a simple print report as described in section 3.14.

Note that in previous versions of \$TAPE a print report was generated as the verify took place and required <CR> to be keyed to return to the main menu instead of <ESC>. For these reasons if V7.0 \$TAPE detects that it is being run under job management it will automatically generate a print report at the end of the verify (if the print option is enabled). Also, it will accept <CR> instead of <ESC> to return to the main menu. In effect it allows jobs set up to work with previous versions of \$TAPE to work in exactly the same way with V7.0 \$TAPE.

**3.6.1 Potential problems with verify**

When the verify option is chosen \$TAPE will automatically read the tape currently in the drive. If this tape has not been initialised the following error message will be displayed:

\* Invalid tape header - Key <CR>

If the tape has been initialised, but not used for a save then the error displayed will be:

Blank tape header - no units to verify Key <CR>

In both cases \$TAPE will return to the main menu.

If the tape drive has difficulties in reading the tape it will return a media error, which in turn will be reported as a read error by \$TAPE by placing an R in the verified column on the screen. If this does happen then you will be able to continue the verify since \$TAPE will attempt to scan to the next header. However, another read error will probably be reported so the scan will fail and you will be prompted as follows:

Key <ESC> to exit, or <CR> to retry

You can retry the scan indefinitely by keying <CR> in the hope that the bad portion of tape will eventually be skipped. Alternatively, you can key <ESC> which will abort the verify.

Verify can also detect if a unit has not been saved, usually due to ignoring the unit during the save due to open files. In this case the following warning will be displayed:

Tape sequence error, unit not verified Key <CR>

Note that this error will not halt job management and a "-" will be displayed in the unit verified column on the screen. See figure 3.14 which shows an example of a complete verify pass of a tape. Note that

one unit, I14, does not exist on the tape but all the rest have verified correctly.

**Figure 3.15 - List tape**

**Figure 3.16 - Scan tape**

### 3.7 List Tape

This option reads the tape header and shows details of the backup it contains, and also allows the subvolume information on the tape to be inspected. If a valid, non-blank header is successfully read, a screen shown in figure 3.15 appears, together with the prompt:

Key Back, First, Last, Next, Print, <CR> to scan, <ESC> to exit:

#### Next, Back, First and Last

Next and Back perform as when saving and restoring, while First and Last display the respective pages of the list, so that Next and Back do not have to be used repeatedly.

#### Print

Print will produce a simple report containing information from the tape header, regardless of the setting of the print report option.

#### Tape Scan Option

Keying <CR> to the baseline prompt will cause \$TAPE to search for the next unit header on the tape. As each header is located its information, including the files on the unit, long volume description, subvolume size, data saved, etc will be displayed on the screen shown in figure 3.16. Note that if a pre-V7.0 tape is being used the long volume description and subvolume size will be displayed as spaces since these fields do not exist in the header information. The following baseline prompt will be displayed:

Key Back, Next, Restore, Tape details, <CR> for next unit, <ESC> to exit:

#### Next and Back

These functions page through the list of files. The file details are displayed in a similar manner to \$F, except that Cobol Library (CL) files appear as VL files.

#### Restore

You can restore the current unit to any valid destination unit by keying R to the baseline prompt. If you do choose this option the following baseline prompt will be displayed:

Key unit to restore vvvvvv onto uuu

By default the destination will be the unit from which the subvolume was originally saved, but you can enter any other valid unit number. As with restore a variety of error conditions can be detected by \$TAPE about the destination unit so refer to section 3.5.2 for details.

Note that when you are being prompted for the destination unit \$TAPE will have released exclusive control. This will allow you to swap partitions and use \$V to set up a unit of the correct size (it must be at least as large as the value specified in the data saved field) before attempting the restore.

**Figure 3.17 - Tape details****Figure 3.18 - Selective Verify****Tape details**

This function displays information from the tape header as shown in figure 3.16, and shows general identification and creation information about the backup.

**Next unit and exit**

Keying <CR> will cause \$TAPE to search for the next unit header on the tape and display its details. You can automatically scan the entire tape by keying <CTRL B> at this prompt. The scan baseline prompt does not appear after each unit header is located. This feature can be cancelled by using <CTRL G>, but you must allow the next unit header to be located before the scan baseline prompt will appear. If you do not wish to scan any further keying <ESC> rewinds the tape and returns to the main menu.

**3.8 Unload Tape**

Some tape drives (e.g. Exabyte) require that the tape is explicitly unloaded by the software. This is done automatically when obviously necessary (e.g. when prompting for a new tape to be mounted) but in other circumstances, such as after listing a tape, you can use this option to unload the current tape.

**3.9 Save and verify**

This option combines the functions of save, i.e. you can select units and save them, and verify; details of how these functions work are covered in sections 3.4 and 3.6 respectively. The save and verify are carried out on a tape by tape basis, i.e. in a multiple tape backup the tape is verified immediately after the save has completed on that tape, in order to minimise the number of tape changes.

**3.10 Selective verify**

This option reads the tape currently in the drive and displays units saved on that tape on the standard verify screen, see figure 3.18. The following baseline prompt will be displayed:

Key All units, Back, Next, Select, <ESC> to exit

**Next and Back**

These options allow you to page forwards and backwards through the list of units in the save set.

**All units**

This option allows you to select all units for verify, which is equivalent to using the standard verify option (see section 3.6).

**Select**

This option allows you to select individual units to be verified.

**Figure 3.19 - Selective verify example**

The selection phase of the verify is entered by keying either A or S to the first baseline prompt. The baseline prompt will change to:

Key Back, Clear range, Next, Peruse, Select range, Verify <ESC>:

### Next and Back

These options allow you to page forwards and backwards through the list of units in the save set.

### Select range

Use this option to select a range of units to be verified. You will be prompted for the first and last units of the range, for example:

```
Key first (or only) unit: Z08
last unit (or <CR> for just this one): Z10
```

Your responses will be rejected if the units you specify are not in the save set.

### Clear range

This option will prompt you for a range in a similar manner to select, and then de-select all units in that range. The screen display will be updated accordingly.

### Peruse

This option loops through the entire save set, asking if you wish to select each unit, for example:

```
Verify SYSRES? Y/N:
```

The default response will be N if the unit is not already selected, or Y if it is. Entering Y will cause the unit to be selected, which will be highlighted on the screen. Entering N will cause the unit to be de-selected, and the next one will be prompted for. Keying <ESC> to the Y/N prompt will exit the Peruse option.

### Verify

By using the various selection methods available, it is possible to select units to verify. Once you are satisfied with the selection, V will start the actual verify process. Alternatively, <ESC> will abandon your current selection, after confirmation, returning to the "All units..." baseline prompt, as described at the start of this section.

The baseline will display the current subvolume on the tape, its unit number, and the one which is being searched for. For example:

```
Current subvolume vvvvvv unit uuu - searching for subvolume xxxxxx
```

Note that the unit number uniquely identifies the current subvolume so it is possible to determine how far the verify has progressed. The example in figure 3.19 shows 3 units (N02, N04 and I15) have been selected where N02 and N04 have been verified and \$TAPE is currently scanning through unit I12.

### Figure 3.20 - Catalogue maintenance

### Figure 3.21 - Adding units to a catalogue

Once the appropriate unit has been found the following message will be displayed on the baseline:

```
Verifying volume vvvvvv unit uuu
```

The unit data is then read into memory in the same way as when restoring, but of course, nothing is written to disk. If all the data from the unit can be read then that unit will be flagged as verified on the screen with a Y in the unit verified column.

When all selected units have been verified, the tape is rewound. The operator can interrupt the process by keying <CTRL G>.

### 3.11 Catalogue maintenance

This option allows you to set up a list of units, which will be stored in a catalogue file which can be used in any of the save options to build a save set. On entering this option the screen shown in figure 3.20 will be displayed and you will be prompted for the catalogue file name and unit. The catalogue file name consists of between 1 and 6 characters which are appended to "\$t" to form the catalogue file name, e.g. if you create a catalogue using the name DAY1, \$TAPE will create a file named \$tDAY1 on the appropriate unit. The unit assignment specifies where the catalogue file can be found and defaults to the \$TAPE unit.

If the catalogue file exists then its contents will be displayed on the screen which you will be able to edit, otherwise you will be prompted on the baseline as follows:

```
New file ? (Y)
```

If you key N then you will be prompted for another catalogue file name, otherwise the following baseline prompt will be displayed:

```
Key Add, Back, Change, Insert, Next, Remove, <CR> to update, <ESC> to abandon
```

#### Add

To add units to the list key A and you will be prompted for the first unit number. If you specify a domain unit (e.g. 200) then all the volumes in that domain are added to the list. If you specify any other unit, then you are prompted for the last unit required, or <CR> to select just one. For example:

```
Key first (or only) unit to add: 201
last unit (<CR> for just this one): 204
```

will add units 201, 202, 203 and 204 to the list, assuming they are allocated, see figure 3.21 for an example. Note that the first and last units specified must correspond to a subunit of a domain, and if they are not you will be asked for them again.

#### Change

A catalogue file holds a list of unit numbers which can be used to build a save set, but this information can become outdated. There are two reasons for this:

1. A subvolume name can be changed which will result in an inconsistent volume name warning.

2. A subvolume can be de-allocated which will result in a unit not found warning.

The change function allows you to edit a catalogue with respect to changing subvolume names (this could also be done by removing the unit then inserting it at the appropriate place but change is much simpler). If you choose this option you will be prompted as follows:

```
Key Automatic update, Change volume name, <ESC> to exit
```

### Automatic update

This option will loop through all units in the catalogue and update all subvolume names. If a unit has been de-allocated then you will be prompted as follows:

```
Unit uuu no longer exists. Remove from catalogue? Y
```

Accepting the default response will delete this entry from the catalogue, otherwise it will be left.

After the automatic update has finished, \$TAPE returns to the main baseline prompt.

### Change volume name

This option allows a single volume name to be changed. You will be prompted as follows:

```
Key unit to change
```

You must key in a unit number which exists in the catalogue, otherwise the following warning will be displayed:

```
Unit not found in catalogue. Key <CR>
```

On keying <CR> you will be re-prompted for a unit number.

If an existing unit number is keyed in then its name will be updated. If this unit has been de-allocated then you will be prompted to confirm that it can be removed as described in the automatic update above.

After you have updated one unit, the same unit prompt will be displayed, allowing you to update another unit. If there are no more units to change then key <ESC> to return to the main baseline prompt.

### Insert

This function is an extension of add which allows you include units at any point in the list, instead of just adding them to the end of the existing list. You will be prompted as follows:

```
Key unit to insert before
```

The unit specified here must exist in the current list, otherwise you will be prompted for it again. If you do not wish to insert units key <ESC>, which will return you to the main baseline prompt. Once a valid unit has been entered you can insert domains or ranges of units in the same way as described in Add above.

**Remove**

The dialogue used by remove is identical to that described in **Add** above except that domains cannot be removed.

**Next and Back**

When units are added using any of the options described above they are also displayed on the screen and when the screen fills up (i.e. when more than 72 units have been added) the next screen will be displayed automatically. These options can be used at any time to page through the list of units.

**Update**

Once you are satisfied with the catalogue you can save it by keying <CR>, and it is now ready for use by the save options.

**Abandon**

You can abandon the existing updates you are making by keying <ESC>, in which case you will be prompted:

```
Abandon - Are you sure ? (Y)
```

If you choose to continue with the abandon then no information will be written back to the catalogue file. This is particularly useful if you are editing an existing catalogue but make a mistake and wish to go back to the original. If you are building a new catalogue and abandon the update then no file is created.

**3.12 Save and compare**

This option works in the same way as save and verify, except the data on the disk and tape are compared. A save set is built using the facilities described in section 3.4.2 and the data is saved onto tape. After that tape has been filled (or the save set has been completely backed up) the data on the tape is compared with that on the disk. If a discrepancy is found then the following error will be displayed:

```
* DATA COMPARISON ERROR ON TAPE tttttt-cnn Key <CR>
```

This error will be denoted by an X in the units compared column. Note that this error does not halt job management.

**Figure 3.22 - The Options Screen**

**3.13 Change Options**

This option allows you to customise various options and parameters that control \$TAPE. When selected the screen shown in figure 3.22 is displayed, with the prompt:

```
Key Amend, Customise, <ESC> to exit:
```

Key A to amend the details shown, as described below. When they are correct, key C to customise them permanently into the program so that these values will be used in future. Alternatively, if you exit by keying <ESC> the new values are temporary and apply only to this invocation of \$TAPE.

**Print report**



This option controls the report produced during a Save operation.

N for no report.

S for a summary report listing the units invoked.

F for a full report showing in addition the names of the files copied and start and end times for each unit.

In addition, S or F will enable print reports for the Verify and List operations.

#### **Use staging unit?**

Enter Y if a staging (work) unit on \$WK is to be used when copying files across the network, N if staging is not required.

#### **Ignore open files**

\$TAPE checks for open files on a unit both when validating the unit before it is added to the save set and just before the unit is saved. Consequently, there are two flags so that each phase is controlled independently.

Setting a flag to Y causes \$TAPE to ignore open files and continue with the current phase of the save operation (i.e. either creating the save set or saving the data to tape). If a unit is backed-up via a staging unit, open files are not saved since they cannot be copied to the staging unit. This will result in an incomplete backup. When restoring a unit that was saved with open files, you should check for the possibility of inconsistent data.

These flags are both set to N by default (the safest setting) but can be changed according to your own circumstances.

If you make un-supervised backups, e.g. at the end of a day, then set the during save set creation flag to N and the during save flag to Y. In this case open files will be reported before the save takes place allowing you to close them, and the backup will not stop even if more are detected during the save. Also a save report should be selected, and carefully examined afterwards since it will indicate which units were saved with open files.

If you can take backups under supervision then you will normally only be interested in open files on a unit when that particular unit is being saved. In this case set the during save set creation flag to Y and the during save flag to N.

#### **Overwrite protected units?**

V7.0 \$TAPE allows units to be restored onto protected units, but a confirmation message will be displayed before it is attempted. If it safe to overwrite **all** protected units then this flag can be set to Y and the confirmation message will not be displayed.

#### **Restore long volume descriptions?**

The long volume description of a unit is now saved on the tape but is not restored by default. Setting this flag to Y ensures that **all** long volume descriptions are restored.

#### **Does Unload Eject Tape?**

Enter Y if the unload operation ejects the currently loaded tape (this is of use for the Exabyte tape drive), in which case it will be done only when clearly necessary, such as when mounting a new tape. Key N otherwise.

### **Read Tape Before Initialise?**

Normally, this flag will be set to Y. However, some tape drives cannot read from a blank, formatted tape without giving a hardware error. This means that a blank tape cannot be initialised by \$TAPE, because \$TAPE first checks to see if there is a label at the beginning, and this check causes an error (see section 3.3). If your tape drive performs in this manner, setting this response to N will cause \$TAPE to initialise tapes without performing the check.

### **Average Transfer Rate (Kb/sec)**

The average transfer rate achieved on a save in Kbytes per second, used to produce the timing estimates. Note that this figure must make an allowance for pauses between units and rewind time. This customisation is only used when calculating the timing estimates. It does not affect the operation of \$TAPE.

### **Network Copy Speed (Kb/sec)**

The average speed of copying files across the network, used to produce the initial timing estimates when a staging unit is used. This customisation is only used when calculating the timing estimates. It does not affect the operation of \$TAPE.

### **Fixed Tape Size?**

Set this to Y if you only use a single tape size, to suppress the prompt during initialise.

### **Default tape size (Mb)**

The option specifies the default value displayed when initialising or erasing a tape. Note that \$TAPE, unlike \$TDUMP, ignores the various tape size fields in the configuration data (e.g. Tape length in feet).

## **3.14 Print reports**

\$TAPE can produce print reports for all options involving save, verify, list and compare operations, which are controlled by a flag on the options screen, as described in section 3.13.

### **3.14.1 Save reports**

There are two different report formats for save - a full listing, "F" and a summary listing, "S".

Both reports start with a summary, before the backup has started, of the subvolumes \$TAPE intends to save, together with the amount of data on each one. The rest of the report is built up as each unit is saved.

The summary option produces a report showing, for each unit saved, the subvolume name, long volume description (if running on a V7.0 or later system), size and unit number; the times at which \$TAPE started and completed the backup of that unit; whether any files were open when the unit was saved; and whether the unit was staged or not. If \$TAPE ignored the unit because files were inaccessible, this will be recorded. An example of the summary report is shown on page 3-43.

The full option produces a report showing, for each unit saved, all the information in the summary, and also a list of all the files saved from the unit. An example of the full report is shown on page 3-44.

Both reports finish with information about the success (or otherwise) of the backup operation.

### **3.14.2 Verify reports**

Verify produces only one format of report which is created after the verify pass of the tape has completed. A heading gives the backup details, including who performed the backup and when it was taken. This is followed by the report which details the subvolume name, source unit and data size, together with the sequence number and whether or not the subvolume was verified. If a subvolume could not be verified, explanatory text will appear in the report. The report concludes with a reason why the verification pass stopped (normally this will be because the end of the tape was reached). Selective verify produces a similar report of the units chosen to be verified.

### **3.14.3 List reports**

Print will produce, regardless of the setting of the print report option, a report containing information taken from the tape header, in the same format as the save reports except the data sizes are not displayed. An example is shown on page 3-45.

As each subvolume is processed during a scan, a full listing of the files on it is added to the print report. The report is generated automatically, either if the print report option has been set up, or if the Print response to the previous baseline prompt was used. This is the Scan report shown on page 3-46.

Assuming that the print report option is not "N", the subvolume information for the whole tape can be listed by selecting List Tape from the main menu, using <CR> to scan the tape, and then keying <CTRL B>.

### **3.14.4 Compare reports**

A print report can be produced at the end of a compare operation which is identical to a verify report.

**Figure 3.23 - Summary save report (first & last pages).**

**Figure 3.24 - Full save report (first page)**

**Figure 3.25 - List report**

**Figure 3.26 - Scan report (first page)**

## Appendix A – Error Messages

If an error occurs accessing the tape, a standard error message is produced of the form:

*\* error description ON TAPE*

The meaning of some of these errors is however slightly different from disk errors, as described below.

**ERROR H:** a fatal error connected with the drive hardware has been detected (e.g. motor stalled).

**ERROR D:** the tape controller hardware is not present at the specified I/O address or SCSI-id.

**ERROR Y:** the \$TAPE controller has timed out whilst waiting for a command to complete.

**ERROR Z:** the \$TAPE controller has received status from the drive which cannot be translated into a standard \$TAPE error.

**Not Ready:** either the tape is not correctly mounted, or for an external drive, the drive is not switched on.

**Hardware Write Protection:** the "write protect" tag on the tape cartridge is set on, preventing the drive from writing to the tape.

**Insufficient Space:** the "end of tape" marker was found before the backup was complete. This occurs when the size specified during the initialise operation is greater than the actual tape capacity.

**Read Error:** a block on the tape was unreadable. The unit concerned cannot be restored (you could try again after cleaning the tape heads). Normally this error will be followed with a message:

Key <CR> to restore next unit, <ESC> to exit:

If you reply <CR> \$TAPE will attempt to restore any other selected units: this will however not always be possible, depending on the tape drive and the cause of the error.

**Write Error:** the drive is unable to write to the tape. This probably indicates a fault on the medium.

**Tape Not Supported:** the configuration file does not specify a tape.

**Error Loading Controller:** the tape controller cannot be loaded, probably because it is not present on the correct unit. If the controller number is nn, and the architecture code of the computer is am, then the controller must be present as either file %.amCTnn on SYSRES or member amCTnn in library P.\$TAPE.

## Appendix B – Diagnostics Mode

\$TAPE includes a diagnostics mode which can be used in order to determine more information if tape problems occur. It is enabled in one of two ways:

1. By copying or renaming \$TAPE as \$TAPED, then running \$TAPED. In this mode \$TAPE will halt before displaying the main menu. A message similar to the following will be displayed:

```
Running in test and development mode.
Work area size (bytes): 40758
Controller message: ARCHIVE VIPER 150 21247-005 Key <CR>:
```

The work area size is the amount of space that can be used by the controller for its buffer areas.

The controller message is the drive description as returned by the tape drive itself, and does not appear for all types of tape drive supported by \$TAPE.

Note that this prompt does not halt job management.

2. Diagnostics mode can be toggled on/off when running \$TAPE by keying DIAG at the main menu. The change of status will be displayed on the status line by a message "Diagnostics enabled" or "Diagnostics disabled".

When diagnostics mode is enabled extra information is either displayed on the screen or included in the print report. The extra information is as follows:

1. The controller operation currently in progress will be displayed on the status line and will be one of the following:

```
Initialise
Load tape
Unload tape
Rewind tape
Retension tape
Format tape
Read tape header
Read tape trailer
Read unit header
Read auxiliary header
Write tape header
Write tape trailer
Write unit header
Write auxiliary header
Save data
Restore data
Read header
Verify tape
Compare data
```

Note that each \$TAPE option is carried out as a series of these basic operations, which always start with a "Load" and terminates with an "Unload".

Also, when using \$TAPE on IBM PC clones a buffer count will be displayed on the status line of the integral screen. This is displayed directly by the tape controller and relates to how much more information has to be transferred to/from the tape to complete the operation on that unit, hence it will always appear as a number that is continuously decrementing. The following operations result in a display of the buffer count:

```
Save data
Restore data
Verify tape
Compare data
```

Note that the count will always be displayed on the integral screen, even if you are running \$TAPE from a serial screen.

- When the tape controller detects an error it returns an overall result code to \$TAPE, which is displayed on the screen, e.g. READ ERROR ON TAPE BACKUP-A01. The tape drive often returns much more information about the error which is usually ignored by \$TAPE. Moreover, when diagnostics mode is enabled, the extra information is displayed as a controller message as follows:

```
Controller message:0002F0000500000010
```

The information is supplied directly by the tape drive and so cannot be deciphered without a technical manual for that drive.

- Extra information is added to the print report describing the controller operation currently in progress, its result code and controller message (described in 2 above). The print report option must be set to "F" on the options screen.
- Extra information is displayed on the time estimates screen during a save. The first number is the number of bytes that will be saved, i.e. the datasize value given on the print report. The second is the absolute position of the data on the disk. In addition, the following message will be displayed on the baseline after each unit has been saved:

```
Speed for this unit (bytes/s): nnnnnnn
Average speed (K/s): nnn
```

The average speed value is used to calculate the completion time estimates.

- When setting up a save set diagnostics mode sets up a hidden option on the main baseline prompt. Keying <CR> to this prompt results in the display a tape usage screen which shows how much data will be saved on each of the 30 possible tapes.

## Appendix C – Troubleshooting

This appendix describes various techniques to help investigate problems that may occur when running \$TAPE, describes some of the more common errors and documents a few hidden commands.

### C.1 Tape drives

When a tape drive is installed into a computer it may not work first time because its settings do not agree with the information in the configuration file. Normally this will result in \$TAPE reporting an error D when it is run which implies that either the port address (on Everex and Wangtek QIC-02 drives) or the SCSI-id are not set correctly. Also, if an Everex or Wangtek QIC-02 drive can perform some operations, e.g. unload or retension, but not ones which require data transfer then either the DMA channel or interrupt level are incorrect.

Whenever an error is reported by an Everex or Wangtek QIC-02 tape drive it is probable that the next tape operation will also fail. If it does then the only way to get the drive working properly again is to perform a reset, which can only be achieved by exiting \$TAPE and trying again.

In general, when dealing with any problem which has been caused by the tape drive failing in some way it is important to repeat the problem in diagnostics mode (see Appendix B) for two reasons:

1. The controller operation will be displayed on the status line, so indicating the one which failed.
2. The extra status information returned by the drive will be displayed which will describe the low-level cause of the problem. This information may help to resolve whether the problem was caused by the hardware or the software.

### C.2 Initialise

Certain tape drives have problems reading blank tapes which prevents such tapes from being initialised. In these circumstances set the "Read tape before initialise" flag on the options screen to Y in order to skip the initial read. If this problem occurs on Everex and Wangtek drives, the drive must also be reset as described in section C.1 above.

There can also be problems initialising tapes which have been used for other purposes, e.g. "tar" backup under Unix. When \$TAPE searches for a header it scans the tape to find the next filemark, which the tape drive will do successfully provided there is data on the tape. So, when attempting to initialise a tape which has been used for a "tar" backup (in which case there will be data but no filemark) the tape drive will spool the tape until the end of data point is reached. As with the problem with blank tapes described above, the "Read tape before initialise" flag should be used.

### C.3 Restore

There is a hidden feature in restore which can be particularly useful if no information is known about the tape. \$TAPE requires the user to

enter the destination unit before the restore starts, but, since there is no size information held in the tape header, \$TAPE cannot detect whether the unit is large enough to do the restore until it reaches the appropriate unit header. If the unit is not large enough then the restore will fail and will have to be carried out again. For this reason an interactive restore function has been added which is enabled by keying <CTRL D> to the destination unit prompt.

If this option is taken then the chosen unit will be highlighted as normal, but the destination unit will be displayed as "\*\*\*\*". When the restore takes place \$TAPE will search for the chosen units as usual and if it finds one where the destination unit is "\*\*\*\*" it will display the scan screen (see figure 3.16) and display the following baseline prompt:

Key Back, Next, Restore, <ESC> to exit:

### Next and Back

These functions page through the list of files. The file details are displayed in a similar manner to \$F, except that Cobol Library (CL) files appear as VL files.

### Restore

You can restore the current unit to any valid destination unit by keying R to the baseline prompt. If you do choose this option the following baseline prompt will be displayed:

Key unit to restore vvvvvv onto uuu

By default the destination will be the unit from which the subvolume was originally saved, but you can enter any other valid unit number. As with restore a variety of error conditions can be detected by \$TAPE about the destination unit so refer to section 3.5.2 for details.

Note that when you are being prompted for the destination unit \$TAPE will have released exclusive control. This will allow you to swap partitions and use \$V to set up a unit of the correct size (it must be at least as large as the value specified in the data saved field) before attempting the restore.

### <ESC> to exit

Keying <ESC> will result in the following message:

Unit not restored. Key <CR>

\$TAPE will then continue to search for more files to restore (if any).

This option is useful if you want to restore a unit with a common name (if there are several units with the same name), but do not have sufficient information, (i.e. the particular unit number), to be able to restore it using the normal restore procedure. Interactive restore allows you to select all units with the same name without having to find sufficient units to restore them onto.

## C.4 Options screen



An extra, hidden option has been added to the options screen. It is accessed by terminating the response to the baseline prompt with <CTRL A> instead of <CR>. The extra option is displayed as follows:

```
Tape controller buffer size (0 defaults to track size)
```

This is of use when using Exabyte tape drives in computers which use ESDI disks which have an odd number of sectors per track and the tracksize is greater than 16K. This combination of disk and drive would cause a program check within \$TAPE because one of its internal fields overflows, hence the buffer size must be restricted. The value specified in this field must be less than 32768 and must be a multiple of 1024.

## C.5 Save

If a save requires more than one tape to complete a backup \$TAPE will display a message indicating how many will be needed. This has been added because it was easy to start a backup without enough initialised tapes, making the save impossible to complete. This message does not completely solve the problem because it is impossible to initialise tapes without losing the save set just created. The following technique can be used to make re-creating the identical save set automatic:

1. Continue with the save and abort it immediately by keying <CTRL G>. This will write the save set onto the tape in the form of the tape header.
2. Extra tapes can then be initialised.
3. By using the first tape, i.e. the one with the save set details, it is possible to re-create the initial save set with the "use save set on tape" template option (see page 3-10).

## Appendix D – Tape Drives Supported By \$TAPE

This appendix documents which tape drives are supported on IBM PC clones, and under which operating system.

Tape drive	Controller card			
	QIC-02 (AT)	SCSI (AT)	QIC-02 (MCA)	SCSI (MCA)
Everex Stream/60 Stream/125 Stream/150	GSM-BOS and GSM-DOS □ □		GSM-BOS and GSM-DOS □ □	
Wangtek Wangtek/60  Wangtek/125 □ □  Wangtek/150	GSM-BOS and GSM-DOS □ □		GSM-BOS and GSM-DOS □ □	
Archive Viper 2060S Viper 2125S Viper 2150S		GSM-BOS only		GSM-BOS only
Wangtek 5099ES □ □ □ □ □ 5125ES 5150ES 5525ES □ □ □ □ □ 51000ES		GSM-BOS only		GSM-BOS only
Exabyte EXB-8200		GSM-BOS Only		GSM-BOS only

Note that the term "SCSI (AT)" refers to the Adaptec 1540 and 1542 host adapter cards, and the term "SCSI (MCA)" refers to the Adaptec 1640 host adapter card.

## Appendix E – Configuration Information

When \$TAPE is used on IBM PC clones it modifies the information which was intended for use by \$TDUMP, hence it is not necessary to modify the configuration file if you are simply upgrading from \$TDUMP to \$TAPE. In particular, \$TDUMP requires two parameters ("4K blocks per track" and "number of tracks") to be established in order to correctly size the tape. The \$TAPE conversion routine uses this information to estimate the default tape size, but it will always be lower than the actual value, so it is much better to customise the options screen as described in section 3.13.

### E.1 Wangtek and Everex QIC-02 Controllers and Drives

The following sections describe how to set up and use QIC-02 tape drives and controllers produced by Everex and Wangtek. The "Quarter-inch committee" define a number of standards to do with tapes:

QIC number	Description
QIC-02	Describes the command set from the host computer to the controller card in the PC.
QIC-36	Defines the interface between the controller card in the PC and the tape drive.
QIC-24 QIC-120 QIC-150	Define the way in which data is written to the tape on 60Mb, 120Mb, 150Mb and 250Mb drives.

\$TAPE does not work successfully with all controller cards that claim to be QIC-02 compatible. For example, \$TAPE does not work with QIC-02 cards produced by Archive. \$TAPE does work with QIC-02 cards produced by Everex and Wangtek, **except that Wangtek PS/2 Microchannel cards are not supported.**

Until recently tape drives supplied with QIC-02 controller cards all conformed to the QIC-36 interface. Wangtek, however, have introduced a new controller card/drive pairing which does not use the QIC-36 interface. Intelligence has been moved from the controller card plugged into the PC to electronics on the tape drive. Unfortunately old cards can be connected to new drives and vice versa (the cables and connectors used have stayed the same) but they will not work together - beware!

Wangtek and Everex tape drives are available, capable of producing QIC-24 (60Mb), QIC-120 (120Mb), QIC-150 (150Mb and 250Mb) tapes. Everex sell these under the name Excel Stream 60, 125 etc. Wangtek sell these under the names Wangtek/60, /125, etc.

**Note:** \$TAPE does not support any tape drives that are controlled by the floppy diskette controller. Devices of this form are sold by Irwin, IBM and a number of other suppliers and use DC1000 and DC2000 tapes. These drives normally have a capacity of 20 or 40Mb.

#### E.1.1 The Configuration File

Use Global Configurator to update the configuration file to use the CD-TAPE controller with the defaults for all other tape-related prompts.

### E.1.2 Hardware Configuration

The interrupt level, DMA channel and port address must be set up using Global Configurator or the program =.45xx, =.50xx or =.55xx depending on which version of Global System Manager you are using. The defaults are interrupt level 3, DMA channel 1 and port address #300.

Switch bank SW1, which may have 9 or 10 switches, sets up the port address. On Wangtek and Everex QIC-36 cards, SW1-10 is not used and should be set off. To set the switches for address #300 first translate the address into binary - 1100000000 - and then discard the least significant bit - 110000000. Then set the switches using the convention that off=1 and on=0 with SW1-9 the most significant bit.

```

ON      X X X X X X X
OFF     X X X
      1 2 3 4 5 6 7 8 9 10
    
```

On Everex QIC-02 cards the port address select switches have been redefined so that switches 1 to 9 on the QIC-36 card map onto switches 2 to 10, i.e. SW1-1 is not used. To configure a QIC-02 card for port address #300 set the switches as follows:

```

ON      X X X X X X X X
OFF     X X
      1 2 3 4 5 6 7 8 9 10
    
```

A bank of 12 jumpers is used to set up the interrupt level and DMA channel. The first 6 are used to set the interrupt level. The second 6 are used to establish the DMA channel and are divided into 2 groups of 3. The jumpers would be set up as follows for interrupt level 3 and a DMA level of 1:

Interrupt Level						DRQ			DACK		
2	3	4	5	6	7	1	2	3	1	2	3
.	X	.	.	.	.	X	.	.	X	.	.
1	2	3	4	5	6	7	8	9	10	11	12

In addition there are 2 jumpers which should both be off if DMA 1 is being used and on for DMA 3. The jumpers are called DACK3EN and DRQ3EN.

A version of the Everex tape hardware is also available for the PS/2 Micro Channel bus and a flag must be set in the configuration file to indicate whether the software is running on a Micro Channel or not. The address and interrupt level are set up using the IBM reference diskette and options file. If a DSP ARC500 card is in the machine, address #300 will not be available. #7FF0 can be used as an alternative.

The PS/2 Micro Channel PC-DOS software supplied with the tape drive alters the values set up by the reference diskette so if this software has been used you may need to check that the values are still those expected.

### E.1.3 \$TAPE Customisation

After installing \$TAPE select "Change options" from the menu and set the tape size to 60M, 125M or 150M depending on the drive type. Set the average transfer rate to 85 for the 60Mb drive and 110 for the 125 and 150Mb drives. Set the "Does unload eject tape" flag to N.

### E.1.4 Tapes

The correct kind of tape must be used to achieve the best performance.

Drive	Tape type
60Mb	DC600A
125Mb	DC600A, DC600XTD or DC6150
150Mb	DC600XTD, DC6150 or DC6250
250Mb	DC6250

## E.2 SCSI QIC Controllers and Drives

This section describes how to set up and use the following tape drives:

Tape drive	Capacity (Mb)
Archive Viper 2060S	60
Archive Viper 2125S	125
Archive Viper 2150S	150 (or 250Mb with DC6250 tapes)
Wangtek 5099ES	60
Wangtek 5125ES	125
Wangtek 5150ES	150 (or 250Mb with DC6250 tapes)
Wangtek 5525ES	510
Wangtek 51000ES	990

All three drives operate using the SCSI interface.

### E.2.1 The Configuration File

The Adaptec SCSI host adapter must be accessed directly by BOS when performing both disk and tape I/O (normally disk I/O is performed indirectly via the ROM BIOS). Consequently you must use Global Configurator to change the controller used for disk access to ADAPTEC. Similarly the ADAPTEC controller must be used in the tape section of the configuration file. Lastly, you must answer Y to the "Adaptec SCSI card required" prompt in the nucleus options section of the configuration file.

### E.2.2 Software and Drivers

The \$TAPE device drivers for controlling the Adaptec controller must be present on SYSRES or SYSIPL. The drivers, +J5NADA and +J5CA09, are contained in a library called +.J5HP. The library is supplied standardly with some operating systems, and is also supplied on the TEA and TFA distribution diskettes. Use \$F to copy +.J5HP to SYSRES or SYSIPL if the library is not already present.

#### E.2.3.1 Hardware Configuration (Archive Viper)

The SCSI-id of the tape drive is normally set to 6, parity on the SCSI bus must be enabled, and the SCSI disconnect size must be set to 16K. These settings are controlled by jumpering pins on the rear of the drive. The pins are arranged in a pad of 3 pins high and 6 pins wide.

The diagram below indicates which pins should be connected by jumpers and assumes that you are viewing the drive from the rear with SCSI cable connector to the left of the jumper pad:

		Column		
		1	2	3
Row	1	. . .-	. -.	. -.
	2	. . . .	. -.	. -.
	3	.-.	.-.	. . .

The jumper in column 1 row 3 enables SCSI parity. The two jumpers in column 2 set the SCSI disconnect length to 16Kb. The two jumpers in column 3 set the SCSI-id to 6. The SCSI-id can be set to other values if necessary by installing other jumpers in column 3.

		SCSI-ID							
		0	1	2	3	4	5	6	7
Row	1	.	.	.	.	x	x	x	x
Row	2	.	.	x	x	.	.	x	x
Row	3	.	x	.	x	.	x	.	x

### E.2.3.2 Hardware Configuration (Wangtek)

These drives are pre-configured at the factory with the correct jumper settings; the only change you will possibly have to make is to the SCSI-id. The lower capacity drives (5099ES, 5125ES and 5150ES) have had two board assemblies which use different jumper settings to set the SCSI-id.

#### E.2.3.2.1 Board assembly #30552

Drives using this board assembly require the SCSI-id to be set up using two sets of jumpers. One set are positioned on the rear of the drive between the SCSI and power connectors and consist of three pairs of pins. These should be set in the following way for the seven possible SCSI-id's:

SCSI-id	Pin 3	Pin 2	Pin 1
0	-	-	-
1	-	-	x
2	-	x	-
3	-	x	x
4	x	-	-
5	x	-	x
6	x	x	-
7	x	x	x

Note that pin 3 is the one closest to the SCSI connector and pin 1 is closest to the power connector.

The other set of jumpers are positioned on the underside of the drive in the jumper bank marked HDR3. There are three pins (marked A, B and C) for each jumper setting in this bank. The jumpers marked 1, 2 and 3 within this bank should be set as follows for the seven possible SCSI-id's:

SCSI-id	Jumper 1	Jumper 2	Jumper 3
0	B-C	B-C	B-C
1	B-C	B-C	A-B
2	B-C	A-B	B-C

3	B-C	A-B	A-B
4	A-B	B-C	B-C
5	A-B	B-C	A-B
6	A-B	A-B	B-C
7	A-B	A-B	A-B

The SCSI-id set by these two sets of jumpers must be equal, otherwise the drive may appear on more than one SCSI-id.

#### E.2.3.2.2 Board assembly #30559

Drives using this board assembly have a single set of jumpers to set to SCSI-id which is positioned on the rear of the drive. The pins on this jumper set are numbered 1 to 4, where 4 is closest to the SCSI connector and 1 is closest to the power connector. Pins 1 to 3 are used to set up the SCSI-id as described above for board assembly #30552. Note that pin 4 is not used and should not have a jumper installed.

#### E.2.3.2.3 Other Wangtek drives

The two higher capacity drives (5525ES and 51000ES) are configured as described for the lower capacity ones using board assembly #30559, i.e. there is one jumper set with which to set up the SCSI-id.

### E.2.4 \$TAPE Customisation

After installing \$TAPE select "change options" from the menu and set the default tape size and average transfer rate for the various drives as follows:

Drive	Default tape size	Transfer rate
Archive Viper 2060S	60	85
Archive Viper 2125S	125	110
Archive Viper 2150S	150	110
Wangtek 5099ES	60	85
Wangtek 5125ES	125	110
Wangtek 5150ES	150	110
Wangtek 5525ES	510	180
Wangtek 51000ES	990	180

Set the "Does unload eject tape" flag to N for all of these drives.

Note that the default tape size (measured in Mb) for the two high capacity drives is not as large as the drive name might suggest.

### E.2.5 Tapes

The correct kind of tape must be used to achieve the best performance.

Drive	Tape type
Archive Viper 2060S	DC600A
Archive Viper 2125S	DC600A, DC600XTD or DC6150
Archive Viper 2150S	DC600XTD, DC6150 or DC6250
Wangtek 5099ES	DC600A
Wangtek 5125ES	DC600A, DC600XTD or DC6150
Wangtek 5150ES	DC600XTD, DC6150 or DC6250
Wangtek 5525ES	DC6525
Wangtek 51000ES	Magnus 1.0

Note that although the two high capacity drives (Wangtek 5525ES and 51000ES) can read from lower capacity tapes e.g. DC6150's, we have experienced problems writing to these tapes. Hence we only recommend the use of DC6525 and Magnus 1.0 tapes for backup purposes in such drives.

## E.3 Exabyte Tape Drive

The following sections describe how to set up and use an Exabyte EXB-8200 8mm video tape drive.

### E.3.1 The Configuration File

The Adaptec SCSI host adapter must be accessed directly by BOS when performing both disk and tape I/O (normally disk I/O is performed indirectly via the ROM BIOS). Consequently you must use Configurator to change the controller used for disk access to ADAPTEC. Similarly the ADAPTEC controller must be used in the tape section of the configuration file. Lastly, you must answer Y to the "Adaptec SCSI card required" prompt in the nucleus options section of the configuration file.

### E.3.2 Software and Drivers

The \$TAPE device drivers for controlling the Adaptec controller must be present on SYSRES or SYSIPL. The drivers, +J5NADA and +J5CA09, are contained in a library called +.J5HP. The library is supplied with some operating systems, and is also supplied on the TEA and TFA distribution diskettes. Use \$F to copy +.J5HP to SYSRES or SYSIPL if the library is not already present.

### E.3.3 Hardware Configuration

The SCSI-id number must be set using the three dip switches on the rear of the drive. The standard configuration files are set up assuming a tape drive with an SCSI-id of 6 (Switch 1 off and 2 and 3 on). Note that the first disk drive usually has an id of 0 and the Adaptec host adapter has an id of 7.

	SCSI-ID							
	0	1	2	3	4	5	6	7
Switch 1	off	on	off	on	off	on	off	on
Switch 2	off	off	on	on	off	off	on	on
Switch 3	off	off	off	off	on	on	on	on

### E.3.4 \$TAPE Customisation

After installing \$TAPE select "change options" from the menu and set the tape size to 2100M, the average transfer rate to 200, and the "Does unload eject tape" flag to Y.

### E.3.5 Tapes

The drive will use standard domestic Video-8 cartridges. The "90 minute" tapes hold 2100Mb, shorter ones proportionately less. Specially certified Exabyte cartridges are available.

### E.3.6 Operation

After powering on the computer, the tape drive takes about two minutes to warm up. When you put a cartridge in, the drive takes about 30



seconds to load it, after which time the green light on the front will light. Attempting to access the tape before it is loaded will give a "not ready" error. The cartridge will be unloaded automatically when you return to the menu after the backup is complete.

### **E.3.7 Cleaning**

An Exabyte head cleaning tape should be used regularly. You are recommended to clean the heads either every month or after 30,000 Mbytes of data has been saved/restored, whichever comes first.

## Appendix F – Example Jobs

\$TAPE has been designed to work under job management. In particular, various prompts which require user intervention are skipped when running a job, e.g. after the "BACKUP COMPLETED SUCCESSFULLY" message. Since there are so many such prompts, most of which will clear the type-ahead buffer, it is always preferable to run \$TAPE via a job rather than type-ahead from a menu entry.

Example 1 shows a job which uses the add option to create a save set, and represents a typical job used with previous versions of \$TAPE. Note that no response is required to the destroy prompt which will be displayed after the tape name has been entered. This means the job will work with both initialised tapes and any tape with the correct tape name, BACKUP-A01.

```
JOB BACMON Monday's Backup Job
*
PARAMETER DIVISION
*
DIALOGUE DIVISION
*
GSM READY:*TAPE
OPTION:9
TAPE NAME:BACKUP-A
TAPE TITLE:Monday's@Backup
SAVE BASELINE:A
FIRST UNIT:N01 LAST UNIT:N04
FIRST UNIT:I12 LAST UNIT:<CR>
FIRST UNIT:I14 LAST UNIT:I16
FIRST UNIT:<ESCAPE>
SAVE BASELINE:S
*
* Save and verify take place and $TAPE returns control at verify
* baseline prompt.
*
VERIFY BASELINE:<ESCAPE>
OPTION:<CR>
*
ENDJOB
```

\* Choose "Save and verify" option.  
\* Enter tape name.  
\* Add units  
\* in range N01 to N04,  
\* unit I12 alone,  
\* and in range I14 to I16.  
\* Back to save baseline.  
\* Start backup.  
\* Return to \$TAPE menu.  
\* Exit \$TAPE.

### Example 1

Example 2 shows how catalogues can be used within a job. This allows the job to be more flexible since the tape name and title and the catalogue file name can be passed as parameters to the job (c.f. example 1 which produces a fixed save set).

```
JOB CATJOB Backup using a catalogue
*
PARAMETER DIVISION
*
&1 X(10) Tape name
&2 X(30) Tape title
&3 X(6) Catalogue name
*
DIALOGUE DIVISION
*
GSM READY:*TAPE
OPTION:9
TAPE NAME:&1
TAPE TITLE:&2
SAVE BASELINE:T
TEMPLATE BASELINE:C
```

\* Choose "Save and verify" option.  
\* Enter tape name.  
\* Choose template option.  
\* Choose catalogue option.

## Appendix F – Example Jobs

```
CATALOGUE NAME:&3 UNIT:<CR>      * Use specified catalogue name and load
                                  * it from the $TAPE unit.
SAVE BASELINE:S                   * Start backup.
*
* Save and verify take place and $TAPE returns control at verify
* baseline prompt.
*
VERIFY BASELINE:<ESCAPE>          * Return to $TAPE menu.
OPTION:<CR>                        * Exit $TAPE.
*
ENDJOB
```

### Example 2

## Appendix G – TACUS

### G.1 Introduction

An addition utility, TACUS, for use on IBM machines (i.e those running J5 or JW software) is distributed with \$TAPE. TACUS is not installed but may be found on the TEA (or TFA) diskette. This utility can be used to update the tape control block, TA block, in memory.

There are three options:

1. The controller specific parameters can be updated in memory which allows quick changes to be applied when testing tape drives. Note that if permanent changes are required then either =.NNNN or Global Configurator must be used to update the configuration file.
2. A \$TDUMP TA block can be saved permanently within TACUS.
3. A \$TDUMP TA block can be restored to allow \$TDUMP to be used after \$TAPE without re-booting the machine.

### G.2 Usage

On running TACUS a message will be displayed describing which type of TA block is currently resident in memory (\$TDUMP or \$TAPE) and for which type of hardware it is configured (Everex or Adaptec). After this message one of two prompts will be displayed.

If a \$TDUMP TA block is found in memory then the prompt will be:

```
Save TA block, Customise parameters (C)
```

If a \$TAPE TA block is found in memory then the prompt will be:

```
Restore TA block, Customise parameters (C)
```

#### G.2.1 Save TA block

This option will copy the contents of the TA block currently in memory into TACUS and write this information back to the disk. However, it checks if a TA block has already been saved and, if it has, the following prompt will appear.

```
TA block already saved, overwrite (Y)?
```

TACUS will confirm that the TA block has been saved by displaying the message:

```
TA block saved
```

#### G.2.2 Restore TA block

This option will copy the TA block saved within TACUS back to the appropriate location in memory. It checks that the TA block had been previously saved in TACUS before copying the data. If it had not been previously saved the following message will be displayed:

```
The TA block has not been saved
```

TACUS confirms that the TA block has been restored by displaying the message:

```
TA block restored
```

### G.2.3 Customise parameters

This option allows the controller specific parameters to be altered in memory. The prompts for each controller are identical to those in =.NNNN

The following prompts appear for the Everex controller:

```
Port address:0300  
DMA channel (1 or 3):1  
Interrupt level (2 - 7):3  
MCA bus?:N
```

The following prompt appears for the Adaptec controller:

```
SCSI i.d. (0 - 7):6
```

After the updates have been made the following prompt will appear:

```
Do you wish to update the TA block using the parameters specified above (Y)?
```

Keying "Y" to this prompt will proceed with the update and display the message:

```
TA block modified
```

Any other response will result in the following prompt:

```
Abandon update (Y)?
```

Keying "Y" to this prompt will allow TACUS to terminate, otherwise the controller specific parameters will be prompted for again.

## Appendix H – \$TAPE on Unix Configurations

This appendix describes how to use \$TAPE (Version 7.0A) on Global System Manager (Unix).

### H.1 GLTAPE shell variable

The GLTAPE shell variable specifies the device name which the \$TAPE controller will use. It should be added to the user's .profile script (or wherever else the GLDIR and PATH variables are set) as follows:

```
GLTAPE=device_name;export GLTAPE
```

If this shell variable is not setup then an error D (missing device error) will be reported on attempting to run \$TAPE. Note that this name must specify the device which executes a rewind when the device is closed. For example, if you are using a SCSI tape drive on SCO Unix then you should use the /dev/rStp0 device rather than /dev/nrStp0.

### H.2 \$TAPE must not be run by more than one user

Currently, there is no way to lock the tape drive when it is running under Global System Manager. However, if GLTAPE is set up for use by only one user then there will never be a conflict because all other users will obtain an error D when attempting to use \$TAPE (as described above).

### H.3 Options screen settings

Since Global System Manager (Unix) comprises a collection of separate systems which emulate a network of computers \$TAPE will always attempt to use a staging unit. This is unnecessary since all the files reside on a single machine so the "Use staging unit" option should be set to "N" (see section 3.13). The only advantage in using a staging unit is to minimise the size of the units being saved (see section 3.4.3).

### H.4 Tape must be in drive

The \$TAPE controller determines whether the device specified by the GLTAPE shell variable is valid by attempting to open it. If a tape is not present in the drive then the Unix open operation will fail, which is reported as an error D by \$TAPE.

### H.5 Read/write privileges on tape drives

Devices are usually owned by the superuser but Global System Manager does not normally have superuser privileges. For this reason please ensure that all Global users have read/write privileges on the selected tape device. For most versions of Unix, the required privileges are set up by default. For example, the SCSI tape device on SCO Unix has the following privileges:

```
# ls -l /dev/rStp0
crw-rw-rw- 3 root other 46, 0 Oct 30 1992 rStp0
```

### H.6 \$TAPE status displays

\$TAPE displays various helpful messages during save, restore, etc. However, these displays are buffered by the Unix drivers so may not appear in full before the \$TAPE controller takes exclusive control of the process, in which case the screen may appear to hang until the outstanding tape operation completes.



# Appendix I – Data Transfer Between BOS and Unix

Tapes produced by \$TAPE running on Global System Manager (BOS) are incompatible with those produced by \$TAPE on Global System Manager (Unix). All tapes produced by BOS \$TAPE controllers (e.g. J5CT03) contain file marks to separate header and data blocks. The incompatibility comes about because the Unix \$TAPE controller is unable to write file marks. The absence of file marks on tapes produced on Unix systems means that such tapes cannot be read by the standard BOS controllers. However, it is possible to read tapes produced by Global System Manager (BOS) systems on Global System Manager (Unix) systems by using one of the following methods:

## I.1 Using the standard Unix tape device

Certain versions of Unix allow the \$TAPE controller to read BOS tapes (i.e. file marks can be skipped). This represents the simplest option since there is no need to change the GLTAPE shell variable to specify a different device (see section I.2 below). Please refer to the Global Configuration Notes to determine whether this facility is appropriate for your particular version of Unix.

## I.2 Using the "no rewind" Unix tape device

If the standard Unix tape device will not skip file marks then you will need to use the equivalent "no rewind" tape device. The "no rewind" device is usually identified by the addition of an "n" to the standard device name. For example on SCO Unix:

```
/dev/rStp0                (standard tape device)
/dev/nrStp0              ("no rewind" tape device)
```

Note that this is only a Unix naming convention, the major and minor device numbers associated with the device name actually specify the true device characteristics. Please refer to your System Administrator's Guide for the meaning of the major and minor device numbers. For example, the standard and "no rewind" devices for SCSI tape drives on SCO Unix are listed as follows:

```
# ls -l /dev/rStp0
crw-rw-rw- 3 root other 46, 0 Oct 30 1992 rStp0

# ls -l /dev/nrStp0
crw-rw-rw- 3 root other 46, 8 Oct 30 1992 nrStp0
```

Note how the minor device number differs, 0 for the standard device and 8 for the "no rewind" device. The "no rewind" device does not rewind the tape when the tape device is closed, so \$TAPE can use a special technique to skip file marks.

**IMPORTANT NOTE:** The "no rewind" device must only be used when transferring data between BOS and Unix systems, in particular saves will not complete correctly if this device is used.

Using the "no-rewind" tape device can introduce some side-effects because the tape can't be rewound. For example, if a restore is attempted immediately after a list, the operation will fail with a



READ ERROR because the media cannot be rewound back to the tape-header. To initiate a tape rewind, exit \$TAPE. When \$TAPE is next loaded, the tape will be rewound.

### I.3 Preparing a Unix style tape with a special BOS controller

The two techniques described above should enable \$TAPE on most versions of Unix to read tapes created when running \$TAPE on Global System Manager (BOS). If neither of the above techniques work a special BOS controller (for use with Adaptec SCSI tape drives only) must be used to produce a tape with no file marks. Use the following procedure to achieve this:

1. Run \$TAPE and exit immediately, which will convert the \$TDUMP style TA block into a \$TAPE style TA block.
2. Use TACUS to modify the controller code as follows:

```
Restore TA block, Customise parameters (C):<CTRL A>
Controller code:6                               (For QIC tape drives)
                7                               (For Exabyte tape drives)
TAFLAG value:<CR>
SCSI i.d. (0 - 7):<CR>
```

3. Run \$TAPE to save data.
4. Restore the original controller code using TACUS, as described above, or re-boot the machine. IMPORTANT NOTE: This final stage must be performed otherwise normal backup tapes may be inadvertently created using the special "transfer controller".

The special BOS "transfer controller" will also read tapes produced by Unix systems. Thus it is possible to use \$TAPE as a mechanism to transfer data from Unix to BOS systems.

## FIG 2.1 - INSTALL. SCREEN 1

\$TAPE INSTALLATION

-----

\$TAPE requires 500K of space. If this is available on  
SYSRES, you are given the option of installing onto  
SYSRES. Otherwise, the software is installed onto  
a separate unit.

Install onto SYSRES? (N):

## FIG 2.2 - ALLOCATE

### \$TAPE INSTALLATION

\$TAPE requires 500K of space. If this is available on SYSRES, you are given the option of installing onto SYSRES. Otherwise, the software is installed onto a separate unit.

Install onto SYSRES? (N):

Type the name of the unit to install or RETURN for TEPROG:

Overwrite existing TEPROG on unit 231? (Y):N

Specify TEPROG unit (232):







### FIG 3.4 - START SAVE - PROMPTING FOR TAPE NAME

```
f Save
Tape BACKUP-A01 of 08.50.45 06/07/1992
+
Volume Unit Tape Volume Unit Tape Volume Unit Tape Volume Unit Tape
Enter tape name or <CR> to read current tape
```

### FIG 3.5 - START SAVE - PROMPTING FOR TAPE TITLE

```
f Save
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
Volume Unit Tape Volume Unit Tape Volume Unit Tape Volume Unit Tape
Please enter tape title
```





### FIG 3.7 - UNIT LIST

```
f Save
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
Volume Unit Tape Volume Unit Tape Volume Unit Tape Volume Unit Tape
SYSRES 201 1
SPOOL 202 1
SYSDEV 203 1
SYSKIT 204 1
,
Key first (or only) unit to add:
```

### FIG 3.8 - UNIT LIST SHOWING STAGING UNIT STATUS

```
f Save
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
+
Volume Unit Tape Volume Unit Tape Volume Unit Tape Volume Unit Tape
SYSRES N01 1 s
SPOOL N02 1 s
SYSDEV N03 1 s
SYSKIT N04 1 s
TEPROG I12 1
BWPROG I14 1
BWSYSI I15 1
BWORK I16 1
Key Add, Back, Next, Remove, Start backup, <ESC> to exit:
```

### FIG 3.9 - TIME ESTIMATES AND UNIT COUNTS SCREEN

```
f Save ,,
 Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
†
 Saving unit I12 TEPROG onto tape number 01
 Saved Failed Remaining Completion
 Units Units Units Time
 Current tape 4 0 3 08.59
 Whole backup 4 0 3 08.59
,

```

### FIG 3.10 - RESTORE TAPE - PROMPTING FOR TAPE NAME

```
fRestore
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
Volume Unit Tape Volume Unit Tape Volume Unit Tape Volume Unit Tape
Enter tape name or <CR> to read current tape
```

### FIG 3.11 - UNIT LIST

```
fRestore
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
Volume Unit Tape Volume Unit Tape Volume Unit Tape Volume Unit Tape
SYSRES 201 1
SPOOL 202 1
SYSDEV 203 1
SYSKIT 204 1
,
Key All units, Back, Next, Select, <ESC> to exit:
```



### FIG 3.13 - VERIFY TAPE

```
f Verify
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
+
Volume Unit Ver? Volume Unit Ver? Volume Unit Ver? Volume Unit Ver?
SYSRES N01 *
SPOOL N02 *
SYSDEV N03 *
SYSKIT N04 *
TEPROG I12 *
BWPROG I14 *
BWSYSI I15 *
BWORK I16 *
 
 

,
Verifying volume SYSRES unit N01
```



### FIG 3.14 - VERIFY COMPLETED

```
f Verify
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
Volume Unit Ver? Volume Unit Ver? Volume Unit Ver? Volume Unit Ver?
SYSRES N01 Y *
SPOOL N02 Y *
SYSDEV N03 Y *
SYSKIT N04 Y *
TEPROG I12 Y *
BWPROG I14 - *
BWSYSI I15 Y *
BWORK I16 Y *
,
Key Back, Next, Print, <ESC> to exit:
```

### FIG 3.15 - LIST TAPE

```
f List
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
Volume Unit Tape Volume Unit Tape Volume Unit Tape Volume Unit Tape
SYSRES N01 1
SPOOL N02 1
SYSDEV N03 1
SYSKIT N04 1
TEPROG I12 1
BWPROG I14 1
BWSYSI I15 1
BWORK I16 1
,
Key Back, First, Last, Next, Print, <CR> to scan, <ESC> to exit:
```



### FIG 3.17 - TAPE DETAILS

```
f  TAPE HEADER DETAILS
  Block type 1 (tape header) Length (in bytes) 5120
  Initialised tape capacity (in Megabytes) 125
  Identification Information
  Creation Information
  Name BACKUP Backup cycle A Created at 08.50.45 on 09/07/1992
  Tape 1 of a set of 1 Tape created by MDT on computer I
  Title Monday's Backup $$VERS 2 $TAPE V6.0-8
  Subvolumes saved in set 8 Stage unit 250 size 65.20M
  Key <CR>
```



### FIG 3.19 - SELECTIVE VERIFY EXAMPLE

```
f Selective Verify
Tape BACKUP-A01 Monday's Backup of 08.50.45 06/07/1992
Volume Unit Ver? Volume Unit Ver? Volume Unit Ver? Volume Unit Ver?
SYSRES N01
SPOOL N02 Y *
SYSDEV N03
SYSKIT N04 Y *
TEPROG I12
BWPROG I14
BWSYSI I15 *
BWORK I16
,
Current subvolume TEPROG unit I12 - searching for subvolume BWSYSI. . .
```

### FIG 3.20 - CATALOGUE MAINTENANCE

```
f##### Catalogue maintenance
#####"
 Catalogue file Unit
+#####
^^
 Volume Unit Volume Unit Volume Unit Volume Unit
```

  

```

 

```

  

```

,#####
#####...
```

### FIG 3.21 - ADDING UNITS TO A CATALOGUE

```
f Catalogue maintenance
Catalogue file DAY1 Unit 212
Volume Unit Volume Unit Volume Unit Volume Unit
SYSRES 201
SPOOL 202
SYSDEV 203
SYSKIT 204
,
Key first (or only) unit to add:
```



### FIG 3.22 - OPTIONS SCREEN

```
f[V6.0-8] $TAPE Options
[ ]
[ ]
[ ] Print report (Full, Summary, None) S [ ]
[ ]
[ ] Use staging unit? Y [ ]
[ ]
[ ] Ignore open files - during save? N - during save set creation? N [ ]
[ ]
[ ] Overwrite protected units? N [ ]
[ ]
[ ] Restore long volume descriptions? N [ ]
[ ]
[ ] Does unload eject tape? N [ ]
[ ]
[ ] Read tape before initialise? Y [ ]
[ ]
[ ] Average transfer rate (Kb/sec) 100 Network copy speed (Kb/sec) 10 [ ]
[ ]
[ ] Fixed tape size? N Default tape size (Mb) 60 [ ]
[ ]
[ ]
,
Key Amend, Customise, <ESC> to exit
```

Monday's Backup BACKUP BACKUP-A01 Monday 06/07/92 08.50

---



---

Volumes saved	Volume	Unit	Size	Volume	Unit	Size	Volume	Unit	Size	Volume	Unit	Size
SYSRES	N01		2864.8K	SYSDEV	N02	907.3K	PSDATA	N03	1370.5K	PKTEST	N04	929.3K
TEPROG	I12		374.6K	BWPROG	I14	781.2K	BWSYSI	I15	726.2K	BWORK	I16	16.5K

\*\*\*\*\*  
 \*\*\*\*\*

Monday's Backup BACKUP BACKUP-A01 Monday 06/07/92 08.50

---



---

Unit	Subvolume	Size (K)	Datasize (K)	Long volume description	Started	Finished	Open
	Files Staged						
N01	SYSRES	3076.5	2756.5	V7.0F GLOBAL SYSTEM MANAGER VOLUME	08.52	08.53	N Y
N02	SYSDEV	1108.5	906.8	V7.0 GLOBAL COBOL PROGRAMMING KIT PART 1	08.53	08.54	N Y
N03	PSDATA	1508.5	1289.9	V7.0 GLOBAL COBOL PRODUCT SUPPORT	08.54	08.55	N Y
N04	PKTEST	2052.5	929.3	PORTING KIT TEST PROGRAMS	08.55	08.56	N Y
I12	TEPROG	500.5	374.6		08.56	08.57	Y N
I14	BWPROG	Unit not saved due to files inaccessible					
I15	BWSYSI	1028.5	726.2		08.57	08.59	N N
I16	BWORK	500.5	16.5		08.59	08.59	N N

Backup completed at 08.59 Number of tapes used: 1  
 Units specified in save set: 8 Units actually saved: 7

**FIGURE 3.23 SUMMARY SAVE REPORT (first & last pages)**

Monday's Backup BACKUP BACKUP-A01 Monday 06/07/92 08.50

---

Volumes saved Volume Unit Volume Unit Volume Unit Volume Unit  
SYSRES N01 SYSDEV N02 PSDATA N03 PKTEST N04  
TEPROG I12 BWPROG I14 BWSYSI I15 BWORK I16

**FIGURE 3.25 LIST REPORT**

Monday's Backup BACKUP BACKUP-A01 Monday 06/07/92 08.50

Volumes saved Volume Unit Size Volume Unit Size Volume Unit Size Volume Unit Size
SYSRES N01 2864.8K SYSDEV N02 907.3K PSDATA N03 1370.5K PKTEST N04 929.3K
TEPROG I12 374.6K BWPROG I14 781.2K BWSYSI I15 726.2K BWWORK I16 16.5K

Save SYSRES (V7.0F GLOBAL SYSTEM MANAGER VOLUME ) on N01 to tape BACKUP-A01 started at 08.52 Open files? N Staged? Y

----- files -----
BAD ++5518EA +.J5IS +.J5FDC +.J5 +.J5HP +.J0 A.J5OLD =.5518 \$MONITOR
P.\$MON %.J5D \*.J5R %.UNLOAD P.\$TAP \$STARH P.\$DEB \$DBG \$.0 \$MH
P.\$MH \$MHCUS \$\$MENUS !.5518EA P.\$OV\$ S.\$HELP \$\$SWAPN P.\$CMLB1 \$RPSTA01 \$RPSTA02
P.\$PAGES P.\$DBG ERMAIN %.J5CT05 %.J5CT04 %.J5CT01 TACUS \$DIAL %.J5CT02 \$DIALX
\$\$QGN01 \$FCOMM \$DIALS P.QG \$.800 B.1630 S.1630 \$.1630 %.J5CT03 +J5NMO\*
!.J5CT01 \$\$DOM120 \*.5518PA UFILE %.J5CT06 A.J5 \$\$MPARAM \*.5518ED #.5518 C.TEM00
S.TAPE13 S.TACUS \*.5518EB ADDIAG %.ADTEST COPY L.COPY INIT P.\$CMLB0 S.COPY
S.INIT B.COPY B.INIT \$.574 CPTST S.AJU \$\$DEBUG %.J5R \$COMWORK
Total data saved 2751.5K Subvolume size 3076.5K
Save of SYSRES on N01 to tape BACKUP-A01 finished at 08.53

Save SYSDEV (V7.0 GLOBAL COBOL PROGRAMMING KIT PART 1 ) on N02 to tape BACKUP-A01 started at 08.53 Open files? N Staged? Y

----- files -----
P.\$CMLB0 P.\$COBOL \$COMWORK \$ATRAM \$CTRAM \$JTRAM \$KTRAM \$UTRAM \$VTRAM \$ZTRAM
P.\$FORM \$\$LINK P.DM DBMAIN DBRBLD DBDUMP DBTAKE DBREORG DMSDUM C.\$MCOB
C.\$APF C.\$PAGES P.\$TAP \$.0 \$.800 \$.1630 C.\$SPEC
Total data saved 901.8K Subvolume size 1108.5K
Save of SYSDEV on N02 to tape BACKUP-A01 finished at 08.54

Save PSDATA (V7.0 GLOBAL COBOL PRODUCT SUPPORT ) on N03 to tape BACKUP-A01 started at 08.54 Open files? N Staged? Y

----- files -----
P.\$CMLB0 S.\$EHELP AG AGEDIT AGED01 AGED02 PTRANS HLPMAIN HLPRP P.DEVJOB
P.6 Z.\$COB00 Z.\$XRU00 S.AGC S.AS S.CI S.CX S.DG S.DM S.ED
S.FASM S.FX S.HL S.JA S.KT S.KJ S.KZ S.M0 S.MBL S.MJ
S.MN S.NM S.NU S.PF S.PK S.PG S.RA S.RO S.SC S.SCF
S.TD S.UH S.UZ S.XR S.XX S.YY S.ZX \$\$Dmdt 9 \$\$Dmdt 1 \$-L-DL
\$L-QG \$-L-BC \$-M-QG S.QG \$\$DMT 9 \$\$DMT 1 \$\$DMT 2 \$-L-TE \$\$Da 9 \$\$Da 1
\$\$Dmdt 2 \$\$Dnnnn9 \$\$Dnnnn1 \$\$Dmdtr9 \$\$Dmdtr1
Total data saved 1284.9K Subvolume size 1508.5K
Save of PSDATA on N03 to tape BACKUP-A01 finished at 08.55

Save PKTEST (PORTING KIT TEST PROGRAMS ) on N04 to tape BACKUP-A01 started at 08.55 Open files? N Staged? Y

----- files -----
PKTEST P.PK P.PK1 P.PK2 P.PK3 P.PK4 P.PK5 P.PK6 P.PKG P.IASM
Total data saved 924.3K Subvolume size 2052.5K
Save of PKTEST on N04 to tape BACKUP-A01 finished at 08.56

Save TEPROG ( ) on I12 to tape BACKUP-A01 started at 08.56 Open files? Y Staged? N

----- files -----
CPTAPE P.\$TAPE \$TAPE TACUS \$tmdt S.TJOB \$tTEST TJOB
Total data saved 369.6K Subvolume size 500.5K
Save of TEPROG on I12 to tape BACKUP-A01 finished at 08.57

Save of BWPROG on I14 to tape BACKUP-A01 aborted because files were inaccessible

FIGURE 3.24 FULL SAVE PAGE 1

Monday's Backup BACKUP BACKUP-A01 Monday 06/07/92 08.50

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Save BWSYSI ( ) on I15 to tape BACKUP-A01 started at 08.57 Open files? N Staged? N  
----- files -----  
-----

BW\$\$LOCK W.PARAMS W.INDEXI MTENV6.0 MTEMV7.0 MTEN-REP MTEN-TAG MTEN-PIX MTEPV7.0  
Total data saved 721.2K Subvolume size 1028.5K  
Save of BWSYSI on I15 to tape BACKUP-A01 finished at 08.59

Save BWORK ( ) on I16 to tape BACKUP-A01 started at 08.59 Open files? N Staged? N  
----- files -----  
-----

Total data saved 11.5K Subvolume size 500.5K  
Save of BWORK on I16 to tape BACKUP-A01 finished at 08.59

Backup completed at 14.22 Number of tapes used: 1  
Units specified in save set: 8 Units actually saved: 7

Monday's Backup BACKUP BACKUP-A01 Monday 06/07/92 08.50

Volumes saved Volume Unit Volume Unit Volume Unit Volume Unit
SYSRES N01 SYSDEV N02 PSDATA N03 PKTEST N04
TEPROG I12 BWPROG I14 BWSYSI I15 BWORK I16

Subvolume SYSRES (V7.0F GLOBAL SYSTEM MANAGER VOLUME ) saved from unit N01 Staged: Y
Sequence: 1
Total data saved 2817536 Subvolume size 3150336 Directory size 11776 Total of 79
files (maximum allowed 250)

File Created Type Capacity Spare File Created Type Capacity Spare File Created Type
Capacity Spare
BAD 22/05/92 PL 776432 2% ++5518EA 03/06/92 IN 7974 0% +.J5IS 21/11/91 MN 1946 0%
+.J5FDC 30/12/90 MN 4018 0% +.J5 13/02/92 MN 50556 0% +.J5HP 10/10/91 MN 3718 0%
+.J0 12/02/92 MN 61564 0% A.J5OLD 11/10/90 IS 37184 0% =.5518 01/01/91 PL 24830 0%
\$MONITOR 10/02/92 MN 12214 0% P.\$MON 12/02/92 PL 21898 0% %.J5D 01/02/90 MN 210 0%
\*.J5R 01/02/90 PL 936 0% %.UNLOAD 01/02/90 PL 3512 0% P.\$TAP 12/02/92 PL 22374 1%
\$STARH 10/02/92 PL 1202 0% P.\$DEB 12/02/92 PL 86564 0% \$DBG 01/01/91 PL 1146 0%
\$.0 17/12/91 PL 932 0% \$MH 12/02/92 PL 26756 0% P.\$MH 12/02/92 PL 55678 0%
\$MHCUS 12/02/92 PL 19356 0% \$\$MENUS 13/07/92 VL 48554 79% !.5518EA 13/02/92 IN 5962
0%
P.\$OV\$ 12/02/92 PL 97880 0% S.\$HELP 17/12/91 TF 92852 0% \$\$\$SWAPN 15/07/92 SW 4608 0%
P.\$CMLB1 22/05/92 PL 5740 44% \$RPSTA01 17/12/91 SY 20880 0% \$RPSTA02 17/12/91 SY
20880 0%
P.\$PAGES 12/02/92 PL 12260 0% P.\$DBG 01/01/91 PL 12640 0% ERMAIN 10/02/92 PL 28066
0%
%.J5CT05 29/01/92 PL 4296 0% %.J5CT04 29/06/92 PL 4396 0% %.J5CT01 01/02/90 MN 4770
0%
TACUS 10/06/92 PL 10950 0% \$DIAL 01/06/92 PL 32104 0% %.J5CT02 01/02/90 MN 2328 0%
\$DIALX 01/06/92 PL 752 0% \$\$QGN01 27/02/92 RS 16 0% \$FCOMM 01/06/92 PL 1710 0%
\$DIALS 01/10/91 PL 32028 0% P.QG 01/06/92 PL 32670 0% \$.800 01/06/92 PL 963 0%
B.1630 30/08/90 TF 1841 0% S.1630 10/03/92 TF 1939 0% \$.1630 10/03/92 PL 2095 0%
%.J5CT03 03/06/92 PL 4330 0% +J5NMO\* 23/06/90 MN 19748 0% !.J5CT01 02/04/92 MN 4918
0%
\$\$DOM120 20/05/92 RS 4340 0% \*.5518PA 09/04/92 IN 7716 0% UFILE 27/02/91 PL 32144 0%
%.J5CT06 23/04/92 MN 96 0% A.J5 10/01/91 IS 40000 6% \$\$MPARAM 01/01/91 VL 128 0%
\*.5518ED 12/05/92 IN 7974 0% #.5518 21/11/91 BE 26850 0% C.TEM00 25/10/91 VL 647 0%
S.TAPE13 14/04/92 TF 12489 0% S.TACUS 07/02/92 TF 8653 0% \*.5518EB 12/02/92 IN 6040
0%
ADDIAG 31/10/90 PL 8457 0% %.ADTEST 31/10/90 MN 884 0% COPY 20/05/92 PL 3384 0%
L.COPY 20/05/92 RS 2350 0% INIT 20/05/92 PL 3452 0% P.\$CMLB0 22/05/92 PL 776432 2%
S.COPY 20/05/92 TF 764 0% S.INIT 20/05/92 TF 1222 0% B.COPY 20/05/92 TF 769 0%
B.INIT 20/05/92 TF 1390 0% \$.574 03/06/92 PL 1541 0% CPTEST 23/05/92 PL 3258 0%
S.AJU 05/06/92 TF 21 0% \$\$DEBUG 25/06/92 DL 92000 98% %.J5R 09/06/92 PL 942 0%
\$COMWORK 10/07/92 CW 10240 0%

Subvolume SYSDEV (V7.0 GLOBAL COBOL PROGRAMMING KIT PART 1 ) saved from unit N02
Staged: Y Sequence: 2
Total data saved 923460 Subvolume size 1135104 Directory size 11776 Total of 27
files (maximum allowed 250)

File Created Type Capacity Spare File Created Type Capacity Spare File Created Type
Capacity Spare
P.\$CMLB0 01/01/91 PL 176738 0% P.\$COBOL 01/01/91 PL 86048 0% \$COMWORK 01/01/91 CW
10240 0%
\$ATRAM 20/09/87 PL 3590 0% \$CTRAM 14/09/89 PL 74 0% \$JTRAM 20/09/87 PL 3590 0%
\$KTRAM 20/09/87 PL 2442 0% \$UTRAM 21/02/89 PL 74 0% \$VTRAM 24/03/87 PL 4156 0%
\$ZTRAM 24/05/85 PL 2500 0% P.\$FORM 01/01/91 PL 87488 0% \$\$LINK 22/05/92 RS 110 70%
P.DM 01/01/91 PL 142868 0% DBMAIN 01/01/91 PL 8524 0% DBRBLD 01/01/91 PL 1618 0%
DBDUMP 01/01/91 PL 29748 0% DBTAKE 01/01/91 PL 30044 0% DBREORG 01/01/91 PL 13598 0%
DMSDUM 01/01/91 PL 8070 0% C.\$MCOB 01/01/91 VL 66804 0% C.\$APF 01/01/91 VL 136890 0%

FIGURE 3.26 SCAN

Monday's Backup BACKUP BACKUP-A01 Monday 06/07/92 08.50

C.\$PAGES 01/01/91 VL 6171 0% P.\$TAP 12/02/92 PL 22374 1% \$.0 17/12/91 PL 932 0%  
\$.800 01/10/91 PL 963 0% \$.1630 10/03/92 PL 2095 0% C.\$SPEC 01/01/91 VL 56132 0%

Subvolume PSDATA (V7.0 GLOBAL COBOL PRODUCT SUPPORT ) saved from unit N03 Staged: Y  
Sequence: 3  
Total data saved 1315780 Subvolume size 1544704 Directory size 11776 Total of 65  
files (maximum allowed 250)

File Created Type Capacity Spare File Created Type Capacity Spare File Created Type  
Capacity Spare  
P.\$CMLB0 22/05/92 PL 416216 0% S.\$EHELP 01/01/91 TF 10550 0% AG 01/01/91 PL 13608 0%  
AGEDIT 01/01/91 PL 4384 0% AGED01 01/01/91 PL 3752 0% AGED02 01/01/91 PL 23984 0%  
PTRANS 01/01/91 PL 13648 0% HLPMAIN 01/01/91 PL 18710 0% HLP RP 01/01/91 PL 4564 0%  
P.DEVJOB 01/06/92 PL 205904 1% P.6 01/01/91 PL 35630 0% Z.\$COB00 01/10/89 RS 1888 0%  
Z.\$XRU00 01/10/89 RS 1298 0% S.AGC 01/01/91 TF 9486 0% S.AS 01/01/91 TF 20733 0%  
S.CI 01/01/91 TF 16577 0% S.CX 01/01/91 TF 24024 0% S.DG 01/01/91 TF 26280 0%  
S.DM 01/01/91 TF 23944 0% S.ED 01/01/91 TF 4055 0% S.FASM 01/01/91 TF 20265 0%  
S.FX 01/01/91 TF 30238 0% S.HL 01/01/91 TF 2812 0% S.JA 01/01/91 TF 2935 0%  
S.KT 01/01/91 TF 2711 0% S.KJ 01/01/91 TF 8530 0% S.KZ 01/01/91 TF 7802 0%  
S.M0 01/01/91 TF 10877 0% S.MBL 01/01/91 TF 2106 0% S.MJ 01/01/91 TF 5663 0%  
S.MN 01/01/91 TF 36792 0% S.NM 01/01/91 TF 1327 0% S.NU 01/01/91 TF 32647 0%  
S.PF 01/01/91 TF 1765 0% S.PK 01/01/91 TF 4388 0% S.PG 01/01/91 TF 2902 0%  
S.RA 01/01/91 TF 11591 0% S.RO 01/01/91 TF 16731 0% S.SC 01/01/91 TF 13104 0%  
S.SCF 01/01/91 TF 2501 0% S.TD 17/06/92 TF 23742 0% S.UH 01/01/91 TF 1572 0%  
S.UZ 01/01/91 TF 11016 0% S.XR 01/01/91 TF 1677 0% S.XX 01/05/92 TF 83461 0%  
S.YY 01/01/91 TF 1688 0% S.ZX 01/01/91 TF 7410 0% \$\$Dmdt 9 22/05/92 VL 2500 0%  
\$\$Dmdt 1 22/05/92 VL 2500 0% \$-L-DL 01/06/92 PL 3026 0% \$-L-QG 01/06/92 PL 3178 0%  
\$-L-BC 01/06/92 PL 3014 0% \$-M-QG 01/06/92 PL 2982 0% S.QG 01/06/92 TF 17023 0%  
\$\$DMT 9 01/06/92 VL 2500 0% \$\$DMT 1 01/06/92 VL 2500 0% \$\$DMT 2 27/05/92 VL 2500 0%  
\$-L-TE 12/02/92 PL 3636 0% \$\$Da 9 04/06/92 VL 2500 0% \$\$Da 1 04/06/92 VL 2500 0%  
\$\$Dmdt 2 09/06/92 VL 2500 0% \$\$Dnnnn9 11/06/92 VL 2500 0% \$\$Dnnnn1 11/06/92 VL 2500  
0%  
\$\$Dmdtr9 12/06/92 VL 2500 0% \$\$Dmdtr1 12/06/92 VL 2500 0%

Subvolume PKTEST (PORTING KIT TEST PROGRAMS ) saved from unit N04 Staged: Y  
Sequence: 4  
Total data saved 946484 Subvolume size 2101760 Directory size 11776 Total of 10  
files (maximum allowed 250)

File Created Type Capacity Spare File Created Type Capacity Spare File Created Type  
Capacity Spare  
PKTEST 10/02/90 PL 8289 0% P.PK 17/12/91 PL 129998 1% P.PK1 15/06/90 PL 37044 0%  
P.PK2 23/09/90 PL 230722 1% P.PK3 01/06/91 PL 162668 3% P.PK4 01/06/91 PL 95512 4%  
P.PK5 12/10/90 PL 37544 2% P.PK6 08/02/92 PL 52494 0% P.PKG 28/12/88 PL 41134 0%  
P.IASM 14/10/90 PL 137012 0%

Subvolume TEPROG ( ) saved from unit I12 Staged: N Sequence: 5  
Total data saved 378498 Subvolume size 512512 Directory size 11776 Total of 8 files  
(maximum allowed 250)

File Created Type Capacity Spare File Created Type Capacity Spare File Created Type  
Capacity Spare  
CPTAPE 08/04/92 PL 3148 0% P.\$TAPE 01/05/92 PL 175904 0% \$TAPE 01/05/92 PL 16008 0%  
TACUS 01/05/92 PL 6218 0% \$tmdt 07/07/92 SY 130 0% S.TJOB 12/06/92 TF 72 0%  
\$tTEST 27/04/92 SY 90 0% TJOB 12/06/92 PL 2874 0%

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Subvolume BWSYSI ( ) saved from unit I15 Staged: N Sequence: 7  
Total data saved 738560 Subvolume size 1053184 Directory size 11776 Total of 9 files  
(maximum allowed 250)

File	Created	Type	Capacity	Spare	File	Created	Type	Capacity	Spare	File	Created	Type	Capacity	Spare
BW\$\$LOCK	22/09/87	RS	1	100%	W.PARAMS	09/11/88	RS	54528	0%	W.INDEXI	09/07/92	IS	64308	93%
MTENV6.0	31/10/89	WP	54016	0%	MTEMV7.0	15/07/92	WP	148224	0%	MTEN-REP	20/10/89	WP	3584	0%
MTEN-TAG	24/10/89	WP	2048	0%	MTEN-PIX	08/07/92	WP	10752	0%	MTEPV7.0	15/07/92	WP	44800	0%

Subvolume BWWORK ( ) saved from unit I16 Staged: N Sequence: 8  
Total data saved 11776 Subvolume size 512512 Directory size 11776 Total of 0 files  
(maximum allowed 250)

File	Created	Type	Capacity	Spare	File	Created	Type	Capacity	Spare	File	Created	Type	Capacity	Spare

End of tape.